Investor Risk Profiling: An Enhanced Behavioral Finance Perspective and Technique for Identifying Client Risk Profiles

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DECLARATION

This work has not previously been accepted in substance for any degree and is not being concurrently submitted in candidature for any degree.

Signed: Salem Kattoura

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STATEMENT 1

This thesis is the result of my own investigations, except where otherwise stated. Where correction services have been used the extent and nature of the correction is clearly marked in a footnote(s). Other sources are acknowledged by footnotes giving explicit references.   A bibliography is appended.

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Abstract

The ramifications of financial crises and the complex structures of financial products have enabled the hand of regulation to extend beyond the security of investors and into the suitability of the investments proposed by financial institutions and advisors. This process, assessed through a risk profiling questionnaire, carries an opportunity to choose the optimal financial product based on the risk tolerance of the investor and thereafter retain the clients and help their investments grow. In this paper, we argue that the traditional risk profiling questionnaire requires an overhaul through the lens of behavioral finance which offers a more rigorous understanding of the risk appetite of the investor. Through independent samples t test, we measure the performance of two groups of investors over time; one with behavioral finance questions and one offered the traditional risk profiling questionnaire. A Pearson Chi Square test is also conducted to assess the relationship between the risk profile rating and the financial return of the investor groups. The methodology is supported with a review of the yield performance and client retention of the group of investors who had answered behavioral finance questions. Moreover, a qualitative approach was also adopted whereby interviews with financial advisors were conducted to determine their perspectives. Our findings indicate a better performance through financial returns for investors who answered behavioral finance questions and a higher retention for that group of investors with their financial advisor(s). These findings reinforce our hypothesis on the inclusion of behavioral finance questions into risk profiling and its impact on the suitability of investments. The study proposes recommendations to improve the suitability of investments process through risk profiling. The study also proposes further research to be conducted in the field of behavioral finance and risk, as a solution to the limitations offered by traditional financial behavior theories.

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Chapter I: Overview & Purpose

1.1 Introduction

Risk is often associated with a return. The value of the return can be determined extrinsically by markets and monetary value, but risk is also intrinsic; how much can one bear to achieve or attain a goal? What are they willing to jeopardize in order to attain a goal and most importantly is the reward worth the risk? To answer the questions on risk and return, one can look at the solutions the financial institutions and advisors provide: yields, dividends, return on investment and other financial products and instruments that provide a return commensurate with the investor's capital investment and their financial goals and strategy. It takes a good amount of financial planning by investors, financial advisors, managers, firms, and the financial sector as a whole to create a solid financial plan that can withstand market volatility and still provide a decent earning. Financial planning is at the heart of risk mitigation because it allows market participants to develop mitigation strategies such as diversification or asset allocation structures that help investors spread risk instead of compiling it. Financial planning is taught by regulators, universities, and companies but experience is probably the best teacher; one can learn how to forecast, read trends, analyze patterns but cannot know how to adequately plan or develop financial solutions without having seen the effects of poor or successful planning. Financial advisors build years of experience to be better able to anticipate, mitigate, create, and provide sound investment strategies and by doing so they play a major role in helping individual and corporate investors in managing their own expectation. Investing is at the end of the day is also an impulse to participate in money making ventures and many investors go into certain financial schemes based on their optimism, poor understanding of financial products, inability to take risk or taking risk too loosely, etc. The role of the financial advisor is then to curb the investors' appetite when it is not adequate with their financial health and re-center them on the right course. Every time a financial advisor gives some advice to their client(s) they are helping them manage risk and not avoid it, but that risk is in flux, and it is never constant because it is shaped by both internal and external factors. The risk and return tradeoff is at the core of the financial world, managing both aspects of risk and return have very different calculations and considerations (Silitch,2019). In the narrow sense, this transaction between risk and return is subject to various financial considerations and consequently, the financial and banking industry have implemented a risk profiling process to establish the capacity and tolerance of investors to invest in specific products but more broadly so that investors understand what they are investing in as well. So how does risk profiling work? What are the layers and levers behind this process, and most importantly is it reliable?

To start understanding how risk profiling came to be, the school of classical liberalism, a school of thought closely associated with economic liberalization, offers a good start. Classical liberalism argues, much like the neo-classical doctrine, that reducing the severity of government regulations and restrictions in an exchange for greater participation by private entities is more favorable for economic liberalization and consequently economic development. In that vein, the world of banking and investments continues to evolve at high speeds because customers have become more demanding and more knowledgeable of their choices and preferences, but also because governments have loosened regulations in exchange for greater participation by private sectors. Consumer power increased while switching costs have continued to decline which has made it more comfortable for institutional and individual investors to change financial service providers and products. Customers are becoming more interested in "financial wellness solutions" and banks have realized they are unable to sell wealth management products without customer loyalty which translates directly into relationships with customers that include feelings of trust and respect.

Today's investment firms use different aspects of management, ranging from strategic management to risk diversification schemes and quality investments, and as companies expand, they initiate different strategies following various management approaches and styles. The most valuable resource of a company has always been its information capacity. In this modern era where knowledge matters, managers are beginning to realize the depth and effectiveness of communicating crucial information. From prior experiences, analysis and interpretations, scholars and managers have developed the managerial process by applying theories that were well established in the roots of organizational behavior and quality practices. These theories have demonstrated the power of information and its effects on clients, markets, and public sectors (Hunt. 2016) in addition to how information move along the organization and how it affects strategies. Without the existence of predetermined set of rules governing and regulating capital flows as well as access to capital by banks, financial intermediaries can take unnecessary risks beyond their capacities and that of their clients in open markets. This creates a situation where firms and banks are more open to financial volatility, indebtedness, and non-cooperative behavior, which helps create monopolies (Ulici, 2012). Moreover, free market mechanisms in developed countries make it easier for financial agents and investors to have access to information. In developing countries, which are liberalized, an asymmetry of information is created because of an inefficient allocation of resources and unequal access to information (Ishii and Habermaier, 2002).

The concern of organizations today is grounded in the practicalities and ramifications of the financial crises that hit the European and American economies from 2007 onwards; what has become a matter of principle is how organizations divulge information and manage associated risks by transmitting transparent information and promoting fair market participation and practices. Risk management has gained notoriety in academia for being a broad subject that correlates with politics, economics, social studies, and a variety of fields in different industries and sectors. Since most of risk management's topics are related to identification and mitigation, they also carry a vision and strategy that have been extensively formulated to meet the demands of firms on the long run. It had become a necessity for all types of companies including financial institutions and banking industries to update their processes by linking strategy and decision making within their risk management approach. In doing so, they ensure that they maintain a well-rounded managerial grip, an efficient execution of their strategies through binding decision making along the organization and empowering credible portfolio managers that represent their companies. Banking, for the most part, has been the field of many innovations related to the financial sector, from loans, investments, savings, instant transactions to derivatives, futures, options, trading, and financing. While these innovations grew and evolved over time, their evolution came at the heel of a growing and diversified global economy where individuals and businesses need faster transactions and where banking requires complex operations which entail opportunities for banks and their clients but also associated risks.

Risk mitigation in the financial industry has been central to the proper functioning and operationality of the industry (Härle, et al., 2015) with many processes and procedures providing a regulatory framework for banks and financial companies to protect their assets and those of their clients from the inherent risks of doing business, but also of being open to diversify their investment channels across different sectors and industries. At the wake of the global financial crisis in the late 2000's, the global economy had to reshape it's thinking around financial risk management (Karp, et al., 2018). Many of the lessons learned from the global financial crisis that started in 2008, eventually yielded stronger governance, increased regulatory control and broader oversights by banks, financial institutions and governmental agencies and authorities. The new landscape of financial risk management post-2008, brought on several transformations that further scrutinized the operational, transactional, and regulatory aspects of investments and banking. Examples of these transformations in risk management could be seen through a proactive risk management, heightened expectations by boards of directors on governance and compliance, emphasis on culture at senior management levels, rewarding compliance, centralized control

functions, use of technology, enhanced disclosures and whistleblower incentives and controls (Karp, et al., 2018). Within that reshaped landscape, risk mitigation is one of the many strategies employed by financial institutions to provide oversight and regulate themselves while also expecting a tougher regulatory environment from the public and from governmental agencies.

The paradigm shift in risk management and mitigation could point to the emerging trends in the financial industry. In a paper authored by McKinsey & Company (Härle, et al., 2015) on the future of risk in bank management, a conclusion was drawn that bank risk management will look very different in 2025 with the advent of financial technology, analytics, de-biased decision making and personalized customer expectations and experience. Risk management and mitigation, however, remains a decisive factor in the profitability of banks and financial institutions in the future. While the construct of high risk and high return has been challenged by several researchers (see Baker, 2011; Campbell, 1987), it is still a central tenant in pricing and offering financial products to investors (Guo & Neely, 2008). Investors and customers in general agree that any investment or banking product carries a degree of risk, and within that understanding, banks, financial advisors, traders, regulators, and investors operate in an environment that may be ambiguous and without safe-proof measures. Nonetheless, it is agreed that investments carry risk and that, for the average investor or customer, that risk is dependent on their ability to withstand it in the hope of a higher return. Knowing to which extent one can bear financial risks, can predict the outcome or the return: not quite. Some researchers and financial pundits do not believe that there is a linear and positive relationship between risk and return (Rossi & Timmermann, 2009) but that does not discount the importance of assessing risk in the financial sectors, both for investors and financial institutions. Under a tightened regulatory environment, risk assessment becomes a significant factor in choosing which investment products and portfolios to choose for investors, but also for fund managers and helps them make the right investments for their clients.

Private equity firms have been at the forefront of risk assessment due to their high exposure to volatility (Buchner, 2014). They remain a solid alternative to traditional financial products and asset classes, offering higher returns due to their participation in start-ups, venture capital and their market positioning which makes them an attractive financing alternative. Nonetheless, private equity investments carry higher risks and risk is assessed and measured differently in this asset class when compared to public markets due to several factors: funding risk (*change in the value of the asset*), liquidity risk (*loss of assets due to issuer's credit events*) , market risk (*possibility of capital withdrawal by investors at their own choosing*) and capital risk (*ability to cover future liabilities*). These factors change the underlying nature of risk for institutional investors and for

fund managers who are often managing the investment decisions in private equity (Diller; Jäckel, 2015).

	PUBLIC MARKETS	PRIVATE MARKETS	
Market Risk	Change in value/price	Difficult as no market prices exist. The closest estimation might be "Interim NAV volatility"	**Market/NAV Volatility Risk (short & mid-term)**
Credit Risk	Loss of assets due to issuer's credit events	Credit risk is only part of risk in private equity and is more akin to any risks associated with the GP's abilities and the various "external" factors which can impact a PE investment. Credit risk models overestimate risks as they only reflect downside and not the large potential upside in private equity	**Capital Risk (mid- & long term)**
Liquidity Risk	Redemption possibility; liquidity when selling assets	No redemption possibility, but still relatively small and inefficient secondary market exists	**Liquidity Risk**
Funding Risk	Investors not able to finance future liabilities	Risk that the legal obligation to pay commitments cannot be funded by the investor	**Funding Risk**

Figure 1: Risk Comparison in Public & Private Markets
(Diller; Jäckel, 2015)

What can be concluded or implied from the research and financial reports on inherent risks in public and private markets points to the risk appetite of investors and financial advisors. For example, institutional investors like pension funds find private equity investments to yield more attractive results given the long-term hold of their investment and capital until maturity. However, investment decisions in private equity are not as straightforward due to the volatility of private markets and the intrinsic risks associated with long term investments and private equity funding structures. In that framework, investors and portfolio managers must be able to both assess the risks of entering into investments based on risk capacity and appetite. That is exactly where risk profiling becomes a primordial, if not the most decisive factor for market participation by investors, equity managers and banks; the whole financial industry is affected by these factors.

Even before assessing or attempting to understand how and why financial institutions use risk factors and determinants to attract investors, and ramp up their profits, it is important to understand how risk has evolved. In his extract on the Evolution of Risk, Silitch (2019), broadly discussed the evolution of risk and its management as a changing model based, not on past and existing business models, but rather cyclical and structural changes in credit management and financial markets. The evolution of risk, has been correlated with the evolution of credit from local to global; adding to that the many layers of financial technologies, products and regulatory frameworks that arised (Silitch, 2019). While explaining the different transitions that credit and commerce have gone through, so did risk management in attempting to alleviate losses, protect and hedge savings and earnings and rewarding the disruptions that were brought on by

technological innovations. The 1990's brought on a data challenge, when looking at the mertics of rating agencies of the time; the access to financial data was not sufficient to understand the outcomes of investment choices and therefore the associated risks. Into the 2000's and the 2010's, structured credit had been dominating and with it, an existing but already weak risk model: one that followed the evaluation of Credit Rating Agencies (CRAs).
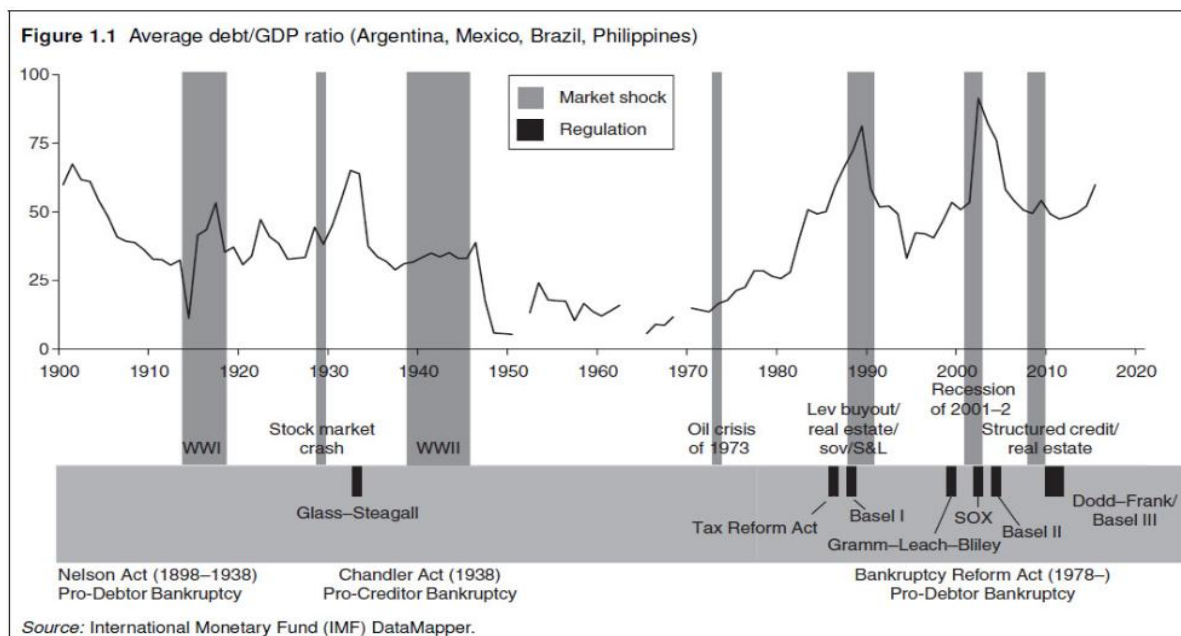
Figure 2:Average debt/GDP Ratio

Source: Extracted from Silitch (2019)

The changes in technology, in regulation, in financial asset classes, in investment banking and hedge funds, did not permeate the CRA space; and therefore these agencies have been dubbed as "key enablers" of the late 2000's financial crisis (Kiesel, 2019). Hence, with new ways of payments, new models of transactions, emerging financial volatility (e.g. Collatarized Debt Obligations, low quality underwriting of mortgages, emerging debt, etc.) and rapidly changing disruptions and business models, risk and its management are shaping the activities and direction of financial markets. Nowadays, the emergence of alternative and digital currencies, the blockchain and Non-fungible tokens, etc. the space for disruption is superlative and the risks are substantial. The versatility of investment options on the markets are numerous and this continues to present opportunities but equally a problem to investors and portfolio managers: how to better advise, how to better invest, how to better protect against volatility. So where does the risk paradigm fall in these multilayered factors? How do we know what is eventually a riskier investment? How do we channel our risk and reward behaviors? How do we profile risk? Let's find out. These questions provide an opening to risk profiling in investments settings: managing

the risk reward trade-off is the foundation of successful and responsible investing (Cheng, 2022). Financial advisors have an important role to advise their clients on the best use of their capital to generate profits and sustain wealth; without a measured and reasoned risk profiling process for investors, any company or fund manager cannot hope to provide healthy returns to their clients on the long run and aligining their vision with their resources (McCrae, 2006). Risk has evolved considerably as stated by the research conducted by Laker (2007) in the sense that it has become multidimensional from credit risk to liquidity risk to management risk, etc. and all these risks require different risk management solutions from a financial advisory standpoint. Consequently, when financial advise is provided it cannot be adopt a holistic approach but rather a more focused approach, especially when working with investors. Risk profiling for investors is significantly different than credit risk or corporate risk and that is why this study attempts to frame risk profiling and management for investors by exploring the tools and techniques of doing so and proposing an alternative method rooted in behavioral finance.

1.2 Need for the Study

Risk profiling is central to credit lending institutions, credit management, wealth management, investment banking and all types of financial products. A majority of banks and financial institutions put an emphasis on investors, and even depositors' risk profiles, not only because of regulations and policies, but also for the sake of the company and the investors alike. According to the Financial Industry Regulatory Authority (FINRA) brokers and related associated entities must "*have a reasonable basis to believe that a recommended transaction or investment strategy involving a security or securities is suitable for the customer, based on the information obtained through the reasonable diligence of the [firm] or associated person to ascertain the customer's investment profile.*" (FINRA, 2015). This due diligence requirements enshrines the suitability process for investors and helps financial institutions determine the investors' risk profiles which are nowadays imposed legally and are not merely considered a value driven service but rather, a due diligent component. On one hand, you have investors who need that risk profiling service to determine their own financial behavior, tolerance, and appetite. On the other hand, companies and managers need it to know how to yield value but maximize profits (and commissions) too.

Risk profiling is still in its early stages of development if we consider the evolution of risk management. It still is a mix of art and science; many companies and managers have different approaches of assessing a risk profile. Nonetheless, and regardless of the approach, the prognosis of a risk profile helps determine the suitable investment in an asset class. It is establishing how

much loss an investor is comfortable incurring and it is defined by two elements: risk capacity and risk attitude, however, these two elements do not go hand in hand. For example, an investor might have a high-risk capacity due to their large wealth but might have a low-risk appetite as they prefer safe investments and have a feeling of "better safe than sorry". Risk appetite is defined by the maximum someone is willing to risk in order to achieve a reward. In finance, financial advisors have mostly always used the traditional finance theories through a questionnaire that is important in identifying how much risk an investor is willing to take given his personal circumstances, professional experience, and financial goals. However, it is argued that these questionnaires fail to capture the behavioral finance aspects in determining the risk profiles of each investor (Hubble, et al., 2012). According to the Chartered Financial Analyst (CFA) Institute, the industry suffers from many ill-advised solutions to measure, create and thereby assess risk profiles (Davies, 2017). The literature on risk profiling and the instruments to measure it differs on the validity of those instruments, mainly questionnaires.

While risk profiling questionnaires remain the most reliable instruments to capture the information of investors and clients, they are not being able to accurately or properly assess risk profiles because of several factors related to the framework on risk profiling and behavioral finance. It is therefore important to explore this topic further and delve deeper into the constructs of risk tolerance, appetite, capacity, and the range of concepts that behavioral finance can produce and contribute to the study and assessment of risk profiling. Risk is multidimensional as it cuts across many sectors, but more so in finance where investments are shaped based on economic, sociological, political, industrial, biological knowledge and more so into every field and sectors where an activity is taking place. Understanding how investors perceive risk and how to better understand it, as a financial advisor, is the ultimate tool a financial firm can have when it advises its clients. Therefore, this study is important because it allows financial advisors and investors to better equip and prepare themselves before venturing into investments or contributing to an asset class. It is important because it can serve as a reference for financial firms and advisors to use empirically tested tools that help them recognize the risk thresholds of investors; what they are comfortable with and what they are not and what they do not know in terms of financial planning and capability. By integrating more behavioral finance and psychometrics in the assessment of investors, financial advisors and investors can better understand the risks, the rewards and their capacities and capabilities in the process. Eventually this leads to better symmetry of information, fair market transactions and more transparent commerce and exchange of goods and services. But perhaps the most important contribution this study has is the effect on investors when they are

provided with suitable investments based on their risk profiles but also based on their own aspirations, capabilities, and personalities. It is quite important that this is made visible for the financial world with many financial and portfolio managers only looking at the yield as a performance indicator, one can lose sight of how vulnerable investors are when it comes to choosing their own interest whether financially, psychologically, or both.

1.3 Purpose of the Study

Given the gap in the literature regarding the assessment of investment risk profiles, this paper will contribute to the field of risk profiling in investments, by applying behavioral finance biases and concepts to determine the risk profile of investors and clients in financial institutions. There are several limitations to the current way financial advisors determine, assess, and create a risk profile; by using behavioral finance to bridge and piece out those methods and approaches together. In that context, this study aims to provide a theoretical foundation from which the risk profiling system currently in use can be re-evaluated and adapted to consider the current research. Qualitative and quantitative methods will be conducted to demonstrate the effect of having behavioral finance aspects in determining risk profiles of investors, and to show the added value that this approach could bring to both investors and their brokers. Moreover, and as a direct outcome of this study, we can also assess client retention ratio as a means to determine whether there exists a relationship between the use of behavioral finance in determining risk profiles with client retention in financial institutions. This research will contribute to new techniques for investors risk profiling. These techniques will be adopting the behavioral finance lens to better identify, determine, and assess risk profiles. Therefore, this paper will attempt to use behavioral finance theories to be able to answer whether their use can predict a better risk profile for different investors that better suits and caters their needs and expectations. The purpose of the study can also touch upon the asset allocation strategy and the behavior of portfolio managers when designing asset allocation and investment strategies for their clients because much of the study is centered on the risk profile rating and the consequences of the rating score. This particular point of interest is an important part of the risk profiling because it provides a comprehensive framework for investors and portfolio managers when structuring and creating portfolios and discussing investment options and strategies through the lens of a risk profiling approach and after having conducted a behavioral based questionnaire. Evidently, such knowledge provides the financial industry and behavioral finance psychologists with tools to upgrade existing knowledge and concrete tool and guide to improve the risk profiling process from a regulatory point of view but also from a investor or customer relationship perspective, noting that such a relationship

emphasizes trust, knowledge, and understanding of the investor and improves the ability of financial advisors to provide better financial advise that helps retain and attract investors.

1.4 Defining the Scope and Terminology of the Study

This study attempts to assess whether there is a relationship between risk profiling and behavioral finance. How does this relationship work, what is the degree of the correlation if it exists, and what are its implications on financial performance and client retention? While linking both concepts of risk profiling and behavioral can be broad, this study is focusing on two main outcomes: does the introduction of behavioral finance into the assessment of a risk profile predict a better outcome for investors and financial institutions? And what effects does this mix have on client retention? By narrowing the scope of this study, we are better equipped to focus on the areas directly related to our research: risk profiling, behavioral finance, asset allocation, and client retention.

What is meant by risk profiling in this study is specifically related to investors' risk profiles. Risk profiling for investors, in this study, is defined broadly as the evaluation of an individual's willing and ability to take risk, financial risk. Nonetheless, as we delve deeper into the literature, and for the purposes of this study, we emphasize on risk profiling through the lens and research of Joachim Klement (2015) as a roadmap for the shortcoming of the current risk profiling methods and approaches. Moreover, in this study, we look at behavioral finance and the concepts it provides to improve the understanding, evaluation, and appetite for risk by investors. While behavioral and cognitive theories have been intertwined in psychology (Ricciardi, 2008), through many fields including the cognitive behavioral therapy (CBT) approach, this study mainly focuses on behavioral finance theories as promulgated by the work of Kahneman & Tversky (1979) which is also rooted in the psychology of behavior and its effect on finance. The study focuses on asset allocation strategies which is explained by the Corporate Finance Institute (CFA) as "*an investment strategy in which individuals divide their investment portfolios between different diverse asset classes to minimize investment risks*" (CFI, 2022), whereby asset classes are distributed across equities, fixed income and cash and equivalents. Asset allocation is the foundational service provided by a financial advisor to investors and through which yields, and returns can be generated based on the capital the investor has invested. The factors affecting asset allocation are relatively and closely similar as those determining the risk profile: objectives, risk tolerance and time horizon (CFI, 2022). Finally, and as part of this study, it is important to track client retention as a potential consequent of the introduction of behavioral finance into risk profiling and this concept is measured and framed by the definition of Vroman & Reichheld (1996) wherein it refers to the

ability of company or product to retain and continually keep its customers or clients. In this study we use client retention as an indicator of an investor's relationship with their financial institution over time. Client retention cannot be expected positive, even when positive returns are gained because goals and objectives change, clients or investors' mindset and situations evolve and therefore it is important to understand client retention as a fluid and constantly moving dynamic but attracting the same or newer clients from one financial cycle to the next is a strong positive indicator (CFI, 2022).

Equity Risk Interest Rate Risk Currency Risk	Market Risk	Liquidity Risk	Concentration Risk
	Credit Risk	Reinvestment Risk	Inflation Risk
	Horizon Risk	Longevity Risk	Foreign Investment Risk

Figure 3: Types of Investment Risk
Source: Ontario Securities Commission

Risk, in this study, is connected to financial risk and defined as the probablity that an outcome or investment's actual gains will differ from an expected outcome or return (Financial Industry Regulatory Authority, 2022). According to Ontario Securities Commission (2022), there are 9 types of investment risks which are also relevant to the scope of this study. The first one is market risk, a risk that is closely associated with markets activitiy based on investments either declining or increasing in value due to economic development or other events that have an impact on markets. Market risk includes three subsets: Equity risk, Interest rate risk and Currency risk. Equity risk is associated with securities and shares as prices of such investments varies based on demand and supply and is interplayed in markets and stocks exchanges. Interest rate risk is associated with debt investments e.g. bonds and is the risk of losing or gaining money due to a change in the interest rates. Currency risk is associated with currencies and foreign exchanges

where the value of investments decreases or increases based on exchange rates. Another type of investment risk is the Liquidity risk which is associated with the inability of selling an investment at the same or higher price that it was purchased with and this may apply to many contexts, mainly market investments. Concentration risk is when investments are placed into one bucket, sector or segment and therefore is not spread and loss can be heightened because the investment is not diversified. Another type of investment is Credit risk which is associated with the risk that government or companies that issued bonds will not be able to repay or experience financial difficulties in repaying their obligations. Reinvestment risk is another type of risk which is associated with reinvesting capital or the principal at a lower interest rate and this applies to bonds where their interest rates drop leaving investors earning less and waiting for more time for maturity. Inflation risk is associate with cash or debt investments where the risk of loss increases when the purchasing power drops as inflation diminishes the value of the present investments. Horizon risk is a type of risk associated with an event or force majeur that happens that forces the investor of withdrawing their investments early and therefore not earning the dividends, interests or losing the opportunity cost. Longevity risk is a type of risk that can be seen frequently amongst retirees who outlive their savings. Finally, Foreign investment risk is the type of risk associate with offshore or investments made in foreign countries where for example issues like nationalization or declining national currency may occur.

Risk profiling must provide the financial advisor a detailed perspective of how to structure a portfolio based on the risk capacity, risk appetite and risk attitude of their clients. Without a proper risk profile, a financial advisor can easily overestimate his/her client's capacity, appetite and attitude (Shafi, 2011). But how to come up with a risk profiling tool or approach that is able to empirically assess the risk factors of investors is the focus of this study, because understanding risk is one thing but assessing it and determining the levels of risk is another issue altogether. At the end, financial advisors can only provide good advise based on the information and data they have on hand, it is then important to gather as much relevant, pertinent and accurate information as possible through a risk profiling approach.

Chapter II: Literature Review

2.1 Literature Review:

A. Risk Profiling

The concept of risk profiling in banking and financial institutions is not new. The closest relative of risk profiling could very well be found in the banking requirements for clients, set and imposed by financial regulatory bodies, in the United States and beyond; KYC, or what is known as Know Your Customer (or Client). The KYC regulation, or requirements, have been brought forward during the 1990's to combat money laundering and expanded after the 9/11 events in New York City (Lowe, 2021). the United States enacted the Patriot Act wherein, in title 3, financial institutions, broker-dealers, finance tech applications, and banks were required to comply with KYC directives: customer identification program and customer due diligence (Lowe, 2021). With both of these requirements, KYC became a tool for financial institutions to collect information on their clients and use that information to better know who their clients are and what are they using their deposits or investments for. Thus, the idea of risk profiling is not too far-fetched when one looks at the stringent regulations placed on financial institutions to know their clients. One can argue that while KYC started as a method to combat and prevent money laundering, trafficking and other financial crimes, the regulation itself offered many hidden benefits to financial institutions. One of the hidden benefits of KYC, is the customer risk rating: a risk rating that is either due to the customer's risk rating or because the company is exposed to high-risk clients (Comply Advantage, 2022). Notwithstanding KYC's powerful legislation and purpose, which is to fight corruption, fraud, money laundering, terrorism funding, etc., the important element of this tool or regulation is the lesson financial institutions would derive from knowing their clients. The risk rating was used primarily to identify high risks to financial institutions, but the advent of data and technology allowed these institutions to better tailor their purpose and their mission and rebrand that customer knowledge as a transparent and well-intended initiative to protect the personal interest of investors, and their revenues in the process.

Risk profiling is concerned with the character, aspirations, and capacities of an individual to achieve their financial goals but much of the profiling is also a psychological evaluation of how one reacts to risk (Kimball, et al., 2008). The literature in psychology provides a foundation into the inherent personality traits and trends that could be well found whilst conducting a risk profiling and businesses and financial advisors do use aspects of such profiling into their surveys but tend to focus heavily on the aspect of financial risk or risk tolerance. This is somewhat unfair to clients because clustering them into different ratings also means removing their unique traits and

aspirations in order to bundle them in packages and categories; it oversimplifies their choices and goals and drives businesses to put the value of the firm above that of the client which is considered dangerous in the financial sector but also plays against the interest of the firm that is providing the financial advice. Thus, the client or the investor may tend to feel dismayed by these categorizations into which they are classified and wonder whether they can find better alternatives elsewhere where more suitable investments are abound. Nonetheless, the suitability of investments is guided by the risk profiling which, at large, is a similar process across the financial industry landscape (Kimball, et al., 2008).

Suitability rules are the main drivers of risk profiling, in the United States FINRA (2015) has enacted the regulation to enable due diligence for the protection of investors. In parallel, in the European Union, the European Securities and Markets Authority (ESMA) has enacted the suitability rule in its article 25 of the Markets in Financial Instruments Derivative II (ESMA, 2014). The suitability clause requires investment firms and financial institutions to obtain necessary information on their clients' potential experience in the asset class or product they wish to invest in. Additionally, the suitability rule asserts that clients must be made aware and assessed as to their ability to bear losses as well as their risk tolerance. This is an important aspect of suitability; the notion that clients should be aware of the risk entailed but also that investment firms and portfolio managers assess their risk tolerance and risk capacity. Risk tolerance is defined as the extent of risk an investor is able to handle emotionally or psychologically, while risk capacity is the extent to which they are able to handle risk financially (Business Insider, 2020).

Through those two constructs, we can start unveiling the psychological aspect of risk and how it can influence financial decisions. While risk tolerance does measure your appetite for risk, hence it is also referred to as risk appetite, it does little to describe what your risk capacity is i.e. how much you are actually able to lose. When your risk tolerance is high, meaning that you are comfortable taking high risks for high returns, your risk capacity may not follow suit because your risk capacity or your ability to bear financial losses is low (Business Insider, 2020).
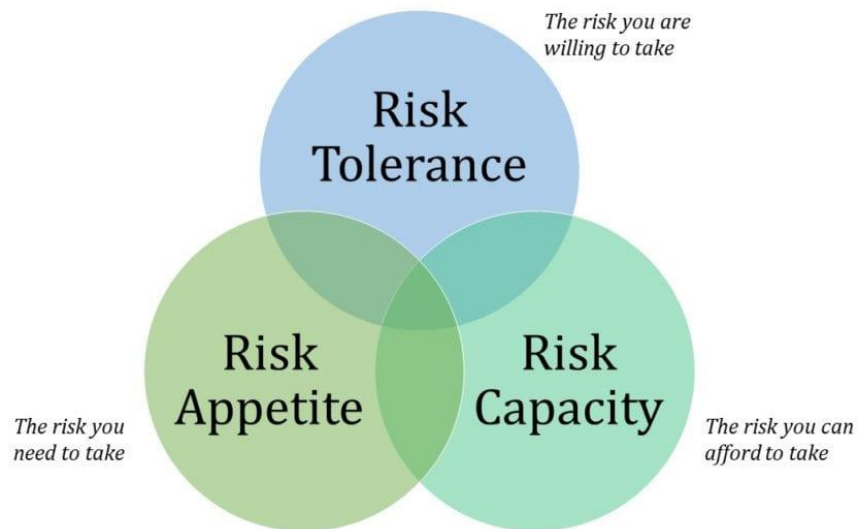
Figure 4: Dimensions of Risk

(The Trust Company, 2019)

One reason why risk capacity matters more financially, is because in real market volatility investors need to brace for longer terms to be able to withstand the bear and bull markets. Joachim Klement (2015), in his research on risk profiling, narrows the definition of risk capacity to the ability of an investor to take on financial risk while his definition of risk tolerance is bounded in the traditional definition proposed by Kogan and Wallach (1964) which is the willingness or desire of an individual to partake in an initiative, project or activity to attain a goal which is uncertain and therefore carries with it the risk of loss. Delving deeper into risk tolerance, Davies & Brooks (2014) propose a more psychological aspect of risk tolerance by defining it as a broad psychological trait inherent in an individual, allowing them to consider the trade-offs between their wealth and their future goals.

In that vein, risks for investors are not only bounded by financial factors but also by psychological ones and therefore the dimensions of risks become mlutilayered when trying to create and designate a risk profile. When trying to come up with a risk profile, many firms and managers look at socioeconomic variables which focus on the ability of the investor to bear loss or the risk capacity which is a determinant of the wealth of the investor and other factors related to their financial capacities. These variables are found in many risk profile questionnaires: investor's net worth, liquidity, capital reserves, time needed to withdraw the investment, household earnings, degree of reliance on the investment for present financial security. These questions differ from one questionnaire to the other based on the financial firm and the financial advisor but they measure relatively the same construct of investor risk capacity.

Within that context, managers and firms create risk profiles that are tradionally based on the Capital Asset Pricing Model (CAPM), according to Klement (2015). In this model, investment firms assume that risk aversion by their clients is the crucial determinant in how their portfolios will be created and how their investor services will be provided. As a result, many investment firms provide their clients with a combination of risk-free assets and market portfolios and funds that carry some degree of risk based on risk capacity. Portfolio risk, by definition, is the potential risk that a portfolio carries where the combination of its assets could either fail to provide expected returns or exceed the expected financial objectives (CFA, 2022). Diversification is one way of reducing the exposure of a portfolio to risk, by having a combination of investments in different industries, sectors and securities. Low risk portfolios are normally composed of bonds, savings accounts, money market funds, Certificates of Deposits, whereas high risk portfolios are composed of business investments (capital ventures, angel investing, IPO investing), Cryptocurrency, real estate, stocks and options, etc. The nature of high risk portfolios is that investors understand the risk return principle and are willing to tolerate a certain amount of risk to achieve a high return (Hayes, 2022). Thus, understanding the risk return principle and risk aversion is one area for investors to find suitable investments and therefore risk profiling is a robust tool when it comes to explain the suitability, but is this enough to better help investors achieve their financial goals? Is it sufficient for investment firms to look at risk aversion as the unique factor in investment products and advise?

The answer to such questions cannot simply be black or white; it is colored with many factors in between, which is why current risk profiling practices are not effective enough to allow both investors and financial institutions to maximize their returns and/or protect their clients. We have discussed in the above section the constructs of risk capacity, appetite, tolerance (See Figure 4**Error! Reference source not found.**) and risk aversion and in many investment firms a risk profile is simply the combination of risk capacity and risk tolerance (Klement, 2015) but the normative view of traditional finance in terms of risk and reward does not fully explain why risk profiles are biased and ineffective in accurately measuring risk using this model or formula.

Previous research by Grable et al. (2006) and Pompian (2018) has shown that the suitability clauses have in part allowed investment firms to caution investors, a mere speed limit sign, on their road to financial freedom but with increased and complex financial products, asset classes and market volatility due to crises and disruptions, a mere warning is not sufficient. Pompian (2018) argues that in addition to what investment firms look for in terms of risk capacity, they could do a better job accessing the psychology of the investor by using behavioral finance. Grable et al. (2006)

argues that the terminology of risk profiling is not robust enough or even clear to allow risk profiles to assess what they need to asses and therefore prevent losses for investors and opportunity costs for investment firms. The standard process of risk profiling is sequential and follows a waterfall approach, where investment firms work with investors on defining their financial goals, asking them to fill a questionnaire, scoring the former, allocating and identifying the choice of investment and continue to execute the investment strategy.
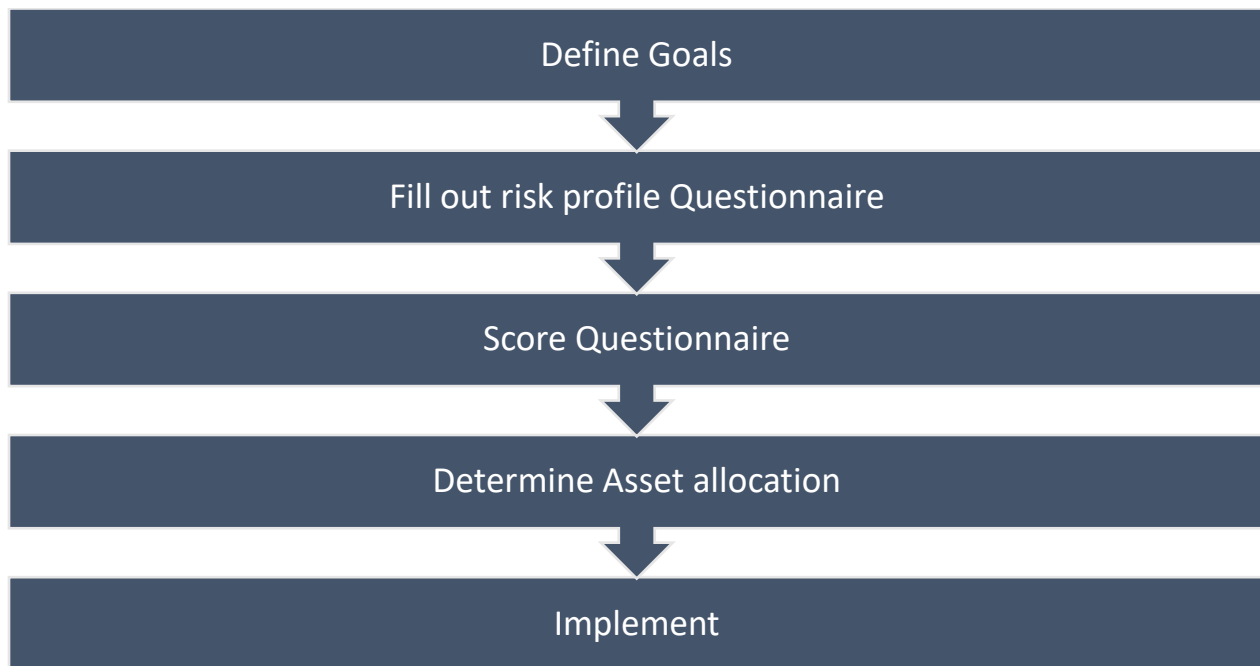
Figure 5: Standard Risk Profiling Process

(Klement, 2015)

This is a fairly simple and standardized approach for creating a risk profile and basing investment strategies on risk capacity and appetite. Recent research however shows that such questionnaires are limiting for both investors and portfolio managers because of many factors that do not take into account the risk tolerance but also other psychometric factors such as risk attitude, risk perception, etc. (Alemanni & Uberti, 2019). Most of the risk profiling weight falls on risk capacity whereby questionnaires are asked to determine a risk rating or score based on income, age, education, financial awareness, experience in investments and investing, tax, owned assets and gender in some instances (Alemanni & Uberti, 2019), but this leaves a lot of room for unknown factors that a traditional risk profile may also ommit like the history, experiences, behaviors and emotional security one has towards investing.

To drive the point further, Klement (2015) reported that the United Kingdom financial ombudsman service received 2,079 complaints in relation to broker-dealer stock broking and financial advisory services; these complains accused the unsuitable nature of asset allocations and advisory as the main reason behind financial losses. That is one example of many complaints that have been received in Europe and in the United States. While these complaints did not directly infer risk profiling, they did point to the inefficency of the suitability of the investment which the plaintiffs attributed to the nature or choice of the asset allocation or the advice. Additionally, the Financial Ombudsman Service (FOS) has reported that 70 per cent of the cases that are escalated to this service body due to inadequate risk profiling of investors by financial advisors and firms (Financial Ombudsman Service, 2015). Moreover, financial planners and firms that follow non-empirical systems of risk profiling which have not been tested, place their businesses and reputations at risk due to ill advised asset allocations and this, in turn, makes them targets for court and legal proceedings and litigations, particularly when markets are down. It is therefore safe to assume that risk profiling methodologies can be improved and can be leveraged for better and more profitable purposes. One of those improvements could very well be in the integration of behavioral finance theories into risk profiling and how psychological and psychosocial factors combied with socioeconomic variables can improve the profiling but also, perhaps, the financial outcomes of market participants.

B. Psychology in Risk Profiling

Ethical and unbiased advice is at the core of the financial advisory profession. In the financial world, reputational risk may tilt the firm's profitability or the financial advisor's career because so much is at stake when it comes to professional advice. Investors gravitate towards integrity when selecting the right advise, they seek expert authority that is seen as consistent, reliable and possesses the skills to help them achieve their financial goals . The ethical component or construct in many of the financial professions is now increasingly regulated to regularize and normalize the ethical conduct of finance and economic institutions and push them towards a more fair and transparent process of work. The ethical foundations of those professions, somewhat regulated and somewhat not, are bounded by processes and legalities as well that promote, safeguard, and check the safety and security of clients. The knowledge that a firm is highly ethical and is able to generate revenues and earnings while also keeping in check its values and the interests of its clients, is seen as a primordial factor in the selection of financial services (Hunt, 2016). Consequently, the ethical foundation carries with it the aspect of research, academic integrity and empirical formulation that is grounded in continuous research and development, and this subsequently helps clients and

financial managers better understand the complexities of the tools and products they offer and the advice that they convey. This continuous critique or revision within the sector or field allows the system to regulate itself but also be exposed to regulation and auditing from external agencies which add to its credibility. Although this is seen as a fait accompli in fields like medicine, social sciences, accounting, etc. when it comes to financial planning, the opportunity for continuous research and development is motivated by generating income and revenues which investigates those avenues with more vigor than the ethical foundation over which the financial and circular economy is built on which is trust. Trust, as a construct or a metaphor, is the glue that holds the financial sector together: trusting that a bond will mature and pay interest and divided, trusting that a company will produce an amount of goods to the value equal or beyond the investment principal, etc. While financial planners and advisors are very professional and are conditioned to be ethical, have the integrity and uphold the safety and prosperity of their clients, the field itself requires more steps to become a genuine self-regulating body that encompasses and invites contribution from communities and professional bodies (Hunt, 2016).

There is a stigma or perhaps a stereotype attached to the nature of risk profiling processes and practices that is inherent in the public eye and in the firms and financial advisors themselves, when conducting a risk profiling exercise; the process itself is prone to be focused only on the product being offered and the investment advice. It is somewhat similar to a patient paying a visit to a general doctor but receiving only a blood test without an overall diagnosis and discussion of treatment and prognosis. Thus, the current process is constrained by what it offers: advice on investment based on the investor's risk profile. The advice itself is limited by the knowledge of the financial advisor and this knowledge itself is bounded by the information retrieved from the risk profile questionnaire which focuses mainly on risk capacity, time horizon and risk tolerance through the lens of financial products (Lehman, 2018). Between what is stated in the risk profile survey and what is revealed by the financial advisor, there is a multitude of information that encompasses aspirations, personal preferences, objectives and of course the metrics of the personal net worth and financial limitation. Therefore, the psychological element remains missing from most questionnaires and while the interests of financial institutions emphasizes the investment advice to generate revenue and profits, financial advisors can add value to investors through a holistic advice beyond asset allocation and investment strategies (Gerard, 2016). The strategic advice provided by financial managers and advisors can contribute and amplify the investor's sense of direction by building trust, empowerment, and confidence in their clients' financial plans and future. Nonetheless, these psychological aspects are not formed easily and require an

investment in time by both the financial advisor and the investor, in order to cement the relationship and build the required trust. The immediate benefits of such a positive relationship would yield a stronger retention and a better understanding of the client and allows the client to feel valued and not bundled in a category and allotted with a specific asset class that has been provided to many other clients resembling their situation (Hunt, et al., 2011).

Asset class	Income	Capital growth	Tax effectiveness	Risk
Income assets				
Cash	Low	None	None	Low
Australian fixed interest*	Medium	None	None	Low/Medium*
International fixed interest	Low	None	None	Medium
Growth assets				
Australian shares	Medium	High	High	High
International shares	Low	High	Low	High
Property	Medium/High	Medium	Medium	High
Global infrastructure	Medium	Medium	Low	Medium

Figure 6: Behavior Of Asset Classes

Extracted from Morgans Wealth Management Risk Profile Questionnaire

How people understand finance and financial planning varies from one individual to the next and the psychology behind it is related to observed trends based on the traits and characteristics of individuals and their perceptions of finance. Harris (2004) argues that traits such as intelligence is linked with the need for achievement and extraversion is linked with creativity (Schuldberg, 2005). These factors or views of the world shape the understanding of finance and its consequent implications, investing being one of those aspects where decision making is skewed by how the individual perceives the world and their place in it. Research by Thompson (2009) on success in entrepreneurship in business finds that temperament, a stable disposition is as important as talent, if not more and that the stability of one's emotions is a more reliable trait for financial success. Thus, when planning to equip investors and clients with financial advice and provide specific investment advice to guide their decisions, personality traits are essential in understanding the needs of the client. And so, risk profiling requires the merging of psychology and finance in order to incorporate a holistic approach to decision making and financial guidance, which helps avoid

the pitfalls of heuristics and biases made by investors which include herding, loss aversion, framing, etc.

Risk tolerance impacts how people choose to forge their careers and their professions, how many want to become entrepreneurs or employees and in which job areas. The other aspect of risk tolerance is to which extent is the risk bearable and this is different for many people: some are comfortable with a large degree of risk, and some are not. Hence, risk tolerance it is quite varied and common to find that risk tolerance in some individuals depends on several factors related to their upbringing, psychosocial traits, behaviors, desires, etc. and this itself impacts how much they are willing to invest in which assets and how risky are those assets. Risk tolerance also affects how investors received the information and how they decide to use financial advice provided by financial advisors. Yang et al. (2007) found that people accepting a higher level of uncertainty has more reasons embedded in their personally than in their financial need, which is why it is evident why some investors would go against the market and invest heavily in futures or options or decide to buy more stocks when a company's stock has seen its value decrease. Risk tolerance is permeant across financial sectors and across financial products but even so, there is little research or literature on the topic and the empirical evidence supporting psychological testing on financial decisions is also limited. What financial planners and advisors know is that in practice there is much more evidence and solutions that can be used with their clients, especially in terms of communicating to them the different options and products they can invest in to achieve their goals, especially when those goals are geared towards reducing the tax levels and increasing the investor's returns. Nonetheless, financial advisors know that investors are only interested in some aspects of the financial plan and do not look at the bigger picture and this takes away from the added value that a financial advisor can have when it comes to financial planning and investment guidance. Therefore, when compiling information about an investor, financial advisors have to focus beyond the financial aspects and look also into the personality traits that make up a large part of what the investor is actually looking for.

C. Behavioral Finance: Theory & Practice

One of the earliest theories on behavioral finance that is specific to risk is seen in the work of Markowitz (1952) on the classical portfolio theory where investment decisions are made in order to maximize revenues within an acceptable range of risk. The work of Markowitz expanded to the modern portfolio theory which introduces diversification or spreading of investments across products to reduce exposure to high risk within a high risk – high return model. The most optimal

solution for risk is a mix of high and low risk investments within one portfolio. In light of this, many investment firms, wealth and portfolio managers base their strategies on this traditional view of the portfolio theory where risk averse investors can maximize returns while having an acceptable degree of risk. When it comes to risk profiling, it is important to understand what is an acceptable degree of risk for each individual as this may be different for each and every investor. Portfolio managers or even financial advisors in mutual funds or hedge funds determine risk tolerance by grouping individuals within segments or clusters based on their wealth (amount, source, history, etc.) (Alemanni & Uberti, 2019). This segmentation has been scaled in investment firms to associate similar income level individuals within one strata and offer them similar products. In terms of risk profiling, this method is similar to customer segmentation and within that one strata, this group of investors is grouped according to their financial goals and based on their risk tolerance and capacity.

At first glance, all this seems to be a good practice: grouping investors en masse and selling them financial products and investments based on their expectations. Recent studies by Wood & Zaichkowsky (2010) on investor segemntation in stock markets are in favor of clustering groups of investors, so is the work of Kumar et al. (2018) on segmentation of individual investors based on demographic variables. However, these methods of segmentation infer that an individual-based approach to risk profiling can be automated or fast tracked without having to induce other factors that personalize investor services. Moreover, risk attitude or perception is not efficiently measured or taken into consideration when creating investment products or services whereas several studies have pointed out that the perception of risk by investors shapes their trading decisions drastically and influence the structuring of portfolios (See Hoffman et al., 2015; Nguyen et al., 2017; Weber at al., 2013). Thus, it could be argued that the process of investor segmentation based on risk capacity and tolerance alone does not quite reflect the perception of risk by investors even when risk profiling does a somewhat good job in averting risk. So how does one maximize returns outside of traditional risk-return models? Or how does one minimize risk while meeting their financial objectives? How do firms and advisors understand their clients's needs in terms of risk, security, financial wellbeing?

Behavioral finance is a relatively new field in finance and economics, but one that has been rapidly growing and gaining traction especially in the new disruptions of financial technologies (FinTech) and the rise of digital currencies. This field attempts to understand how individuals take or made decisions (Pompian, 2018). The premise of behavioral finance starts with understanding that finance, traditionally assume that investment decisions, stock markets and markets in general

operate in a rational behavior, based on the laws of supply and demand or on the expected utility theory which is central to understanding expected reward and its relationship with risk. First identified by Daniel Bemoulli, the expected utility theory developed a framework in which individuals must make decisions with lack of outcome knowledge with resulting consequences. The experiment that Bemoulli conducted, states that individuals are risk averse even when perceived utility or outcomes are high (Martin, 2008). While this theory has come under much criticism, one of the other central behavioral finance theories is the prospect theory coined by the Kahneman and Tversky (1979) which is based on psychological factors that consider that irrationality is a part of the basic human nature. This notion replaces the efficient market hypothesis and classic normative and utilitarian hypotheses. Furthermore, rational behavior of market participants places limitations on risk-reward but also on profiling investors and determining the degree of investments risk. In the work of De Bondt et al. (2008) it is assumed that all investors behave rationally in efficient markets, however, as demonstrated by Statman (2008), financial markets are not efficient but difficult to predict or beat. Statman considers it necessary to explore the psychology of the market participants to understand market anomalies. In this context, with several psychological, behavioral, and financial theories contradicting economic and financial behavior, it is important to understand that utility is not always monetary (it can be knowledge, pleasure, etc.) and supply and demand is not always corrected or subject to rational explanations (greed, corruption, bubbles, etc.), (Briggs, 2019).

Nonetheless, behavioral finance attempts to offer alternative theoretical and practical explanations by developing experimentations in both finance, economics, and psychology. Moreover, human behavior biases amply exist in the real world, outside of the rationality of markets, as Jacobs and Levy (1989) and Mitroi & Oproiu (2014) considered that the complexity of investor behavior is better by espousing theories related to psychological, social, and biological factors. The psychological factors are best explained by the theory of thought, or the Dual process Theory (DPT) as described by Kahneman (2003), which provides a good ground for economist and financiers to explain decision making by humans and attempt to put a framework on how macro and microeconomics function within normal conditions. The Dual Process Theory posits that there are two aspects of cognition: a higher or slower mental process characterized as controlled, reflective, and conscious, and naturally used in cognitive tasks like deductive reasoning and hypothetical thinking. The other aspect is a lower mental or faster process characterized as reactive, automatic, intuitive, associative, and unconscious and used with perceptual and affective operations like cueing and psychomotor response (Grayot, 2020). The DPT has been heavily used

in economics and finance to rationalize decision making and human behavior but in terms of risks, DPT does not provide sufficient guidance or information on how humans perceive risk and how it alters their reaction, reasoning, judgment, etc.

While not immediately uncovered and not rapidly detected, the existence of cognitive heuristics or the tendency to use an unwritten rule to simplify complex decisions as described by Fuller (1998) and Das and Teng (1999), are also important determinants in a risk profile. Ritter (2003) explains that heuristics are rules of thumb or shortcuts that help investors and financial managers to access speedy decisions and make quick and rapid assessments and judgments in financial contexts. The work on cognitive heuristics, first started with Kahneman & Tversky (1974) who helped identify and demystify some of the important heuristics that could lead to bias or fallacies: Anchoring, Representativeness and Availability bias. Two additional heuristics of overconfidence and the gambler's fallacy were uncovered respectively by Waweru et al. (2018) and De Bondt & Thaler (1994). Cognitive biases such as anchoring are found in all areas of our lives but more interestingly in finance, anchoring can be explained by an investor or financial advisor using an initial knowledge or information about a topic and continues to base their decisions on that particular information which has been anchored in their mind, for example if an investor views a high tech stock at $800 s/he may think that an $80 stock in the same industry is cheap. Another heuristic is representativeness which can mislead investors and finacial advisors and managers when thinking that certain stocks or securities will continue on increasing: a good example of this can be seen in cryptocurrencies and Bitcoin where due to the influx of investments into crypto and digital coins has caused a cognitive bias. The availability bias is when investors of financial managers decide to invest in securities or companies where information about the company or stocks are easily accessible and available, disregarding the diversification strategy. The gambler's fallacy is the belief that a small segment like a purchasing an x amount of stocks in real estate will yield the same results as the overall sector trend; this leads to predicting and speculation of going against or with the market and this strategy is very much used in futures and options. Finally, the overconfidence or the over-estimation of a stock and its performance based on the investor's or the financial manager's pre-conceived beliefs in their own ability to rightly predict the movement or being overconfident of the information they possess. (De Bondt & Thaler, 1994)

Nonetheless, the existence of knowledge agents, such as financial advisors can help the investor rapidly get up to speed with the financial knowledge required that allows them to make decisions. Furthermore, there are biases in decision making which are affected by emotions, mood,

and feelings (Grable and Roszkowski, 2008; Shu, 2010; Dow, 2011). Another dimension of decision making is a psychosocial factor which is mostly described by the herd behavior biases which shows how the individual decision is impacted by social influence in his network (Fenzl and Pelzmann, 2012; Seyfert, 2012) as investors start following what others are doing. Another dimension to uncover the contribution of cognitive behavioral psychology to the field of finance is the biological perspective of investor behavior and risk profiling as provided by Harlow and Brown (1990). They consider that various components on the neurochemical systems will affect greatly the investor risk tolerance. This was later developed by Murphy (2012) to explain how variations in the internally produced biological chemicals, different levels of cortisol, and different levels of testosterones can lead to irrational investors behavior in the financial markets. Regardless of the several elements, be it psychological, psychosocial, socio-economic, or biological, when a risk profile questionnaire is presented to investors, their perception of risk is also affected by a concrete understanding of their own world, of its own realities, constraints and limitations. Which is why the assessment of risk cannot be merely construed and standardized; it has to be customized but remains replicable, valid, and reliable to ensure the validity of the assessment but also to ensure that empirical knowledge and testing is evident to protect both investors and firms and safeguard the practices and integrity of the work conducted in the financial industry.

The progression of psychological theories that connected risk to investment took a long time mature. As a start, and as stated earlier, the portfolio theory saw many iterations (Meta, 2015) starting from Blaise Pascale's expected value in 1670, followed by Daniel Bemoulli's Utility function in 1738 and most recently in the 20th century the portfolio theory by Kahneman and Trevsky (1979). These developments into the portfolio theory were paralleled by the psychological integration on the perceptions of risk; as the risk-reward paradigm started to resonate within the financial industry and academic foundation, it became important to analyze how risk and reward were intrinsically linked. The work of Hofstede (1984) on social behavior and cultural dimension provides a snapshot of how culture shapes investment behaviors in constructs like power distance index (hierarchy of control), individualism, masculinity, uncertainty avoidance (intolerance for uncertainty), long term orientation where they are perceived differently in various countries and amongst individuals. Hofstede's work built an academic or theoretical bridge to connect behavior and perception with decision making and hence brought forward the advent of behavioral finance theories such as loss aversion and time preference (Grayot, 2020).

2.2 Literature Gap:

Questionnaires: Validity, Reliability & Limitations

The research on risk profiling has been very limited to traditional financial concepts. The two traditional finance school of thoughts mostly discussed in determining the investor behavior were the rational hypothesis and the efficient market hypothesis which were described by Miller (1999). Other researchers explained how risk profiling arises from the assessment of survey validity from economic perspective which considers clients as purely rational human beings (Grable, et al., 2006). However, there are limitations to these theories. They consider that all market participants are rational, and markets are efficient in where the same information reaches all the participants at the same time, and everyone reacts the same. However, in the real world, this does not exist, asymmetry of information is permanently a threat to market fairness and therefore impacts the ability of both financial advisors and investors to invest in rationally stable conditions where competition is fair. Additionally, market efficiency is not constant as it fluctuates over time and due to several factors. In the work of Kent & Sheridan (2000) we can find evidence of investor overconfidence reshaping market efficiency even when companies did not have sufficient evidence of profitability. This has led to weak market efficiencies that misled investors and financial firms and caused several losses but also hurt the real value of companies and their respective securities (Kent & Sheridan, 2000).

So how can one understand future risk if present risk is variable? The answer is not straightforward, but also the question is not factual or realistic. That is why the understanding of an investor's risk profile (*and profile in general*) is a snapshot of their risk capacity and risk tolerance in a given period of time within varying market conditions. But can questionnaires actually measure the risk capacity, appetite, aversion, tolerance, willingness, and other constructs through a survey? What good does this process yield? How successful is it in finding the best investment strategy for a client?

The first limitation for the use of questionnaires to determine risk, is that they are in essence to measure suitability and conform to regulations. The regulatory adherence drives the suitability assessment through the questionnaire, so questions are formulated based on regulation needs: revenues, assets, knowledge of financial markets, time horizon, etc. Such questions can be expanded and retrieved from the investor's KYC or from different other methods including gamification. The second limitation for the use of questionnaires is the perception of risk; this perception is temporal because it is shaped by the heuristics, cognition and experiences of the clients leading up to that moment in time. Moreover, risk profiling conducted today for a client

cannot set the mood, needs and perception of risk for the client for the longer term; the risk perception changes over time and so does the appetite, aversion, and perception of reward as well. The third limitation of questionnaires is the type of questions asked in risk tolerance; most questions resemble each other for most clients (Hubble, et al., 2012) and other questions try to illicit response from clients based on their life experiences and preferences outside of financial activities and investments. According to Hubble et al. (2012), when asked about anticipating future behaviors, investors cannot accurately assess their own financial knowledge or future decisions and such questions may pose a threat to validity of the questionnaire as well as format such as the revealed preference test which can assess risk aversion rather than tolerance (See Figure 9). Other questionnaires use also ambiguous or complex language to describe financial events and that can incur biases whereas the use of multiple questions is seen to be encouraged as reported by Roszkowski (1992). What is to be concluded from the design of questionnaires for risk profiling is that there is no standard format or methodology but rather a loose framework that firms are using. Nonetheless, including behavioral questions does provide a sense of understanding for managers and clients alike. The existing literature does provide some support on the notion that risk profile questionnaires are generally interested in one aspect of the investor's risk spectrum, rather than a holistic assessment of risk beyond capacity or aversion. In 2005, Douglas Rice (2005) conducted an analysis of 131 questionnaires used in American investment firms and financial advisers. His findings indicate that 11% of questionnaires asked investors themselves to determine a proportional risk profile or portfolio and 35% of questionnaires did not ask investors about the time horizon of their investment.

To understand how to rate levels of risk and return as an investor, one has to probably be familiar with Markowitz's optimum portfolio theory which emphasizes income generation and therefore needs to be clarified by financial advisors to investors who are most times asked to rate their own level of risk and return in repeated and frequent risk profiling questionnaires that emphasize multiple choice questions to investors. Such approaches to surveys that entail risk profiling place emphasis on investors to make choices that they may not be fully knowledgeable of, and the design of such surveys also adds more pressure on investors to answer with a yes or no, or a right or wrong answer. Hunt (2016) argues that the general average investor, whose financial literary is linked with the global events surrounding financial downturns can be more risk averse when attempting to answer questions related to their feelings regarding risk tolerance (Fisher, 1993). This creates a more conservative view of financial products and tends to misplace the rating score of a risk profile causing an imbalance between the aspirations of an investor and

their asset allocation strategy. This sort of understanding could possible only happen in situations where financial advisors know their clients too well through the lens of their lifestyle preferences, choices and other personality traits and determinants that are not only connected to their financial situation, but again this requires time that is normally provided to clients in wealth management and not investors who have limited financial capacity and are bundled into fixed income strategies.

Some of the practices that researchers recommend in risk profiling surveys are combination of empirical survey fields with specific and targeted questions that gauge different aspects of financial and risk appetite, time, emotional composure, and stability as well as investment experience, risk tolerance amongst other factors that have both finance, psychology, and behavioral queues. Financial planning for investors is a very personal process that touches on personal finance which encompasses an individual's assets, liabilities, net worth, and their financial comfort zones, which is why gathering this knowledge as part of a risk profile is so important. Equally important, is understanding the investor's regular income at the household and singular levels, that is because the ability to continuously generate income can impact the time the investor is willing to put into an investment and how fast or slow are they to react to market changes. This is turn has an impact on the risk tolerance: if an investor is in a hurry to generate more income, it can be assumed that their risk tolerance is not high enough to withstand market downturns (Hunt, 2016). Sticking by or adhering to an investment strategy could be very tough for many investors, and that has very much to do with how their behavior shapes their investment decisions because some investors have also an issue reporting their actual net worth: it could be exaggerated or downplayed and in both cases it hurts their choices and investment strategies on the long run. Risk capacity is the foundation of a financial risk profile but also the determinant to how much an investor can achieve financial security, but the current risk profile approaches and systems do not place emphasis on composure or restraint of oneself, despite the evidence that self-control is positively correlated with financial success (Schuldberg, 2005). Setting aside enough savings or income and channeling it into investments and equity requires discipline and many investors forgo the monthly or yearly obligation by withdrawing the investment too soon or stop funneling funds into their investments. This is a phenomenon explained by Shefrin and Thaler (1977) where immediacy and future rewards are in constant struggle and are subject to the control of the individual and this impacts the investor's perception of reward between the present and the future. Moreover, the study on personality traits has yielded some interesting findings, for example a study by Puri and Robinson (2007) explored self-control from the angle of optimism and found that moderate optimists had fewer challenges with controlling themselves and therefore did not feel that they had to alter their

behaviors and this is pertinent when it comes to understand how one's perceptions shape their financial decisions and how fast or slow would they alter their decisions in the course of market events. So how is this related to risk profiling questionnaire?

Research suggests that the approach of risk profile surveying, whether tested or interviewed, could very much benefit from research on self-control because it allows financial advisors to understand how investors will react to market changes and investment strategies without having to necessarily ask them to rate their own risk tolerance or be provided with scenarios to gauge their behavior. What is important here is how to frame questions that target self-control instead of scenario-based questions and it is often difficult to structure questions that truly retrieve this specificity on self-control especially in questionnaires that focus on the relationship between finance and financial goals. So when identifying a client with low self-control, a financial advisor can create and design strategies that curb the investor's ability to either withdraw or exceed the investment strategy or products. Long term commitment to financial products becomes difficult when financial advisors have to handle varying levels of self-control and discipline because that also stands in the way of financial success. Often, financial advisors have to recognize that the creation of investment plans and asset allocations should come hand in hand with communicating the challenges and issues to investors who may persistently demonstrate positive expectations and have higher levels of optimism (Yang, et al., 2007).

Furthermore, the disposition of investors at the time of taking the risk profiling surveys may also affect their responses, sort of like test takers' mood may affect their scores on testing days. Financial advisors must be trained to recognize that undertaking risk profiling should not happen in the course of one session but to allow some time to set in in order for the client to have a balanced view of their capacities and tolerance. As an example, investors who have a more optimistic view of the world, exaggerate their forecasting capabilities and this leads to resistance when it comes to changing their investment strategies when the time for pivoting away from an investment is needed (Puri & Robinson, 2007) whereas investors who are more cautious and generally less optimistic are more prudent in their investment choices and can have a more favorable conversation with their financial advisors when times are hard. So knowing an investor's level of optimism is crucial when developing risk and investment strategies and exploring with them different investment alternatives and backup plans because this ensures that, regardless of the investor's risk tolerance, their investment options are the best they can receive given their risk capacity. Eventually, this type of knowledge does not yield much unless it is applied in the way questions are formulated and strategies are shaped and those responsible for making this happen are financial advisors and

managers who know better how to tailor such conversations and retrieve this information from their interactions with their clients. What is also heavily pertinent is how investors interpret market changes and their knowledge of the financial and investment world; if they have a high level of understanding they may also be overconfident and this also affects their judgment (Hunt et al., 2011) so risk profiling approaches should also offer an opportunity for investors to rate their knowledge but go beyond the multiple choice question and try to gauge their behavior or thinking when it comes to investment choices. Financial advisors must be able to detect their client's financial knowledge through conversation but also to test their knowledge prior to offering them products they do not understand. This is evident in the regulations set forth by agencies and national regulators like Market for Financial Instruments Directive (MiFID) who issue directives that require financial institutions and financial advisors to identify which information to obtain from potential investors before determining the suitable investment strategy. According to Article 19(4) of MiFID, financial intermediaries must obtain "*the client's or potential client's knowledge and experience in the investment field relevant to the specific type of product or service, his financial situation and his investment objectives*" (MiFID, 2014).

MiFID		Literature	
Items	**Variables**	**Items**	**Variables**
		socio-demographic characteristics	gender
			age
			marital status
			current and expected household composition
experience and knowledge	profession	experience and knowledge	profession
	education		education
	nature, volume, and frequency of the client's transactions in financial instruments and the period over which they have been carried out		previous investment experience
			outcome of previous investment choices (positive/negative)
			knowledge of financial products
	types of service, transaction and financial instrument with which the client is familiar		knowledge of how financial markets work / risk-return trade-off, risk dimensions (credit/market/exchange rate), portfolio diversification principle, perception of probability
			overconfidence and optimism
financial situation	investments and real property; assets, including liquid assets	financial situation	investments and real property; assets, including liquid assets
	source and extent of regular income		source and extent of regular income
	regular financial commitments		regular financial commitments
			other financial commitments (expected changes in regular revenues and expenses)
investment objectives	holding period	investment objectives	holding period
			time preferences (discount rate/degree of impatience)
			liquidity needs
	purpose of the investment		purpose of the investment
			amount (in relation to wealth/income)
	risk preferences	risk tolerance	risk attitude (objective risk)
	risk profile		emotional capacity to assume risk (subjective risk)
			loss aversion

Figure 7: Market for Financial Instruments Directive (MiFID) – Criteria

Behavioral finance has seen more integration within mainstream finance as more financial companies and fund managers are becoming more client-centered in their product offerings (Merriwether, 2021) but that is also part of a larger movement within the financial industry to search for the interest of the investor, especially after an erosion of trust in financial services post 2008 financial meltdown (Claessens, et al., 2010). Conducting a risk profiling is already a safety-first approach to investing, however like all good intentions, it must be developed better to avoid pitfalls. The current literature on risk profiling can be summarized by the inadequacy of the risk profiling tool that is used in the financial industry today which is the questionnaire (Linciano & Soccorso, 2012). Additionally, the way questions are asked in many risk profile questionnaires present a stark difference amongst each other, or in other words lack consistency or standardization (MiFID, 2014), and lack of professionals or experts formulating the questions or building the questionnaires as uncovered by the work of Mazzoli & Marinelli (2010). While there are many critiques to the structure and use of the questionnaires, there has not been a serious inclusion of behavioral questions into risk profile questionnaires that have been studied or analyzed when put into the context of a real investment strategy or portfolio building (Ernest & Young, 2020). Ernest & Young (2020) discussed at length how different ways of conducting risk profiling could be advantageous like gamification, situational evaluation, portfolio gap analysis and risk capacity v/s risk appetite but fell short of describing how and if risk profile questionnaires have actually been able to predict financial performance. The same goes for the literature, where many scholars have discussed risk profile questionnaires through their ability to detect risk capacity, tolerance, appetite, aversion but did not regress those findings with real time financial performance on individual investors (See Kristofik & Novotna, 2018; Statman, 2014; Rezaei, 2013).

As a conclusion, the academic literature has much to say about how risk is mitigated in the financial world, but little is spent trying to pin down risk through psychology in finance rather than risk through financial fundamentals. Behavioral finance is still a new concept that has its roots in consumer behavior as well as psychosocial behavior, and because it is still a relatively new concept much more experimentation should be made to explore how it impacts our understanding of behaviors in finance and markets, how supply and demand are shaped by behaviors, wants, and needs. Risk profiling requires an overhaul beyond the current framework of regulation and risk capacity, also beyond risk tolerance and aversion. It has to be tied to a financial plan with a thorough understanding of what the investor is looking for financially, but also personally and what are their limitations, unique preferences and key strengths that allow them or not to achieve their goals.

Chapter III: Methodology

3.1 Conceptual Framework:

The challenge in assessing behavioral changes within a particular field, whether finance, health, economics, education, etc. is the time it takes to notice how behavioral changes can alter or change the direction or outcome of an individual's choices. In this study, we attempt to understand whether there is a significant correlation or relationship between behaviors and risk assessment in the scope of constructing a risk profile questionnaire which includes behavioral questions and evaluating whether it had an impact on financial performance, through the financial advisor's structuring of the portfolio using the constructs and aspects of behavioral finance as a foundation for integrating the assessment of risk. To be able to integrate behavioral finance theories within the traditional context of risk profiling, it is important to determine and define the varying layers of risk profiling and the contributions that will be used from behavioral finance. First, risk profiling as defined and discussed in this study is the process of assessing an investor's risk capacity in addition to their risk tolerance; this framework is the one that is mostly used in financial institutions and by financial advisors today with the aim of determining client suitability. For companies and managers to determine their clients' risk profiles they must ask their clients to fill out a risk profiling questionnaire in line with regulation imposed by both the European Union and the United States as well as other countries.

While these questionnaires vary by asset class, type of fund, company or investment firm, the questions normally revolve around suitability of the client through their financial assets and/or through their goals, objectives and risk capacity or risk appetite. By introducing new questions into existing surveys that target the behavioral history of a client in terms of risk, managers can begin to shape a risk profile and here is where behavioral finance can lend its expertise in the type of questions but also in strengthening and capturing a more realistic view of the client's risk appetite, willingness, and tolerance in general. The more we understand a client behavioral past and history, or their perception on risk and how to handle it, we can make a better assessment of their capacity and tolerance. While many investors perceive risk differently, the common denominator of taking risk is the potential reward and its value, yield, and its perception as well.

3.2 Hypothesis

The literature shows ample evidence why risk tolerance needs to be assessed as part of a risk profiling process, nonetheless, it is not clear what would be the best formula for a risk profile. In this study we have explored how behavioral finance can provide a new ground for experimenting how to better assess risk by coupling behavioral theories with financial practices but in order to concretely measure how the introduction of few questions into a questionnaire can

have an impact or not, one has to test or measure the effects or the consequences that these variables have. The rating score of risk profiles into (conservative investor, moderately conservative, moderate, moderately aggressive, and aggressive) are relevant when rating the risk profile of the investor but they do little if there were not weighed against the suitability of the investments proposed by the financial advisor(s) and the respective yields or performance that these investments have earned their principal holders. So for this study to be reliable and valid, it is important we weigh and try to understand the significance of behavioral finance questions when they are reviewed against the performance of their respective portfolios. If we were to weigh the suitability of investments only on the rating provided by the financial advisor, without looking at the actual financial performance or yield, we cannot concretely and empirically understand or assess the relationship. It is thus important to recognize the difference between the rating score provided on a questionnaire and the actual financial performance that is contingent on the rating score and therefore the suitability of the proposed investment(s). As a result the hypothesis of this study is as follows:

- H1: Inclusion of behavioral finance questions into a risk profile has a positive impact on investment yield and client retention through proposed investment(s)
- H0: Inclusion of behavioral finance questions into a risk profile does not have an impact on investment yield and client retention through proposed investment(s)
- H2: Inclusion of behavioral finance questions into a risk profile has a negative impact on investment yield and client retention through proposed investment(s)

The traditional risk profiles focus heavily on the financial goals, time horizon and current assets to determine suitability of proposed investments, in this study we propose to add few behavioral finance questions to an existing risk profile and compare whether they had any change on the same sample in determining suitability but more importantly on the yield of the investors based on their portfolio's performance or investment. It would also be interesting to assess whether, from a suitability perspective, investors remained with the investment firm as this would provide more evidence of their satisfaction and retention vis-à-vis the firm and/or financial advisor. The first construct, which is the inclusion of 6 behavioral finance questions (*Independent Variable*) that can be found in the questionnaire under risk tolerance section, are targeting the temperament or the expected behavior. The combination of these 6 questions provides a ground for assessing the client's risk tolerance but also their risk aversion and their preferences i.e., what they value most. The other construct which is positive financial performance (*Dependent Variable*) is measured by

the higher returns or yields on proposed investments by financial managers, compared to the first group of investors. Additional information on the retention of the client for more than one year after the administration of survey and financial cycle could also serve as an indicator of positive impact or change but to be only taken into account as a secondary effect of the returns or financial performance of proposed investments.

3.3 Methodology:

To be better able to assess whether the integration of behavioral finance into risk profiling has a significant impact on investors, managers and their financial health, this study will use both qualitative and quantitative methods to explore if a relationship exists and if it would have some to no impact on client retention and their financial prosperity. The primary component begins by unpacking the constructs and operationalizing the constructs surrounding risk tolerance, risk capacity and risk appetite. Through the questionnaire, investors and clients will be asked to respond to traditional questionnaires that ask similar questions across the industry for their risk profiling, nonetheless few more questions would be added to this survey that will constitute the behavioral finance aspects and can help retrieve more information from clients on their behaviors and perceptions. The analysis that will be retrieved from the responses provided can be regressed against the financial performance of the portfolios and the clients' wealth within specific periods. Additionally, a qualitative method which constitutes a set of interviews will also be included to have a more industry-specific view of risk profiling and its measurement and analysis. The interviews will lend a hand and help provide more context to why and how some questions and some feedback can bring a change to the approach of risk profiling or not. The combination of both qualitative and quantitative methods will reinforce the findings of this paper as it attempts to provide a more practical view of behavioral finance within the field of risk and especially in investment banking, wealth management and securities in general. For the purposes of this study, positive impact is defined as a higher yield on investments within one year for both groups and investors as well as an unchanged or slightly changed client retention number which means loss of less than 25% of client numbers. In all investments, the realities are that investors may withdraw from one financial cycle to the next for different reasons, even if they were enrolled in a longer term investment strategy. For this reason we do not expect client retention to be consistent from one cycle to the next, but a loss of 25% or more of clients within one year is normally seen as a negative indicator (Statitsa, 2018).

3.4 Quantitative Method:

A. Pearson Chi Square:

The exploratory method in this study is conducted through the use and comparison of two questionnaires within a three-year period with one questionnaire being traditional without inclusion of behavioral questions and another administered after a period of 1.5 years and includes behavioral finance questions. As a quantitative method in this study, the comparison of the questionnaires will be conducted as statistical hypothesis test, Pearson's Chi Square test, which is used to determine if there is a significant statistical difference expected and observed frequencies. Given that our hypothesis attempts to test whether there is a positive impact on client retention and given that we also are interested whether it had a negative impact, the Pearson Chi Square test will help determine if the null hypothesis is rejected or confirmed and whether two categorical variables are independent of each other. The method of employing the Pearson Chi Square test is because of two groups of investors, one group that has not been asked to fill in behavioral questions and another group that has been asked to fill in those questions.

$$\chi^2 = \sum \frac{(O_i - E_i)^2}{E_i}$$

χ^2 = chi squared
O_i = observed value
E_i = expected value

The use of the Pearson Chi Square test in comparison of the questionnaires will allow a better understanding of the different variations in perceptions and behaviors of investors who are being asked to respond to certain questions that try to gauge their own projections, feelings and behaviors when faced with risks. The risk profile questionnaire proposed is designed by a financial institution responsible for managing wealth and capital assets in Hong Kong.

B. Independent Samples T Test:

The exploratory method in this study is conducted through the use and comparison of two questionnaires within a three-year period with one questionnaire being traditional without inclusion of behavioral questions and another administered after a period of 1.5 years and includes behavioral finance questions. In addition to the Pearson Chi Square, which attempts to measure a

As a quantitative method in this study, the comparison of the questionnaires will be conducted as an inferential statistic measure, t test, which is used to determine if there is a significant difference between two groups. Given that our hypothesis attempts to test whether there is a positive impact on client retention and given that we also are interested whether it had a negative impact, the t test will be an independent two samples, two tailed t test. The method of employing an independent sample t test is because of two groups of investors, one group that has not been asked to fill in behavioral questions and another group that has been asked to fill in

$$t = \frac{\overline{x}_1 - \overline{x}_2}{\sqrt{(s^2(\frac{1}{n_1} + \frac{1}{n_2}))}}$$

The use of the t test in comparison of the questionnaires will allow a better understanding of the different variations in the financial yield or return of investors who are being asked to respond to certain questions that try to gauge their own projections, feelings and behaviors when faced with risks. Three components form the questionnaire with 16 questions in total distributed in three sections: Financials, Goals and Risk Tolerance. The financials part of the questionnaire contains 4 questions that attempt to determine the client's assets, net worth, liquidity, etc. and form the basis of understanding the risk capacity of the client. The second part attempts to understand the client's financial goals by focusing on 4 questions that gauge the client's financial objectives, time horizon and flexibility in managing investments. The third part focuses on risk tolerance and in this part, 8 questions assess the client's risk tolerance and gauge their ability to withstand volatility, behaviors based on market activity and risk aversion. The questionnaire's two sections: goals and risk tolerance have respectively a score for their section based on the client's answers which are rated based on the question and the response of the investor. The combined score of both sections is tabulated and based on a rating scale developed by the company, the client's risk profile is created, and a rating is provided to allow the portfolio manager or advisor to suggest suitable asset classes, investment strategies and financial products. The risk profile questionnaire is used by a recognized financial institution in Hong Kong and is used by their wealth managers, portfolio managers and financial advisors when advising their clients on the best investment strategies they could decide to embark on.

3.4.1 Scoring

The rating scale for the risk profiling questionnaire is based on the number of points assigned to each question related to the investor's goals and risk tolerance. The range of points starts from the conservative rating of an investor's profile to an aggressive rating

which is assigned the maximum points for each question. Each section is calculated separately and finally both sections are calculated, and a final score is presented which allows the manager and/or advisor to rate the profile according to these five rating points: conservative investor, moderately conservative, moderate, moderately aggressive, and aggressive. This rating allows portfolio managers to design investment strategies taking into consideration the risk capacity of the investor and therefore this also becomes an exercise in suitability of the investor and the respective products being sold.

3.4.2 Sampling

Multibank is a multinational financial company specialized in trading forex, metals, shares, indices, commodities, and cryptocurrencies. Established in 2005 in Hong Kong, it is regulated and has a global presence spanning 5 continents with more than 20 offices worldwide. Through its extensive network of brokers and traders, Multibank has a large number of clients investing in mutual funds, capital ventures, securities, currencies, etc. Because of its exposure to several markets and investments, Multibank has offered the service to its clients to invest in more volatile capital assets; cryptocurrencies, securities, commodities, and other products that have a higher risk-reward dimension. Through this study, we will explore the responses of 300 clients who have completed their risk profile questionnaire in February 2021 and contrast it with their current financial results as well as the company's client retention figures, i.e., if those 300 clients remained with the company and how did their investment strategy or risk rating change. The survey results will be collected from the responses of 300 clients along a period of 13 months, starting February 2021 and ending March 2022.

3.4.3 Behavioral Questions

When the survey was initially designed by Multibank, it was anchored in the traditional model of risk profiling and with a broad base of products and asset classes, the company required a safe proof assessment of its clients. While it has engaged with many of its client through a "know-you-client" (KYC) process, it has also asked some of its clients wishing to invest in securities and currencies and emerging markets to complete a risk profile questionnaire. The company's approach to the risk profile questionnaire was based on the traditional combination between risk capacity and risk tolerance, nonetheless the risk tolerance component was mainly focused on their risk aversion. This focus on risk aversion could not paint the entire picture of the risk profile, because of the constraints of understanding behavior without the associated risk of losing. In order to better measure

whether behavioral finance has an impact or a relationship between risk tolerance and improved financial outcomes, 6 questions have been added to the survey that explore the decisions made by investors as a result of exogenous factors in the market. With scenarios covering volatility, predictions, perception of reward, avoidance or steadfastness in the continuity and perpetuity of the investment over a time horizon. This set of questions (11,12,13,14,15, and 16) have been included recently in the surveys. Because of the COVID-19 pandemic, changes in Multibank exposure on investment banking, markets, etc. had doubled as did many financial institutions. With markets bracing for a downturn and a global halt in services and industries, the focus on investment bankers and financial advisors was to gauge the appetite of investors in specific asset classes and better understand what their clients are willing to take in terms of risk and receive, in terms of reward.

3.4.3 Independent Variable

Two measures of independent variables are measured in this study. For the purpose of understanding whether the introduction of behavioral questions into the survey have a better effect on risk tolerance, the first independent variable is the result of the risk profile rating of the financial advisor to the investors (n=300). A Pearson Chi Square test for the two independent groups (group 1 & group 2) is conducted to determine whether behavioral questions have impact on their risk profile rating and therefore on the suitability of the investments. The Pearson Chi Square test result helps determine whether the introduction of the behavioral questions did have an impact on the risk tolerance rating. The other independent variable are the yields of the 150 respondents to the survey, who answered the behavioral questions compared to the yield of the other 150 respondents who did not; the yield or financial performance is measured over the period of one financial year.

3.4.4 Dependent Variable

The dependent variable in this study is considered to be the 6 behavioral questions introduced to one group of 150 respondents who answered those questions. The behavioral questions are meant to assess how this group of respondents' views and determines risk and comparing their results on risk tolerance through the Pearson Chi Square test will allow to view if there has been a significant difference between their risk profile rating (Conservative, Moderately Conservative, Moderate, Moderately Aggressive, Aggressive).

3.5 Qualitative Method:

To couple the results of the Pearson Chi Square test, through the questionnaires, with the perceptions of financial managers, an interview will be held with three of MultiBank's financial advisors about their opinions, practices and insights on behavioral finance and risk profiling. The interview asks 5 questions to determine whether there is a positive relationship between behavioral finance questions and risk profiling. The 5 questions (See **Error! Reference source not found.**) attempt to explore whether there is value in including behavioral questions, the results of including behavioral questions, the risk profiling process validity, and the reliability of behavioral questions in contrast with financial results. The questions are interrelated and provide insights about what financial advisors think are the most significant components of a risk profile questionnaire, additionally the interviews attempt to assess how financial advisors perceive risk tolerance and how accurate, in their view, the measure of risk tolerance according to their previous experience. The interviews also question financial advisors on the reliability of behavioral questions such as: what an investor would choose or prefer when making a financial decision. Additionally, this qualitative part also asks financial advisors and managers their thought on whether there is value in including behavioral questions to investors to determine investment suitability. Finally, it asks whether previous experimentation in behavioral questions on risk profiles had yielded any results and what were those results.

Chapter IV: Findings & Results

4.1 Quantitative Method: Survey Results

The below results indicate the answers and distribution of the 300 respondents who have been split into two groups: group 1 in which behavioral questions were not included and group 2 in which behavioral questions were included. The below results provide an overview of the respondents' answers through the frequency tables.

4.1.1 Section 1: Risk Capacity

In this section of the survey the questions cover the risk capacity assessment which captures the net worth, liquidity, income, and tax bracket of respondents. The risk capacity allows financial managers to understand how much investors could invest in based on their net worth and ability to enter into specific investment schemes. The risk capacity of the investors is the prime consideration for most financial firms because it is measurable through assets and income and is a very strong indicator of which financial product the financial advisor will eventually recommend.

Table 1: Group of investors

	N	%
Group 1: Without Behavioral Questions	150	50.0%
Group 2: With Behavioral Questions	150	50.0%

The above table shows the distribution of the 300 respondents into two equal groups (n=150 for group 1: without behavioral questions) & (n=150 for group 2: with behavioral questions). It was important to separate both groups of investors between those who were administered the behavioral finance questions and those who did not to understand what effects this had on the study premise. Both groups are equally distributed and have been also assessed based on the financial performance or yield of their portfolios. The information provided on the responses and rating score by MultiBank were anonymized to maintain confidentiality and the ratings assigned to the investors were made by MultiBank's financial advisors. The responses below are based on the investors answers and have been classified and categorized according to the structure of the questions and that of the questionnaire. It is also important to mention that both groups have had different risk profiling evaluation based on different cycles, but our study takes into account the year-to-year yield and we are assessing their responses based on 2021 financial year starting 01 January 2021 – 31 December 2021.

Table 2: Approximate Net Worth
What is your approximate net worth (excluding your principal residence)?

		Without Behavioral Questions	With Behavioral Questions	Total N	Total %
What is your approximate net worth (excluding your principal residence)?	Under 100K	19	15	34	11.3%
	100K-300K	34	19	53	17.7%
	300K-500K	43	34	77	25.7%
	500K-750K	23	40	63	21%
	750K-1.0M	21	20	41	13.7%
	1.0M-3.0M	8	15	23	7.7%
	Above 3.0M	2	7	9	3%
Total		150	150	300	100%

The above table attempts to understand the approximate net worth of the investor within a range of options, it is linked to their risk capacity and financial situation. shows the distribution of the net worth of respondents (n=300) with most respondents having a net worth between 300K-500K (25.7%). The first group of responders under 100K represent 11.3% or 34 respondents of the sample, the group between 100-300K represents 17.7% or 53 respondents of the sample. The group of responders between 300-500K represent 25.7% or 77 respondents of the sample and are the most reported in this sample of investors. The group between 500-750K represents 21% or 63 respondents and is the second group with most weight in this sample size. The group between 750K-1.0M represents 13.7% or 41 respondents. The group between 1.0M-3.0M represents 7.7% or 23 respondents. Finally, the group above 3.0M represents 3% or 9 respondents of the sample.
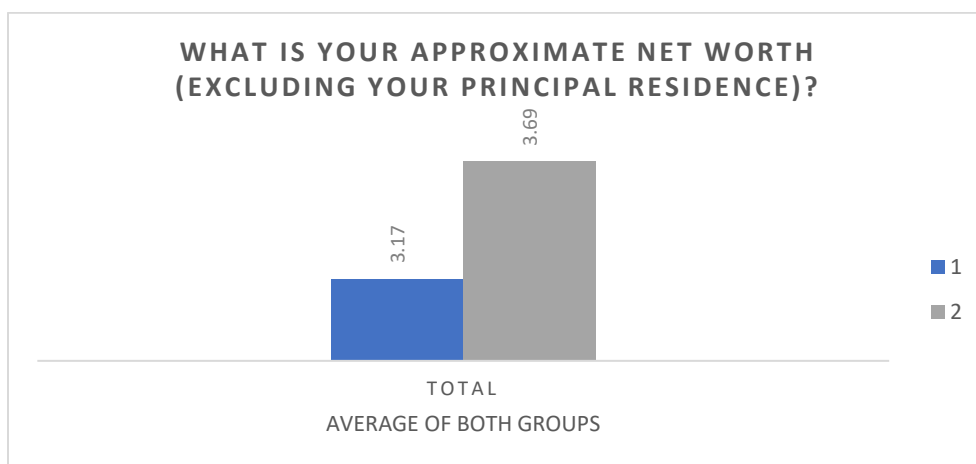
WHAT IS YOUR APPROXIMATE NET WORTH (EXCLUDING YOUR PRINCIPAL RESIDENCE)?

TOTAL
AVERAGE OF BOTH GROUPS

In terms of mean scores between both groups, while there is some difference between the average scores, it is evident that the difference is not significant between both groups given that the average score for Group 1 (Without Behavioral Questions) is 3.17 whereas the average score for Group 2 (With Behavioral Questions) is 3.69, a difference of 0.52 which means they both cluster around the same bracket of 300-500K on their net worth approximation.

Table 3: Liquid Net Worth
What is your liquid net worth? (Assets that can be readily converted to cash)?

		Without Behavioral Questions	With Behavioral Questions	Total N	Total %
	<25K	20	21	41	13.7%
What is your liquid	25K-50K	44	51	95	31.7%
net worth? (Assets	50K-100K	44	26	70	23.3%
that can be readily	100K-250K	23	32	55	18.3%
converted to cash)?	250K-500K	11	14	25	8.3%
	>500K	8	6	14	4.7%
Total		150	150	300	100%

The above table attempts to understand the approximate liquid net worth of the investor within a range of options, it is linked to their risk capacity and financial situation The above table shows the distribution of the liquidity of respondents (n=300) with most respondents having a liquidity net worth between 25K-50K (31.7%). The first group of responders under 25K represent 13.7% or 41 respondents of the sample, the group between 25-50K represents 31.7% or 95 respondents of the sample and is the largest representation in this sample. The group of responders between 50-100K represent 23.3% or 70 respondents of the sample and are the second most reported in this sample of

investors. The group between 100-250K represents 18.3% or 55 respondents. The group between 250-500K represents 8.3% or 25 respondents. Finally, the group above 500K represents 4.7% or 14 respondents of the sample.

WHAT IS YOUR LIQUID NET WORTH? (ASSETS THAT CAN BE READILY CONVERTED TO CASH)?

AVERAGE OF BOTH GROUPS

In terms of mean scores between both groups, there is no difference at all, since both groups 2 have an average score of 2.9 which means they both cluster on average around the same bracket of 25-50K on their liquid net worth approximation.

Table 4: Household Income
What is your current household income?

		Without Behavioral Questions	With Behavioral Questions	Total N	Total %
What is your current household income?	<50K	19	25	44	14.7%
	50K-100K	44	47	91	30.3%
	100K-150K	40	42	82	27.3%
	250K-500K	34	27	61	20.3%
	>500K	13	9	22	7.3%
Total		150	150	300	100%

The above table attempts to understand the approximate household income of the investor within a range of options, it is linked to their risk capacity and financial situation The above table shows the distribution of the current household income of respondents (n=300) with most respondents having a household income between 50K-100K (30.3%). The first group of responders under 50K represent 14.7% or 44 respondents of the sample, the group between 50-100K represents 30.3% or 91 respondents of the sample and is the largest representation in this sample. The group of responders

between 100-150K represent 27.3% or 82 respondents of the sample and are the second most reported in this sample of investors. The group between 250-500K represents 20.3% or 61 respondents. Finally, the group above 500K represents 7.3% or 22 respondents of the sample.
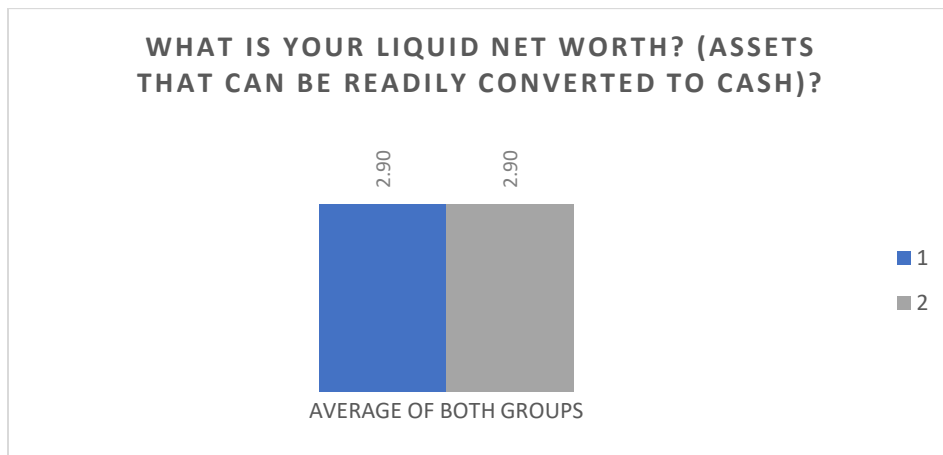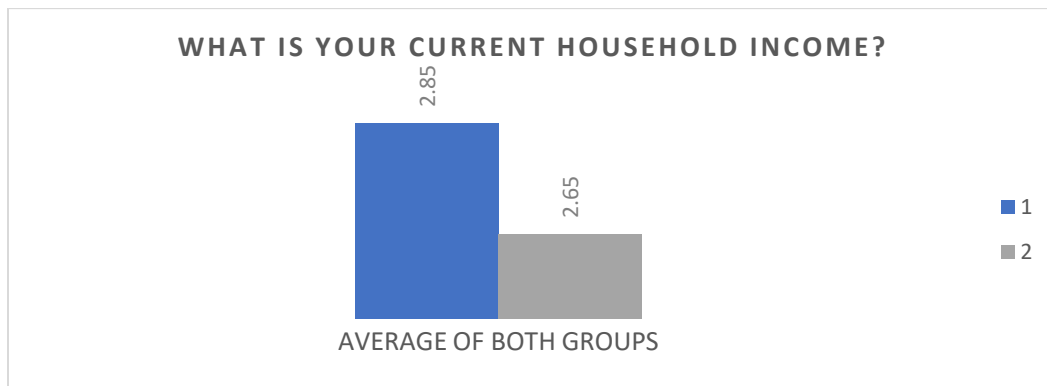

In terms of mean scores between both groups, while there is some difference between the average scores, it is evident that the difference is not significant between both groups given that the average score for Group 1 (Without Behavioral Questions) is 2.85 whereas the average score for Group 2 (With Behavioral Questions) is 2.65, a difference of 0.2 which means they both cluster around the same bracket of 50-100K, with group 1 having slightly more investors in the 3rd segment of 100-150K of their household income.

Table 5: Income Tax Bracket
What is your income tax bracket?

		Without Behavioral Questions	With Behavioral Questions	Total N	Total %
What is your income tax bracket?	10%	19	14	33	11%
	15%	41	28	69	23%
	25%	40	42	82	27.3%
	28%	42	48	90	30%
	33%	6	15	21	7%
	35%	2	3	5	1.7%
Total		150	150	300	100%

The above table attempts to understand the approximate tax bracket of the investor within a range of options, it is linked to their risk capacity and financial situation. The above table shows the distribution of the income tax bracket of respondents (n=300) with most respondents having a tax

bracket of 28% (30%). The first group of responders at 10% tax bracket represent 11% or 33 respondents of the sample, the group of responders at 15% tax bracket represent 23% or 69 of respondents. the group of responders at 25% tax bracket represents 27.3% or 82 of respondents and is the second most reported group of this sample. The group of responders at 28% tax bracket represent 30% or 90 of respondents and is the largest reported group in this sample. The group of respondents at 33% tax bracket represent 7% or 21 of respondents and finally the group respondents at 35% tax bracket represent 1.7% or 5 respondents of this sample.
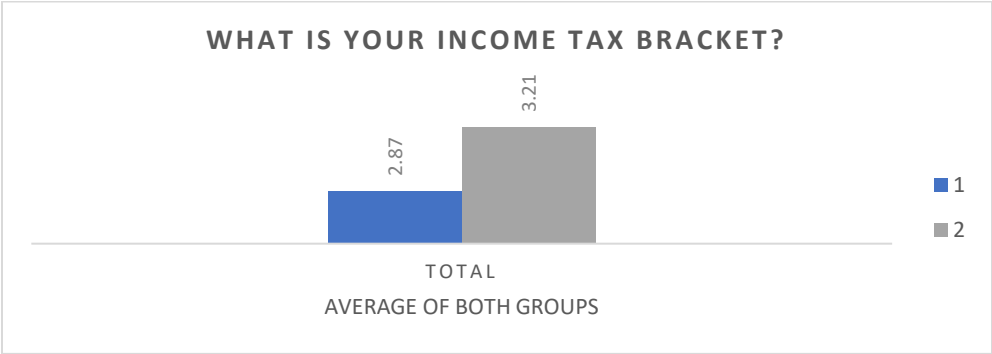
In terms of mean scores between both groups, while there is some difference between the average scores, it is evident that the difference is not significant between both groups given that the average score for Group 1 (Without Behavioral Questions) is 2.87 whereas the average score for Group 2 (With Behavioral Questions) is 3.21, a difference of 0.34 which means that group 2 has slightly higher tax bracket at 28% whereas group 1 tends to cluster more around the 25% tax bracket.

4.1.2 Section 2: Goals

In this section of the survey, the questions cover the time horizon and goals of investors and captures personal information related to their investment objective, income reliance, time needed to withdraw the investment and investment experience. This section allows financial managers to better tailor their recommendations and financial products and investments to suit the timeline of investors and their expectations.

Table 6: Investment Objective
What is your investment objective?

		Without Behavioral Questions	With Behavioral Questions	Total N	Total %
What is your investment objective?	Preserve Principal	21	17	38	12.7%
	Income	48	51	99	33%
	Income & Growth	34	33	67	22.3%
	Growth	33	37	70	23.3%
	Aggressive Growth	14	12	26	8.7%
Total		150	150	300	100%

The above table attempts to understand the investment objective of the investor within a range of options, it is linked to their goals, time horizon and risk appetite. The above table shows the distribution of the investment objectives by respondents (n=300) with most respondents indicating income as their objective (33%). Income & Growth and Growth alone were also somewhat equal with (22.3%) and (23.3%) respectively. The first group of responders whose investment objective is to preserve their principal represent 12.7% or 38 respondents of the sample. The group of responders whose investment objective is to have income represent 33% or 99 respondents of the sample and are the largest reported group in this sample. The group of responders whose investment objective is to have both income and growth represent 22.3% or 67 respondents of the sample. The group of respondents whose investment objective is focused on Growth represents 23.3% or 70 respondents and is the second reported group in this sample. Finally, the group of investors who investment objective is focused on aggressive growth represents 8.7% or 26 respondents and is the least represented group in this sample.
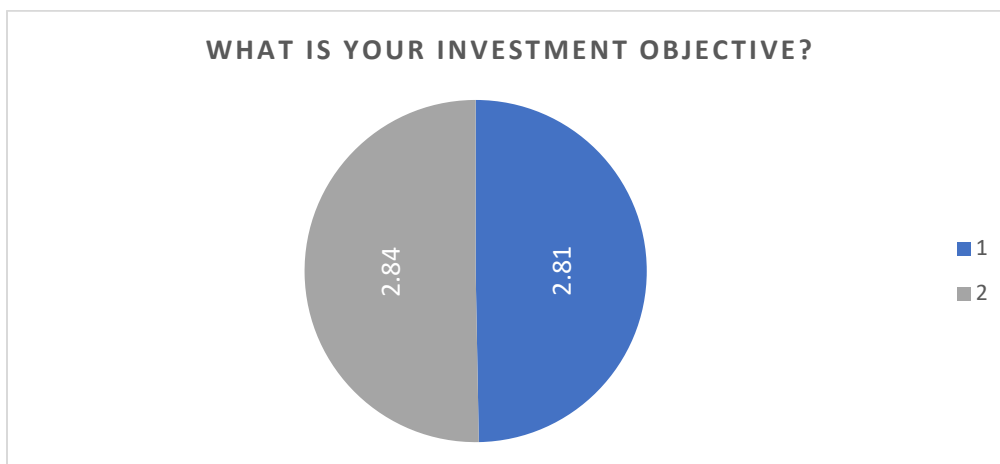
WHAT IS YOUR INVESTMENT OBJECTIVE?

2.84   2.81

■ 1
■ 2

In terms of mean scores between both groups, there is almost no difference at all, since both groups have an average score of 2.8 which means that for most investors in both groups and on average, income and growth is their investment objective.

Table 7: Duration of Taking Money out of Investments
I plan to begin taking money from my investments in

		Without Behavioral Questions	With Behavioral Questions	Total N	Total %
I plan to begin taking money from my investments in	Less than 1 year	19	24	43	14.3%
	1-3 years	46	42	88	29.3%
	4-6 years	41	38	79	26.3%
	7-10 years	28	28	56	18.7%
	More than 10 years	16	18	34	11.3%
Total		150	150	300	100%

The above table attempts to understand, within a range of options, when the investor is planning on withdrawing money from their investments and this question is linked to their goals, time horizon and risk appetite. The above table shows that most respondents (29.3%) would plan to start taking money from their investments in 1-3 years. The group of investors who plan to begin taking money from their investment in less than 1 year represents 14.3% or 43 respondents. The group of investors who plan to begin taking money from their investment within 1 to 3 years represents 29.3% or 88 respondents and is the largest reported group in this sample. The group of investors who plan to begin taking money from their investment within 4 to 6 years represents 26.3% or 79 respondents and is the second largest group of respondents in this sample. The group of investors who plan to

begin taking money from their investment within 7 to 10 years represents 18.7% or 56 respondents. The group of investors who plan to begin taking money from their investment in more than 10 years year represents 11.3% or 34 respondents.

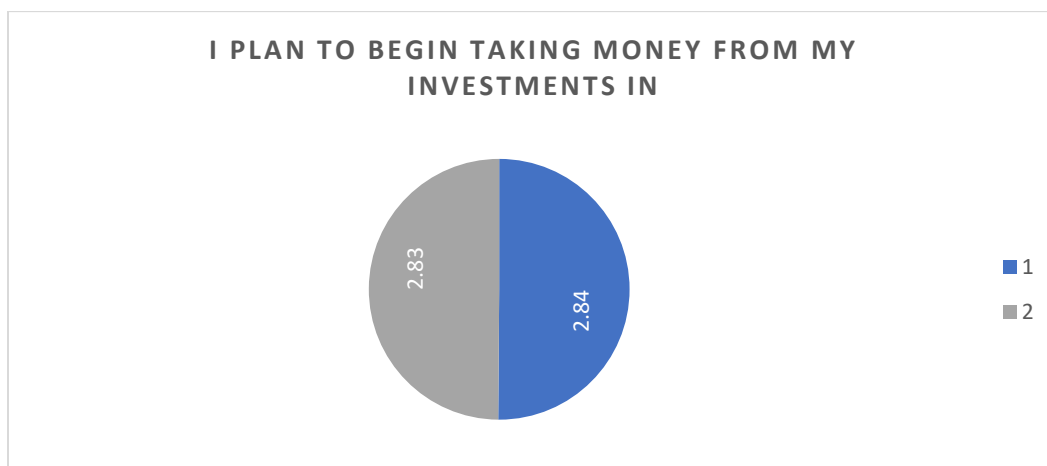**I PLAN TO BEGIN TAKING MONEY FROM MY INVESTMENTS IN**

2.83 2.84

■ 1
■ 2

In terms of mean scores between both groups, there is almost no difference at all, since both groups have an average score of 2.8 which means that for most investors in both groups and on average, they plan to withdraw money from their investments in between 1-3 years with slightly skewed result between 4-6 years.

Table 8: Reliance on Investment
Today, how much do you rely on income from your investment accounts?

		Without Behavioral Questions	With Behavioral Questions	Total N	Total %
Today, how much do you rely on income from your investment accounts?	Heavily	27	36	63	21%
	Slightly	58	40	98	32.7%
	Moderately	43	55	98	32.7%
	Not at all	22	19	41	13.6%
Total		150	150	300	

The above table attempts to understand, within a range of options, how much does the investor rely on income from their investments and this question is linked to their goals, time horizon and risk appetite. The above table shows that a majority of respondents (65.5%) rely on their income only slightly or moderately while both slightly and moderately are equal. This is an important question

given that it conveys to the financial managers how much their clients could be risk averse or not. The group of investors that stated that they rely heavily on their income from their investment accounts represents 21% or 63 respondents. The group of investors that stated that they rely slightly on their income from their investment accounts represents 27% or 98 respondents and The group of investors that stated that they rely moderately on their income from their investment accounts represents equally 32.7% or 98 respondents and are both equally the largest reported in this sample. Finally, the group of investors that stated that they rely heavily on their income from their investment accounts represents 13.6% or 41 respondents.

TODAY, HOW MUCH DO YOU RELY ON INCOME FROM YOUR INVESTMENT ACCOUNTS?

2.38 2.40

■ 1
■ 2

In terms of mean scores between both groups, there is almost no difference at all, since both groups have an average score of 2.4 which means that for most investors in both groups and on average, they slightly rely on income from their investment accounts.

Table 9: Investment Experience
What is your investment experience?

		Without Behavioral Questions	With Behavioral Questions	Total N	Total %
What is your investment experience?	None	34	32	66	22%
	Limited	53	53	106	35.3%
	Moderate	42	41	83	27.7%
	Extensive	21	24	45	15%
Total		150	150	300	100%

The above table attempts to understand, within a range of options, what is the investment experience of the investor, and this question is linked to their goals, time horizon and risk appetite. The above

table shows that a majority of respondents (35.3%) have a limited investment experience which allows the financial manager to guide them more into suitable recommendations based on their status. The group of investors who have reported that they have no investment experience is 22% or 66 respondents. The group of investors who have reported that they have limited investment experience is 35.3% or 106 respondents and represent the majority of this sample. The group of investors who have reported that they have moderate investment experience is 27.7% or 83 respondents and is the second largest reported group of this sample. Finally, the group of investors who have reported that they have extensive investment experience is 15% or 45 respondents.
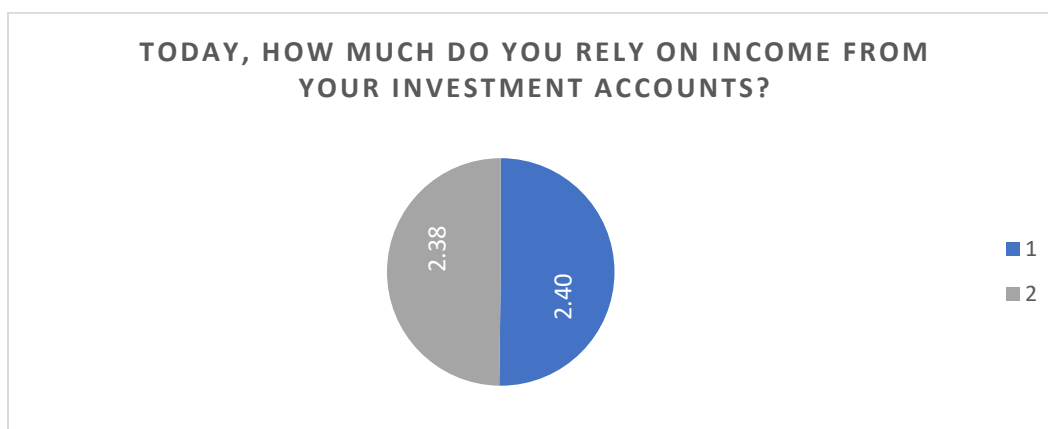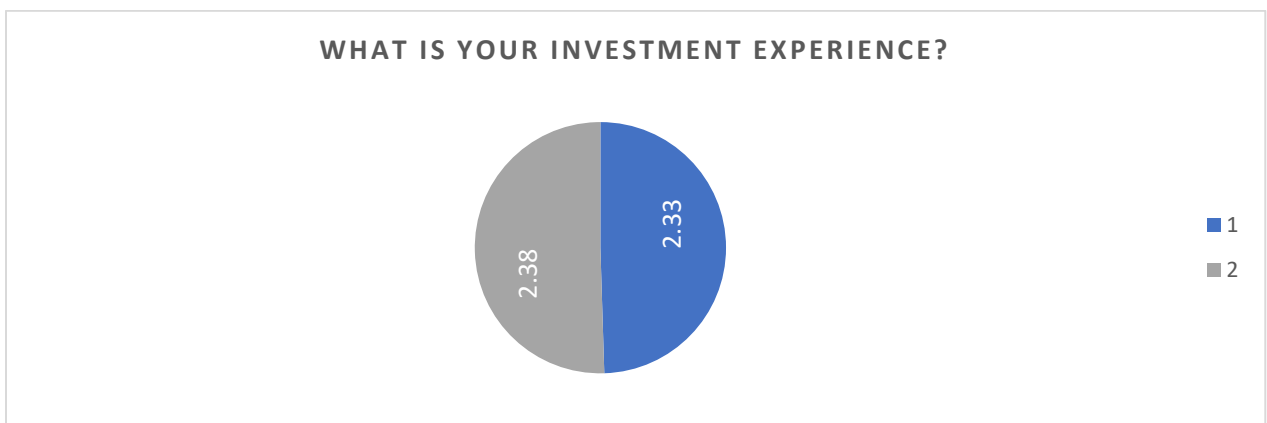

WHAT IS YOUR INVESTMENT EXPERIENCE?

In terms of mean scores between both groups, there is almost no difference at all, since both groups have an average score of 2.3 which means that for most investors in both groups and on average, they have a limited investment experience.

4.1.3 Section 2: Risk Tolerance

In this section of the survey, the questions cover a range of questions related to the investor's risk tolerance which is their ability to bare risk. One group of respondents (group 1; n=150) were asked only to answer the question related to describing their risk tolerance, whereas group 2 (=150) were asked to answer all the remaining questions. The remaining questions focus on behaviors when faced with financial scenarios. Those behavioral finance question related to the decisions investors make if they were presented with scenarios on rate of return, selling/buying stocks, etc. The final result of the survey is the risk profile rating provided by the financial advisor to the investor measured as part of their responses to the questionnaire.

Table 10: Risk Tolerance
Indicate the response that you feel best describes your risk tolerance

		Without Behavioral Questions	With Behavioral Questions	Total N	Total %
Indicate the response that you feel best describes your risk tolerance	Conservative	22	12	34	11.3%
	Moderate	44	35	79	26.3%
	Moderately Conservative	40	35	75	25%
	Moderately Aggressive	31	54	85	28.3%
	Aggressive	13	14	27	9%
Total		150	150	300	100%

The above table attempts to understand, within a range of options, which best describes the risk tolerance of investor, and this question is linked to their risk tolerance. The above table shows that a majority of respondents (174 or 58%) are between Moderately Aggressive. This question is asked to all respondents (n=300). The answers indicate that even with some investors having a higher-than-average risk capacity, compared to the sample, their risk tolerance is fluctuating between moderately conservative and moderately aggressive. The group of investors who have indicated that they have a conservative outlook based on their risk tolerance represents 11.3% or 34 respondents. The group of investors who have indicated that they have a moderate outlook based on their risk tolerance represents 26.3% or 79 respondents. The group of investors who have indicated that they have a moderately conservative outlook based on their risk tolerance represents 25% or 75 respondents. The group of investors who have indicated that they have a moderately aggressive outlook based on their risk tolerance represents 28.3% or 85 respondents and constitute the majority of responses. Finally, The group of investors who have indicated that they have an aggressive outlook based on their risk tolerance represents 9% or 27 respondents.

INDICATE THE RESPONSE THAT YOU FEEL BEST DESCRIBES YOUR RISK TOLERANCE
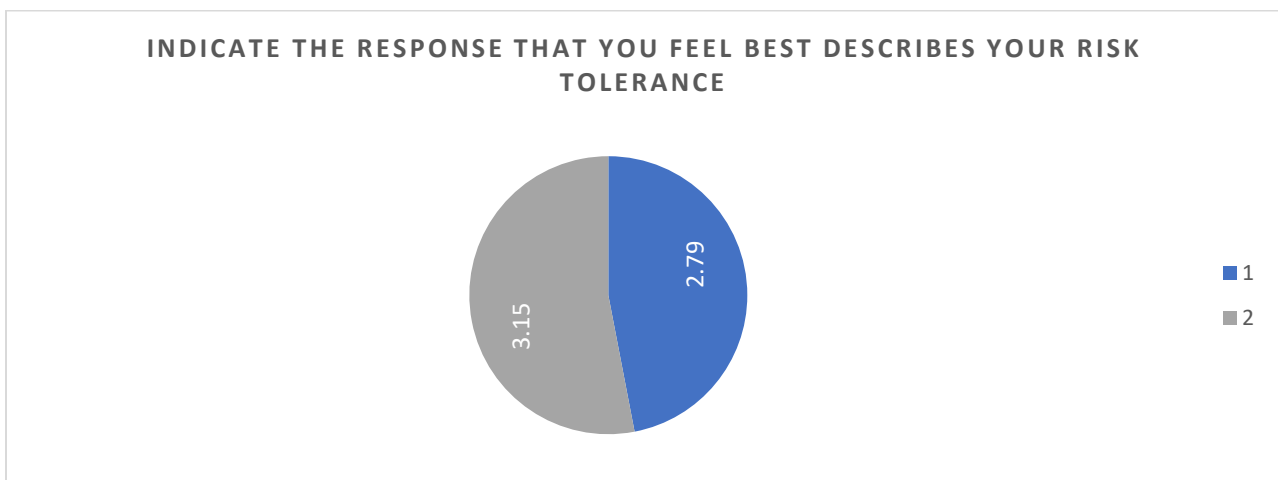
In terms of mean scores between both groups, there is a more pronounced difference between the average scores, it is evident that the difference is slightly noticeable between both groups given that the average score for Group 1 (Without Behavioral Questions) is 2.79 whereas the average score for Group 2 (With Behavioral Questions) is 3.15, a difference of 0.36 which means that group 1 tends to be concentrated in the moderately conservative whereas group 2 tends to be concentrated more in the moderately aggressive segment.

Table 11: Investment Reaction
Investment Reaction From September 2008 through November 2008, stocks lost over 31%. If I owned a stock investment that lost about 31% in three months, I would

	N	%
N/A	150	-
Sell all the remaining investment	17	11.3%
Sell some of the remaining investment	45	30.0%
Hold on to the investment and sell nothing	39	26.0%
Buy more of the investment	49	32.6%

The above table attempts to understand, which scenario will the investor choose based on the presented case and this question is linked to their risk tolerance. The above table shows the first behavioral questions asked to only group 2 (n=150) where a majority of respondents would either sell some of the remaining investment (30%) or buy more the investment (32.6%). The varying results here could be based on the risk capacity of the investors or time horizon. The group that would sell all their remaining investment based on the scenarios in this table represents 11.3% or 17 respondents. The group that would sell some their remaining investment based on the scenarios in this table represents 30% or 46 respondents and is the second largest reported group in this sample. The group that would sell hold on to their investment and sell nothing based on the scenarios in this table represents 26% or 39 respondents. Finally, The group that would buy more of the investment based on the scenarios in this table represents 32.6% or 49 respondents and is interestingly, the largest group in this sample.

Table 12: 1 Year Hypothetical Portfolio
Which hypothetical portfolio are you most comfortable with, considering the possible range of returns, for $100,000 invested, over a 1-YEAR period?

	N	%
N/A	150	-
102K-105K	22	14.6%
100K-107K	21	14.0%
95K-110K	44	29.3%
90K-115K	38	25.5%
75K-125K	25	16.6%

The above table attempts to understand, which scenario will the investor choose based on the presented case and this question is linked to their risk tolerance. The above table shows the second behavioral questions asked to only group 2 (n=150) where a majority of respondents would be more comfortable investing in a portfolio that would yield between 95K-110K over a 1-year period. This range is considered a median which indicates that most respondents fall in the average mean of these portfolio suggestions. The group of investors that are most comfortable with considering a range of return between 102-105K over a 1 year period represents 14.6% or 22 respondents. The group of investors that are most comfortable with considering a range of return between 100-107K over a 1 year period represents 14% or 21 respondents. The group of investors that are most comfortable with considering a range of return between 95-110K over a 1 year period represents 29.3% or 44 respondents and is the largest group in this sample. This is followed by the second largest group in this sample, the group of investors that are most comfortable with considering a range of return between 90-115K over a 1 year period represents 25.5% or 38 respondents. Finally, the group of investors that are most comfortable with considering a range of return between 75-125K over a 1 year period represents 16.6% or 25 respondents.

Table 13: 5 Years Hypothetical Portfolio
Investments with the highest potential for gains carry the greatest risk of loss. Which hypothetical portfolio are you most comfortable with, considering the possible outcomes of $100,000 invested for 5-YEARS

	N	%
N/A	150	-
105K-120K	21	14.0%
90K-135K	33	22.0%
85K-145K	43	28.6%
80K-160K	32	21.3%
70K-180K	21	14.0%

The above table attempts to understand, which scenario will the investor choose based on the presented case and this question is linked to their risk tolerance. The above table shows the third behavioral question asked only to group 2 (n=150) where a majority of respondents (28.6%) would be more comfortable investing in a portfolio that would yield between 85K-145K over a 5-years period. The answers by respondents are also very scattered in the sense that a good 14% would like to invest in the riskiest option (70K – 180K) and another 14% would like to invest in the safest option (105K-120K). These variations would be based on risk capacity, time horizon but also even investment experience. Based on the scenarios in the above table, the group of investors who would consider investing with a possible outcome between 105-120K represents 14% or 21 respondents. the group of investors who would consider investing with a possible outcome between 95-135K represents 22% or 33 respondents and is the second largest group in this sample. The group of investors who would consider investing with a possible outcome between 85-145K represents 28.6% or 43 respondents and is the largest group in this sample. The group of investors who would consider investing with a possible outcome between 80-160K represents 21.3% or 32 respondents. Finally, the group of investors who would consider investing with a possible outcome between 70-180K represents 14% or 21 respondents.

Table 14: 2 Days Hypothetical Portfolio
Historically, markets have experienced sharp, short-term downturns. If your investment portfolio lost 25% of its value over TWO DAYS, how would you react?

	N	%
N/A	150	-
I would immediately move all my holdings to cash	21	14.0%
I would immediately change to strategies that are more conservative	43	28.6%
I would wait at least 3 months before deciding to make any changes	47	31.3%
I would immediately change to strategies that are more aggressive	27	18.0%
I would immediately add to my investment portfolio and buy more equities to take advantage of the lower prices	12	8.0%

The above table attempts to understand, which scenario will the investor choose based on the presented case and this question is linked to their risk tolerance. The above table shows the fourth behavioral question asked only to group 2 (n=150) where a majority of respondents (31.3%) would likely wait 3 months before deciding to make changes to their investments, even if their portfolio

lost 25% of its value in two days. This question assesses the ability of investors to withhold risk in expectation of a return as well as their risk aversion. The second highest distribution by respondents (28.6%) is to immediately change to more conservative strategies to protect their investment. The group of investors who indicated they would immediately move all their holdings to cash if their investment portfolio lost 25% of its value over 2 days represents 14% or 21 respondents. The group of investors who indicated they would immediately change to strategies that are more conservative if their investment portfolio lost 25% of its value over 2 days represents 28.6% or 43 respondents and is the second largest group in this sample. The group of investors who indicated they would wait at least 3 months before deciding to make any changes if their investment portfolio lost 25% of its value over 2 days represents 31.3% or 47 respondents and is the largest group in this sample. The group of investors who indicated they would immediately change to strategies that are more aggressive if their investment portfolio lost 25% of its value over 2 days represents 18% or 27 respondents. Finally, the group of investors who indicated they would immediately add to their investment portfolio and buy more equities to take advantage of the lower prices if their investment portfolio lost 25% of its value over 2 days represents 8% or 12 respondents.

Table 15: 3 Months Hypothetical Portfolio
Historically, markets have experienced prolonged periods of declines. If your investment portfolio lost 33% of its value over the last 3 MONTHS, how would you react?

	N	%
N/A	150	-
I would immediately move all my holdings to cash	16	10.6%
I would immediately change to strategies that are more conservative	47	31.3%
I would wait at least 3 months before deciding to make any changes	52	34.6%
I would immediately change to strategies that are more aggressive	26	17.3%
I would immediately add to my investment portfolio and buy more equities to take advantage of the lower prices	9	6.0%

The above table attempts to understand, which scenario will the investor choose based on the presented case and this question is linked to their risk tolerance. The above table shows the fifth behavioral question asked only to group 2 (n=150) where a majority of respondents (31.3%) would likely wait 3 months before deciding to make changes to their investments, even if their portfolio lost 33% of its value in three months. This question assesses the ability of investors to withhold risk in expectation of a return as well as their risk aversion. The second highest distribution by

respondents (31.3%) is to immediately change to more conservative strategies to protect their investment. The group of investors who indicated they would immediately move all their holdings to cash if their investment portfolio lost 33% of its value over the last 3 months represents 10.6% or 16 respondents. The group of investors who indicated they would immediately change to strategies that are more conservative if their investment portfolio lost 33% of its value over the last 3 months represents 31.3% or 47 respondents and is the second largest group in this sample. The group of investors who indicated they would wait at least 3 months before deciding to make any changes if their investment portfolio lost 33% of its value over the last 3 months represents 34.6% or 52 respondents and is the largest group in this sample. The group of investors who indicated they would change to strategies that are more aggressive if their investment portfolio lost 33% of its value over the last 3 months represents 17.3% or 26 respondents. Finally, the group of investors who indicated they would immediately add to their investment portfolio and buy more equities to take advantage of the lower prices if their investment portfolio lost 33% of its value over the last 3 months represents 6% or 9 respondents.

Table 16: Investment in Stocks
Assuming you want to invest in stocks, which one would you choose?

	N	%
N/A	150	-
Companies with significant technological advancement but selling their stocks at a low price	37	24.6%
Established well-known companies that have a potentially high rate of growth	60	40.0%
Blue chip stocks that pay the dividend	37	24.6%
Other	16	10.6%

The above table attempts to understand, which scenario will the investor choose based on the presented case and this question is linked to their risk tolerance. The above table shows the sixth behavioral question asked only to group 2 (n=150) where a majority of respondents (40%) would likely invest in the stocks of established well-known companies that have a potentially high rate of growth. This shows that many investors prefer companies with strong fundamentals and solid performance but normally such types of stocks are associated with lower returns given their stability in comparison with capital ventures and other types of risky financial investments. The group of investors that would choose companies with significant technological advancement but selling their stocks at a low price as a stock investment represents 24.6% or 37 respondents. The group of investors that would choose established well-known companies that have a potentially

high rate of growth as a stock investment represents 40% or 60 respondents, this group of investors represents the largest group in this sample. The group of investors that would choose blue chip stocks that pay the dividend as a stock investment represents 24.6% or 37 respondents; both this group and the group that would choose companies with significant technological advancement but selling their stocks at a low price are equally the second largest group in this sample. Finally, the group of investors that would choose other stock investment choices represents 10.6% or 16 respondents.

4.1.4 Yield on Proposed Investments & Client Retention

The dependent variable of this study is the yield or the earnings of the 300 investors who are part of MultiBank's clientele and who have been offered recommendations and subscribed to financial products advised by the firm's financial advisors and managers. In that context, we showcase the yield results of group 1 and group 2 below. MultiBank's range of financial products encompasses securities, currencies, bonds, treasury bills, capital ventures, mutual funds and other financial products and investment instruments. For the purpose of this study, we look at the tailored portfolios that have been proposed to group 1 and group 2 as part of MultiBank's recommendations based on risk profiling.

Table 17: Asset Allocation; MultiBank

Portfolio Type	Exchange Traded Funds (ETFs) / U.S. Stocks	Foreign Stocks	Fixed Income Bonds	Short-term (Money Market, Capital/Convertible Notes)
Conservative	14%	6%	50%	30%
Moderate/Balanced	35%	15%	40%	10%
Growth	49%	21%	25%	5%
Aggressive	60%	25%	15%	-

Table 1 shows the asset allocation by type of risk profile that MultiBank has used in its portfolio mix and strategy. On the conservative side much of the focus is on Bonds/Fixed Income where exposure to long term treasury bonds like US bonds are normally stable. In its conservative allocation ETFs are also reduced to reduce volatility. For its Moderate or Balanced risk profile, MultiBank has chosen a higher exposure on ETFs and a high expose on Bonds which balances the

volatility of the ETFs and creates a stable cushion for market fluctuations. For its Growth (Moderately Aggressive) risk profile, MultiBank's asset allocation is highly exposed to ETFs and balanced towards foreign stocks and bonds. For its Aggressive risk profile strategy, its asset allocation is in large part based on ETFs, followed by foreign stock and minimal investment in bonds with no investment in cash markets. This diversification does play to the hand of reducing risk, but MultiBank's strategy is different amongst asset classes too; for example in its growth portfolio it used large-capital ETFs like Vanguard Growth ETF whereas for its aggressive strategy it has a much higher exposure on blue chip technology and iShares.

A: Group 1

The first group of investors who have not been administered behavioral finance questions (group 1) are 150 investors who have different risk profile ratings as well different time horizons and are not grouped into group 1 based on any characteristic or trait or income level or any other determinant and they were randomly sampled. For this group the below details provide information about their age, net worth, income levels, rating scores and education level and financial literacy.
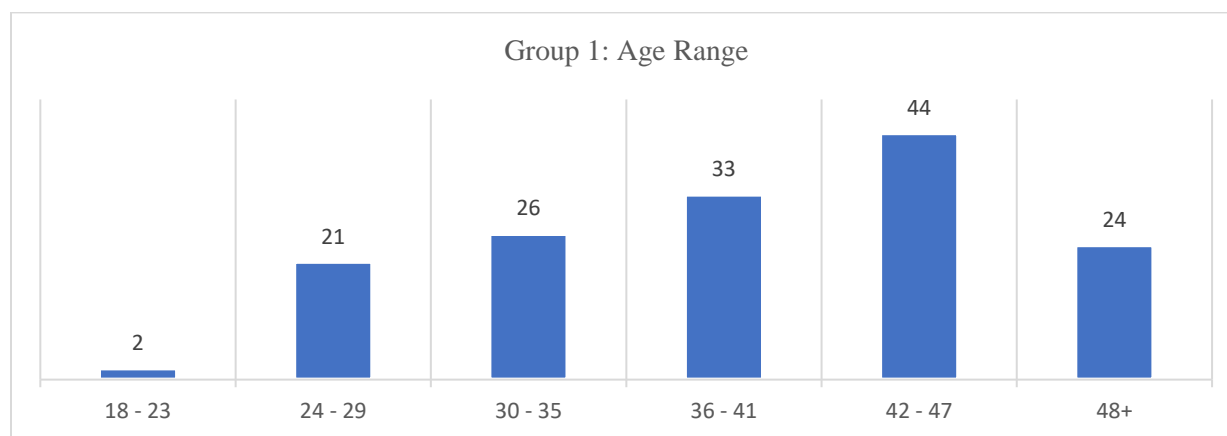
The above chart shows the age range of group 1 (n=150) which indicates that the most reported age range is between 42-47 years. The age range in this group starts from the range of 18-23 up till 48 years and above. Respondents whose age range is between 18-23 make up 1.3% or 2 investors in this sample. Respondents whose age range is between 24-29 make up 14% or 21 investors in this sample. The segment of respondents whose age range is between 30-35 make up 17.3% or 26 investors in this sample. Respondents whose age range is between 36-41 make up 22% or 33 investors in this sample and are the second largest segment in this sample. The segment of respondents whose age range is between 42-47 make up 29.3% or 44 investors in this sample and is the largest reported segment. Investors in this group whose age is 48 years or above make up 16% or 24 respondents in this sample.

Group 1: Education Levels

High School	Bachelor	Post Graduate	Doctorate
4	69	51	26
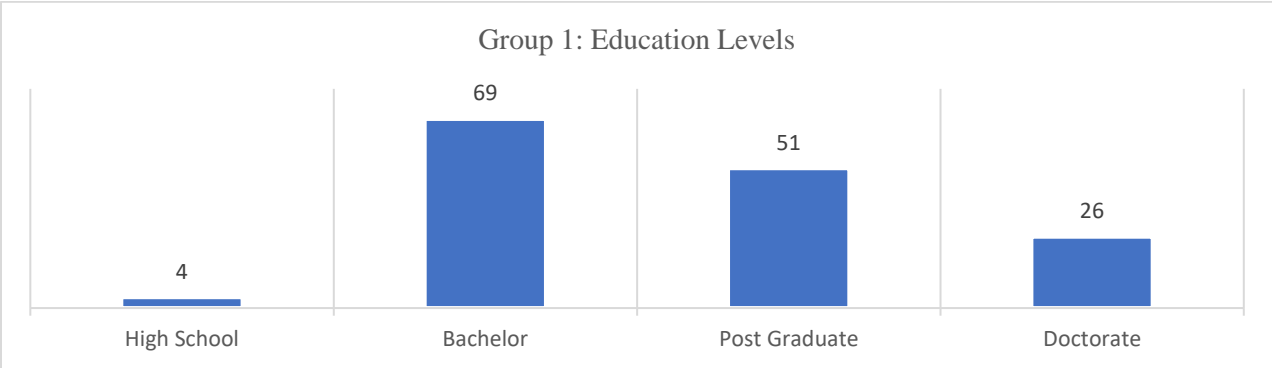
The above chart shows the education levels of group 1 (n=150) which indicates that the most reported education level is investors who have attained the bachelor's degree level. Respondents who have attained a high school degree represent the least segment in this group making up 3% or 4 investors in this sample. Respondents who have attained a bachelor's degree represent the largest segment in this group making up 46% or 69 investors in this sample. Respondents who have attained a post graduate degree represent the second largest segment in this group making up 34% or 51 investors in this sample. Finally, respondents who have attained a Doctorate level represent 17% or 26 investors in this sample.

Group 1: Financial Literacy/Investment Experience

None	Limited	Moderate	Extensive
33	52	45	20
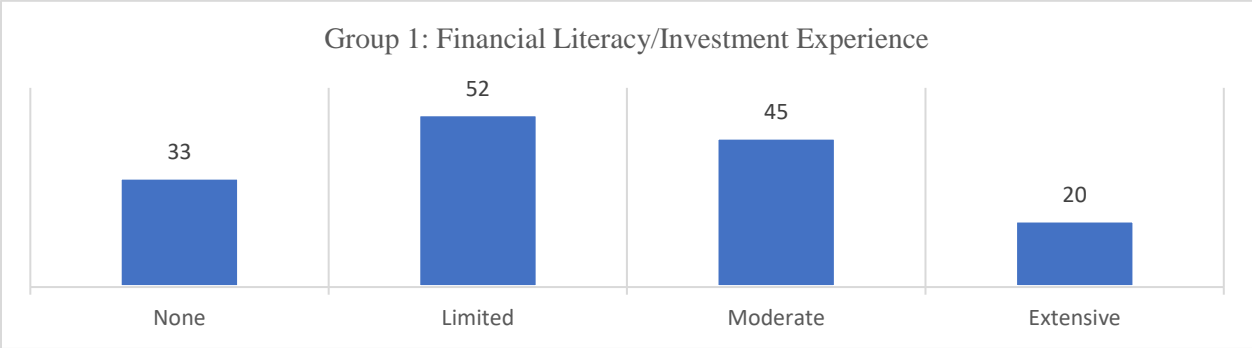
The above chart shows the investment experience or financial literacy of group 1 (n=150) which indicates that the most reported experience is reported as limited. Respondents who have no experience in investment represent 22% or 33 investors in this sample. Respondents who have limited experience in investment represent 34% or 52 investors in this sample and is the largest segment in this group. Respondents who have moderate experience in investment represent 30% or 33 investors in this sample. Finally, respondents who have extensive experience in investment represent 13% or 20 investors in this sample.

Group 1: Net Worth

Under 100K	100K-300K	300K-500K	500K-750K	750K-1.0M	1.0M-3.0M	Above 3.0M
13	25	39	31	27	12	3
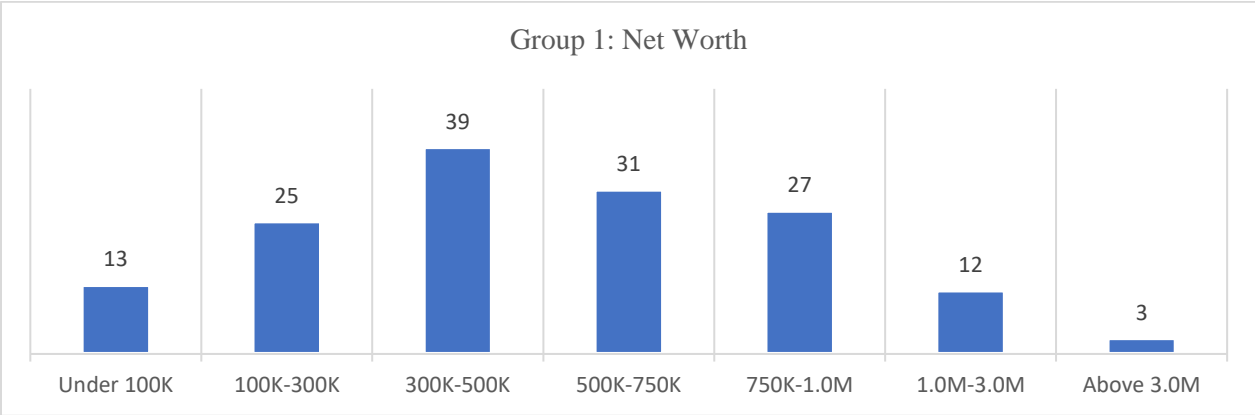
The above chart shows the net worth of group 1 (n=150) which indicates that the most reported net worth is between 300-500K. The net worth range in this group starts from the range of under 100K up till 3 Million and above. Respondents whose net worth is under 100K make up 8.7% or 13 investors in this sample. Respondents whose net worth is between 100-300K make up 16.7% or 25 investors in this sample. The segment of respondents whose net worth is between 300-500K make up 26% or 39 investors in this sample and is the largest reported segment. Respondents whose net worth is between 500-750K make up 20.7% or 31 investors in this sample and are the second largest segment in this sample. The segment of respondents whose net worth is between 750K-1.0M make up 18% or 27 investors in this sample. Investors in this group whose net worth is between 1.0-3.0M make up 8% or 12 respondents in this sample. Respondents whose net worth is 3.0 Million and above make up 2% or 3 investors in this sample.

Group 1: Household Income Level

<50K	50K-100K	100K-150K	250K-500K	>500K
37	44	46	17	6
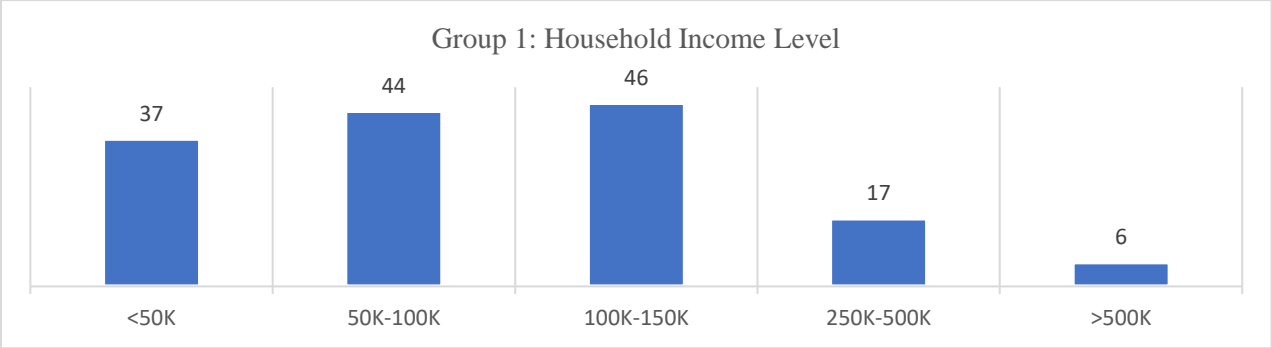
The above chart shows the household income levels of group 1 (n=150) which indicates that the most reported household income is between 100-150K. The household income range in this group starts from the range of under 50K up till 500K and above. Respondents whose household income is under 50K make up 25% or 37 investors in this sample. Respondents whose household income is between 105-100K make up 29% or 44 investors and is the second largest reported segment in

this sample. The segment of respondents whose household income is between 100-150K represent 31% or 46 investors in this group and is the largest reported segment in this sample. Respondents whose household income is between 250-500K make up 11% or 17 investors and respondents whose household income is 500K or above make up 4% or 6 investors.

The charts above represent a snapshot of group 1 data that provides insights into their age, education, income, net worth, experience and allows us to understand this group better. The most important factor in this study is to compare how the financial advisor's risk profile rating fares with the yield of the investors as per their proposed investment. For that, the below table provides a snapshot of Year-on-Year (YoY) investment growth per cluster of investors based on their risk profile. The measure starts in January 2021 and ends in January 2022 and is provided by MultiBank with anonymized details to retain confidentiality.
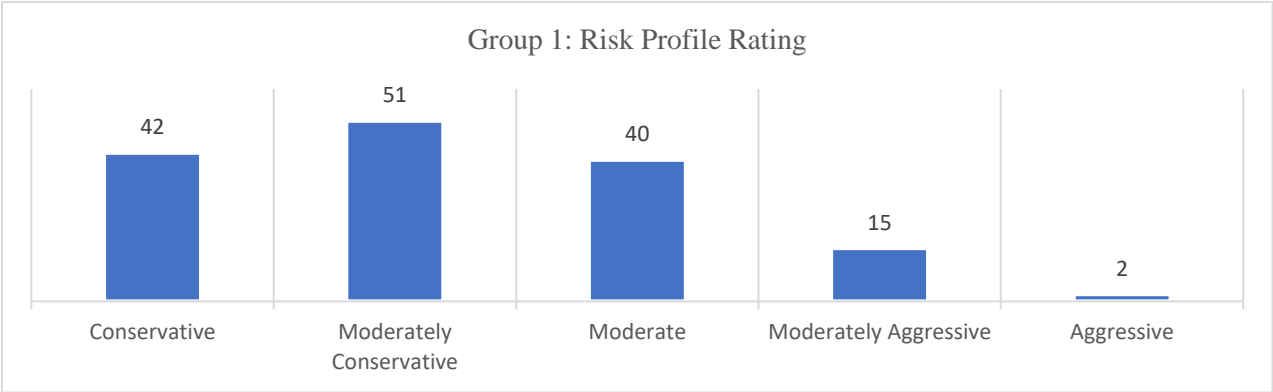
The above chart shows the risk profile rating of group 1 (n=150) which indicates that the most reported rating is Moderately Conservative. Respondents whose risk profile rating is Conservative represent 28% or 42 investors in this sample. Respondents whose risk profile rating is Moderately Conservative represents 34% or 51 investors and is the largest segment in this sample. Respondents whose risk profile rating is Moderate represents 26.7% or 40 investors in this sample. The segment of respondents whose risk profile rating is Moderately Aggressive represents 10% or 15 investors in this sample and finally, respondents whose risk profile rating is aggressive represents 1.3% or 2 investors in this sample. The graph below shows the shape of the curve for this group 1 distribution with an observed mean of 2.23 (Moderately Conservative).
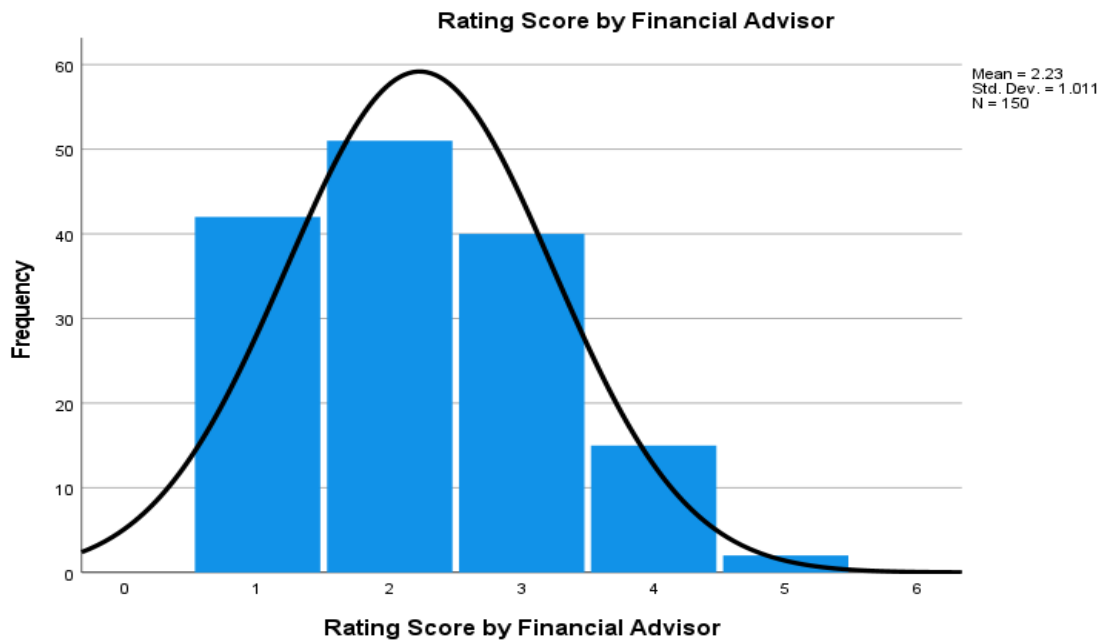
Rating Score by Financial Advisor

Mean = 2.23
Std. Dev. = 1.011
N = 150

*(1=Conservative; 2=Moderately Conservative; 3=Moderate; 4=Moderately Aggressive; 5=Aggressive)

Table 18: Group 1 Investment Yield (%Change YoY)

Risk Profile Rating	Number of Investors	Asset Allocation Rating	Asset Class (Largest Investment)	Average 2021 Yield ($M) (by Asset Allocation Cluster)	Average 2022 Yield ($M) (Asset Allocation Cluster)	YoY Investment Yield %Change	Number of Investors (by 01 Feb 2022) Retention
Conservative	42	Conservative	Money Market	$52.7	$54.1	3%	37
Moderately Conservative	51	Balanced	Fixed Income	$58.4	$56.8	-3%	33
Moderate	40	Balanced	ETFs	$72.1	$79.4	10%	35
Moderately Aggressive	15	Growth	ETFs	$31.8	$36.2	14%	11
Aggressive	2	Aggressive	ETFs	$0.72	$0.93	29%	2
TOTAL	150	-	-	$215.7	$227.4	5%	118

The above table (Table 2) shows the asset allocation, asset class and yield of the group 1 investors (without behavioral finance questions) and the percentage change based on their earnings in January 2021 and January 2022. What this table shows is that the asset allocation rating matches

the risk profile rating, and the most invested asset class is different for each asset allocation rating. For group 1, we note that the total average yield for 2021 was $215.7M whereas the total average yield for 2022 is $227.4M which is a 5% change in the Year-on-Year (YoY) investment growth. This indicates that MultiBank has been able to secure a positive yield for its investors and the only asset class it has suffered losses in was the Fixed Income for investors who were rated as moderately conservative who lost 3% of the value of their investments on average. The most optimized return in this group was for the aggressive segment, which witnessed a 29% YoY investment growth although this segment is made up of only 2 investors who were highly exposed to Exchange Traded Funds (ETFs) in technology. An important aspect to consider in this table is also the figures related to the retention of investors. At the beginning of January 2021, this group of investors was numbered at 150 and by the end of January 2022, the number became 118 which meant about 21% drop in the number of investors. This could have multiple explanations and interpretations mainly related to time horizon or other priorities, but this figure explains the retention of clients, and the largest drop in number of investors per risk profile rating is in the Moderately Conservative segment which lost 18 investors. The total loss of investors for group 1 is 31 investors.

B: Group 2

The second group of investors who have been administered behavioral finance questions (group 2) are 150 investors who have different risk profile ratings as well different time horizons and are not grouped into group 2 based on any characteristic or trait or income level or any other determinant and they were randomly sampled. For this group the below details provide information about their age, net worth, income levels, rating scores and education level and financial literacy.
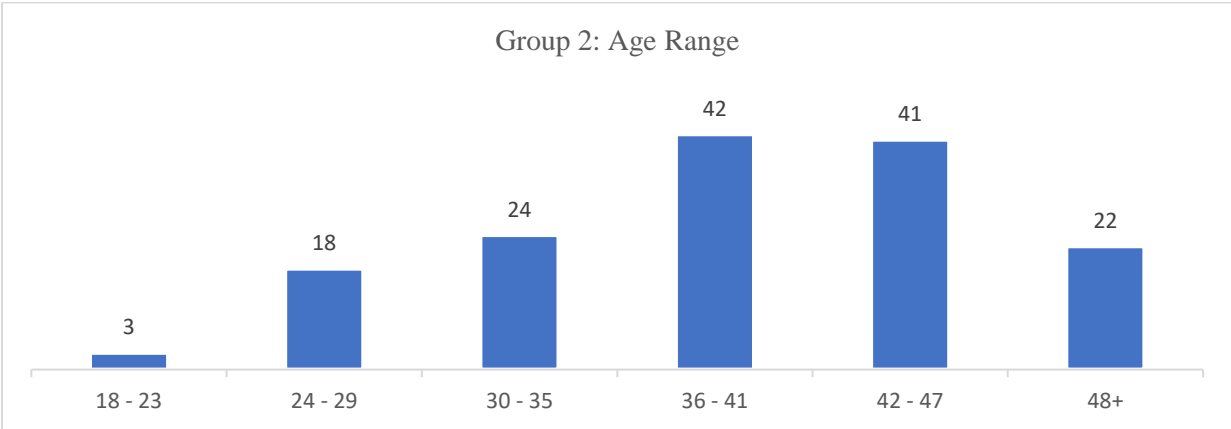
Group 2: Age Range

The above chart shows the age range of group 2 (n=150) which indicates that the most reported age range is between 36-41 years. The age range in this group starts from the range of 18-23 up

till 48 years and above. Respondents whose age range is between 18-23 make up 2% or 3 investors in this sample. Respondents whose age range is between 24-29 make up 12% or 18 investors in this sample. The segment of respondents whose age range is between 30-35 make up 16% or 24 investors in this sample. Respondents whose age range is between 36-41 make up 28% or 42 investors in this sample and are the largest segment in this sample. The segment of respondents whose age range is between 42-47 make up 27% or 41 investors in this sample and is the second largest reported segment. Investors in this group whose age is 48 years or above make up 15% or 22 respondents in this sample.

Group 2: Education Levels

High School	Bachelor	Post Graduate	Doctorate
3	71	48	28
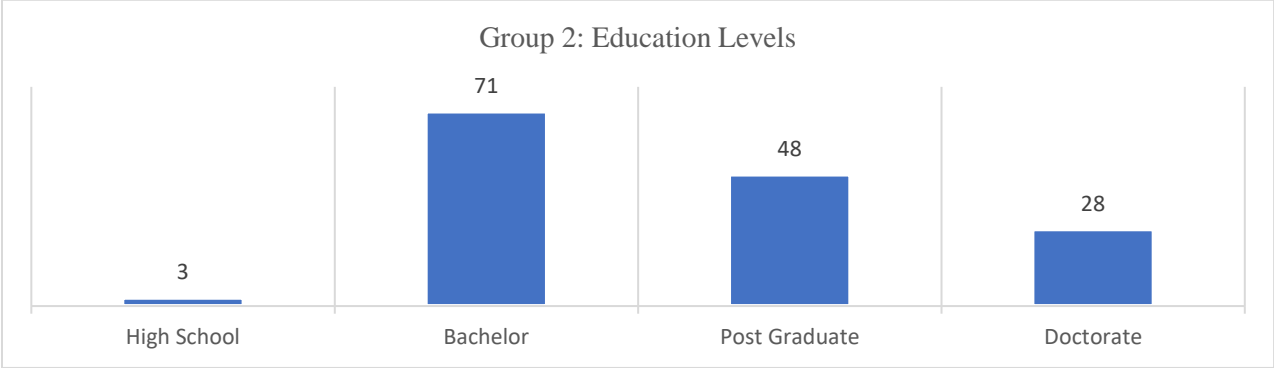
The above chart shows the education levels of group 2 (n=150) which indicates that the most reported education level is investors who have attained the bachelor's degree level. Respondents who have attained a high school degree represent the least segment in this group making up 2% or 3 investors in this sample. Respondents who have attained a bachelor's degree represent the largest segment in this group making up 47% or 71 investors in this sample. Respondents who have attained a post graduate degree represent the second largest segment in this group making up 32% or 28 investors in this sample. Finally, respondents who have attained a Doctorate level represent 19% or 28 investors in this sample.

Group 2: Financial Literacy/Investment Experience

None	Limited	Moderate	Extensive
32	53	41	24
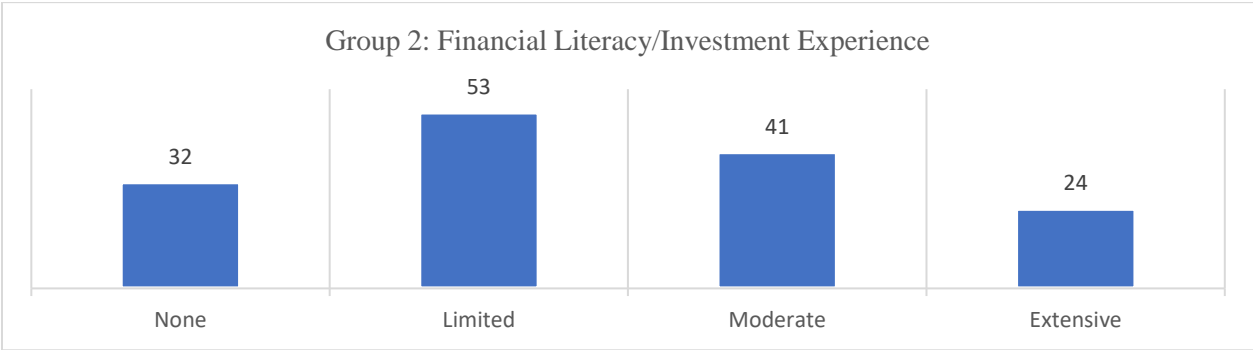
The above chart shows the investment experience or financial literacy of group 2 (n=150) which indicates that the most reported experience is reported as limited. Respondents who have no experience in investment represent 21% or 32 investors in this sample. Respondents who have limited experience in investment represent 35% or 53 investors in this sample and is the largest segment in this group. Respondents who have moderate experience in investment represent 27% or 41 investors in this sample. Finally, respondents who have extensive experience in investment represent 16% or 24 investors in this sample.

Group 2: Net Worth

Under 100K	100K-300K	300K-500K	500K-750K	750K-1.0M	1.0M-3.0M	Above 3.0M
15	19	34	40	20	15	7
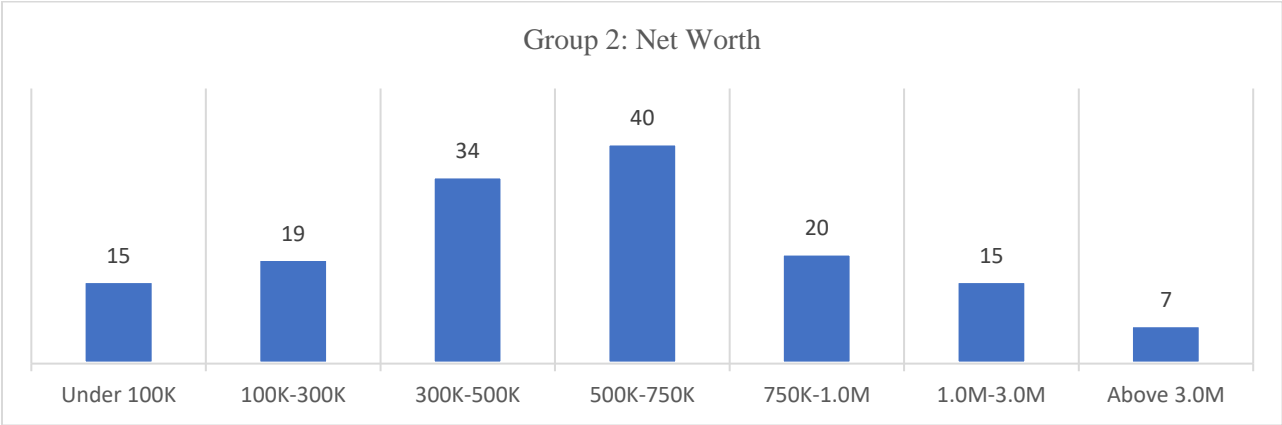
The above chart shows the net worth of group 2 (n=150) which indicates that the most reported net worth is between 500-750K. The net worth range in this group starts from the range of under 100K up till 3 Million and above. Respondents whose net worth is under 100K make up 15% or 15 investors in this sample. Respondents whose net worth is between 100-300K make up 13% or 19 investors in this sample. The segment of respondents whose net worth is between 300-500K make up 23% or 34 investors in this sample and are the second largest segment in this sample. Respondents whose net worth is between 500-750K make up 27% or 40 investors in this sample and are the largest segment in this sample. The segment of respondents whose net worth is between 750K-1.0M make up 13% or 20 investors. The group of investors whose net worth is between 1.0-3.0M make up 10% or 15 respondents in this sample. Finally, investors whose net worth is 3.0 Million and above make up 5% or 7 investors in this sample.

Group 2: Household Income Level
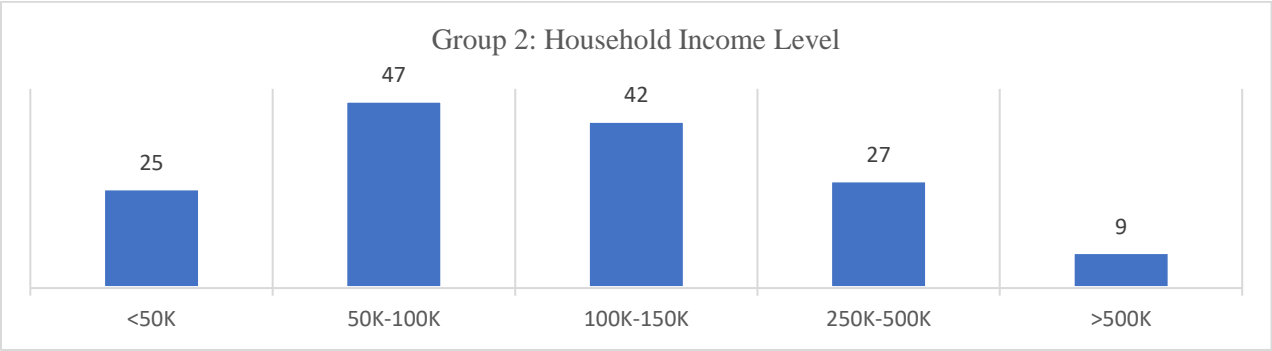
The above chart shows the household income levels of group 2 (n=150) which indicates that the most reported household income is between 50-100K. The household income range in this group starts from the range of under 50K up till 500K and above. Respondents whose household income is under 50K make up 17% or 25 investors in this sample. Respondents whose household income is between 50-100K make up 31% or 47 investors and is the largest reported segment in this sample. The segment of respondents whose household income is between 100-150K represent 27% or 42 investors in this group and is the second largest reported segment in this sample. Respondents whose household income is between 250-500K make up 18% or 27 investors and respondents whose household income is 500K or above make up 6% or 9 investors.

The charts above represent a snapshot of group 2 data that provides insights into their age, education, income, net worth, experience and allows us to understand this group better. The most important factor in this study is to compare how the financial advisor's risk profile rating fares with the yield of the investors as per their proposed investment. For that, the below table provides a snapshot of Year-on-Year (YoY) investment growth per cluster of investors based on their risk profile. The measure starts in January 2021 and ends in January 2022 and is provided by MultiBank with anonymized details to retain confidentiality.

Group 2: Risk Profile Rating
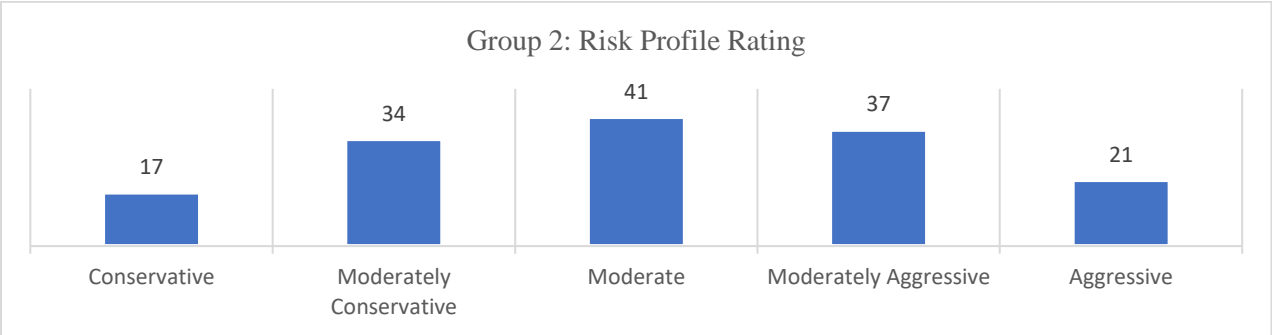
The above chart shows the risk profile rating of group 2 (n=150) which indicates that the most reported rating is Moderate. Respondents whose risk profile rating is Conservative represent 11%

or 17 investors in this sample. Respondents whose risk profile rating is Moderately Conservative represents 23% or 34 investors. Respondents whose risk profile rating is Moderate represents 27% or 41 investors in this sample and is the largest segment in this sample. The segment of respondents whose risk profile rating is Moderately Aggressive represents 25% or 37 investors in this sample and is the second largest segment in this sample and finally, respondents whose risk profile rating is aggressive represents 14% or 21 investors in this sample. The graph below shows the shape of the curve for this group 2 distribution with an observed mean of 3.07 (Moderate).
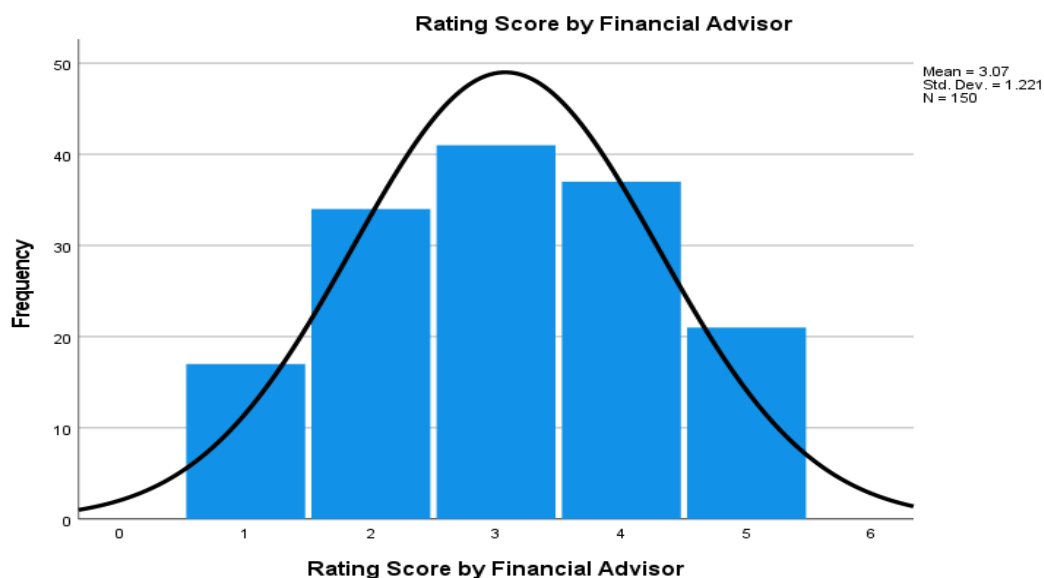
Rating Score by Financial Advisor

Mean = 3.07
Std. Dev. = 1.221
N = 150

*(1=Conservative; 2=Moderately Conservative; 3=Moderate; 4=Moderately Aggressive; 5=Aggressive)

Table 19: Group 2 Investment Yield (%Change YoY)

Risk Profile Rating	Number of Investors	Asset Allocation Rating	Asset Class (Largest Investment)	Average 2021 Yield ($M) (by Asset Allocation Cluster)	Average 2022 Yield ($M) (by Asset Allocation Cluster)	YoY Investment Yield %Change	Number of Investors (by 01 Feb 2022) Retention
Conservative	17	Conservative	Money Market	$43.7	$44.6	2%	13
Moderately Conservative	34	Balanced	Fixed Income	$61.7	$65.2	6%	32
Moderate	41	Growth	ETFs	$81.3	$93.1	15%	41
Moderately Aggressive	37	Growth	ETFs	$71.4	$86.8	22%	35
Aggressive	21	Aggressive	ETFs	$4.06	$5.39	33%	16
TOTAL	150	-	-	$262.2	$295.1	13%	137

The above table (Table 2) shows the asset allocation, asset class and yield of the group 1 investors (without behavioral finance questions) and the percentage change based on their earnings in January 2021 and January 2022. What this table shows is that the asset allocation rating matches the risk profile rating, and the most invested asset class is different for each asset allocation rating. For group 2, we note that the total average yield for 2021 was $262.2M whereas the total average yield for 2022 is $295.1M which is a 13% change in the Year-on-Year (YoY) investment growth. This indicates that MultiBank has been able to secure a positive yield for its investors and the only without suffering any loss in any asset class when compared with group 1. The most optimized return in this group is also for the aggressive segment, which witnessed a 33% YoY investment growth although this segment is made up of only 21 investors who were highly exposed to Exchange Traded Funds (ETFs) in blue chip technology and other securities. An important aspect to consider in this table is also the figures related to the retention of investors. At the beginning of January 2021, this group of investors was numbered at 150 and by the end of January 2022, the number became 137 which meant about 9% drop in the number of investors. This could have multiple explanations and interpretations mainly related to time horizon or other priorities, but this figure explains the retention of clients, and the largest drop in number of investors per risk profile rating is in the Aggressive segment which lost 5 investors. The total loss of investors for group 2 is 13 investors.

4.2 Means Comparison

The below tables provide a summary on the results between both groups (group 1 without behavioral finance questions; group 2 with behavioral finance questions). The results below compare the means of the responses on the rating scores of the risk profiling. One important test in this section is the means comparison; while the Pearson Chi Square test is used in this study, it is also interesting to check if the means between both groups is close or distant.

Table 20: Case Processing Summary

| | Cases | | | | | |
| | Included | | Excluded | | Total | |
	N	Percent	N	Percent	N	Percent
Rating Score by Financial Advisor * Group of investors	300	100.0%	0	0.0%	300	100.0%

Table 21: Rating Score by Financial Advisor

Group of investors	Mean	N	Std. Deviation
Without Behavioral Questions	2.23	150	1.011
With Behavioral Questions	3.07	150	1.221
Total	2.65	300	1.197

The above table shows the mean between the two groups (group 1 & 2; n=300). When the rating scores on the risk profiles of both groups were analyzed, group 1 respondents (without behavioral questions) were rated as Moderately Conservative with a mean of 2.23. whereas group 2 respondents (with behavioral questions) were rated as Moderate with a mean of 3.07. While this mean difference is statistically significant, the difference between moderately conservative and moderate is not large in terms of investment strategies as both yields could turn out to either be closely apart or similar. However, this result does show more favoritism towards moderate risk rather than moderately conservative risk.

4.3 Pearson Chi Square test

The purpose of running a Pearson Chi Square test in this study is to establish whether the introduction of behavioral questions to group 2 has an impact on the risk tolerance of that group, through their risk profile rating. The result of the Pearson Chi Square test will indicate whether the difference in the mean of both groups is different than 0. The P value generated from the Pearson Chi Square test should indicate whether these two groups' risk profile ratings are different (if less than < 0.05). What the Pearson Chi Square test shows will have an impact on the hypothesis, especially if it determines that the dependent variable (risk tolerance) has a statistical difference, and this can allow us to conclude that behavioral questions do impact risk tolerance assessment. This is an association test which allows us to determine whether the null hypothesis can be rejected or not, the null hypothesis being that the inclusion of behavioral finance questions into the risk profiling questionnaire did not have an impact on the investor's yield in their proposed investments. However, to be able to assess that we must first explore whether there is a statistical significance between group 1 and group 2 investors' risk profile rating based on their questionnaires. The Pearson Chi Square test is run here to determine the rating of the investors' risk profile for both groups by their financial advisor to determine whether there is a significant change or association between both groups.

Table 22: Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	39.009[a]	1	.531
Likelihood Ratio	42.273	4	<.001
Linear-by-Linear Association	37.537	1	<.001
N of Valid Cases	300		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 11.50.

The above table shows the result of the Pearson Chi Square test with the p value being less than <0.001. The smaller the p value the stronger the evidence to reject the null hypothesis (H0: *Inclusion of behavioral finance questions into a risk profile does not have positive impact on proposed investments*.) The result herein suggest that there is a 50% chance to reject the null hypothesis based on the rating score alone because the p value of 0.531 is much higher than <0.05. Nevertheless, this result does not provide sufficient statistical significance to reject the null hypothesis or to confirm the alternative hypothesis and therefore, the Pearson Chi Square test alone is not sufficient to confirm the H1 hypothesis that including behavioral finance questions will have a better risk profiling because we still need to demonstrate the suitability of the proposed investments through financial performance for the control group (group 2). This result opens the door to more investigation mainly because there is a 50% chance that any outcome could be possible but our hypothesis in this study is not based on whether the rating score plays a role in the risk profiling but rather, whether that rating was solid to suggest successful investment options that would yield positive results.
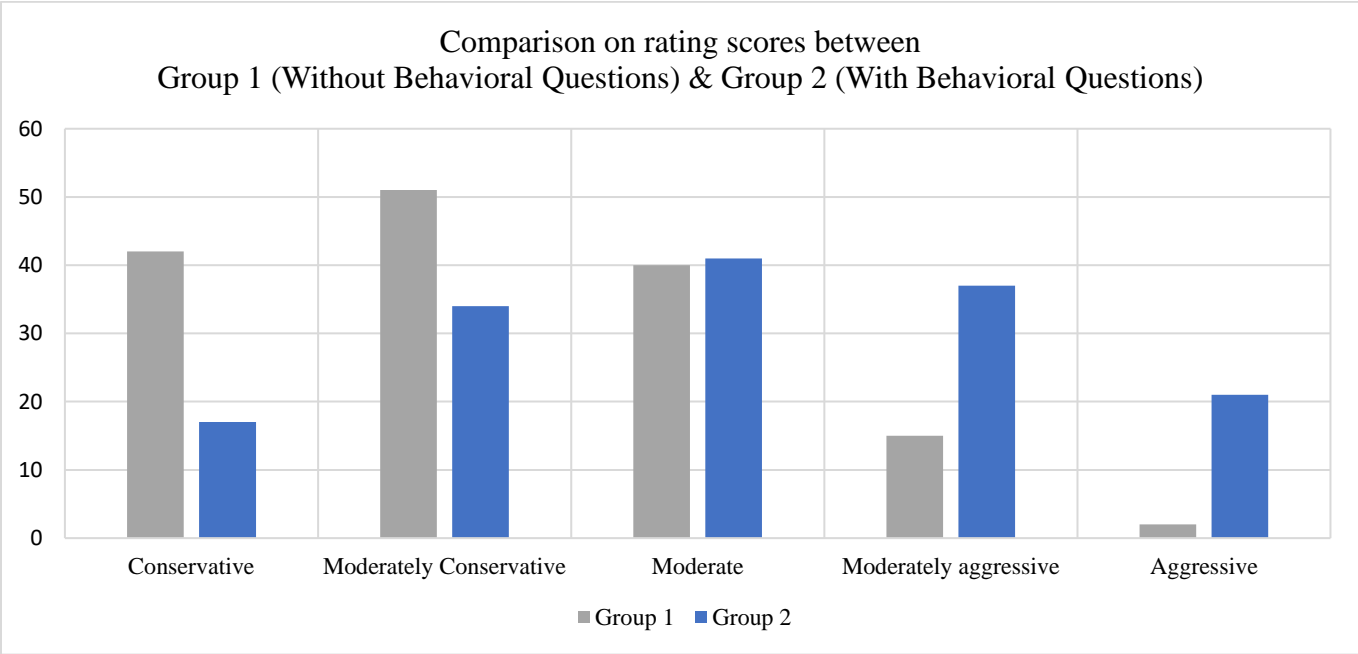
Figure 8: Comparison on rating scores between Group 1 & Group 2

The above table and figure show the differences between both groups in terms of rating scores on their respective risk profiles and this shows that the group of investors who have not been administered behavioral finance questions (Group 1) tend to be more conservative in their risk tolerance given that their ratings range strongly between conservative to moderate. Whereas the group of investors who have been administered behavioral finance questions (Group 2) tend to be more moderate to moderately aggressive in their risk tolerance given that their ratings range strongly between moderate to aggressive. While this shows that those ratings differ between both groups, we are unable to assess so far what this means in terms of earnings.

4.4 Independent Samples T Test

The purpose of running a t test in this study is to establish whether the introduction of behavioral questions to group 2 has an impact on the returns or financial performance of that group, through their risk profile rating. The result of the t test will indicate whether the difference in the mean of both groups is different than 0. The P value generated from the t test should indicate whether these two groups' financial returns are different (if less than < 0.05). What the t test shows will have an impact on the hypothesis, especially if it determines that the dependent variable (positive impact: return) has a statistical difference, and this can allow us to conclude that behavioral questions do have a positive impact on investors.

Table 23: Group Statistics

	Group of investors	N	Mean	Std. Deviation	Std. Error Mean
Return	Without Behavioral Questions	150	1,516,060.03	828785.748	67670.073
	With Behavioral Questions	150	1,967,361.32	994533.382	81203.311

The above table shows the mean between the two groups (group 1 & 2; n=300). The mean of the financial perform, yield, or return of investors in group 1 (without behavioral questions) is $1,516,060.03 whereas the mean of group 2 (with behavioral questions) is $1,967,361.32. This mean difference is statistically significant, because it means that group 2 outperformed group 1 by $451,301.29 and that also can indicate that the investment strategies were also different.

Table 24: Independent Samples Test

Return	Levene's Test for Equality of Variances		t-test for Equality of Means (For Financial Returns between Group 1 & Group 2)								
					Significance		Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
	F	Sig.	t	df	One-Sided p	Two-Sided p			Lower	Upper
Equal variances assumed	5.336	0.022	-4.270	298	<.001	<.001	-451301.29	105703.436	-659321	-243281
Equal variances not assumed			-4.270	288.616	<.001	<.001	-451301.29	105703.436	-659348	-243253

The above table shows the result of the independent samples t test with the two-sided p value being less than <0.001. The smaller the p value the stronger the evidence to reject the null hypothesis (H0: *Inclusion of behavioral finance questions into a risk profile does not have a positive impact on proposed investments*). In this t test for the return results, the p value is 0.022 which is smaller than 0.05 and that indicates that the result is statistically significant and therefore aids us in rejecting the null hypothesis.

4.5 Analysis of Findings

There are several interpretations to be drawn from the previous sections, but it is important to frame the scope of this study and focus on the implications of the tests conducted in the aforementioned sections in order to assess the result of the hypothesis. The findings retrieved from the previous sections will be focused on presenting the evidence on group 1 and group 2 results: risk capacity, time horizon, risk tolerance and finally the yield or financial performance of both groups. Part of this study is also concerned with the retention or satisfaction of investors which is measured as the number of retention of clients in a fiscal year following release of their yield or earnings. Moreover, this section will also highlight the results of the qualitative findings through the interviews with the 3 financial advisors at MultiBank and how their answers match or not the results from the surveys. The next sections provide a discussion of findings on the comparative results of this study across five categories: risk capacity, time horizon, risk tolerance, yield, and retention.

4.5.1: Risk Capacity

In this section we describe the differences noted between the two groups on risk capacity which is defined as the ability of an investor to take on financial risk or the willingness or desire of an individual to partake in an initiative, project, or activity to attain a goal which is uncertain and therefore carries with it the risk of loss. Both groups show different results in terms of risk capacity and as per the questionnaire, risk capacity was the first section which delved into net worth, household income, liquidity, and tax bracket.

Table 25: Group 1 Approximate Net Worth

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Under 100K	19	12.7	12.7	12.7
	100K-300K	34	22.7	22.7	35.3
	300K-500K	43	28.7	28.7	64.0
	500K-750K	23	15.3	15.3	79.3
	750K-1.0M	21	14.0	14.0	93.3
	1.0M-3.0M	8	5.3	5.3	98.7
	Above 3.0M	2	1.3	1.3	100.0
	Total	150	100.0	100.0	

Table 26: Group 2 Approximate Net Worth

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Under 100K	15	10.0	10.0	10.0
	100K-300K	19	12.7	12.7	22.7
	300K-500K	34	22.7	22.7	45.3
	500K-750K	40	26.7	26.7	72.0
	750K-1.0M	20	13.3	13.3	85.3
	1.0M-3.0M	15	10.0	10.0	95.3
	Above 3.0M	7	4.7	4.7	100.0
	Total	150	100.0	100.0	

The first question of the risk profiling questionnaire was to determine the approximate net worth (excluding the investment or principal invested). Both groups (with and without behavioral questions) answered this question, and the difference was that the group that had not been asked behavioral questions (group 1) had a lower net worth in general than the group that had been asked behavioral questions (group 2) with more than 82 respondents in group 2 valuing their net worth above 500K compared to 54 respondents in group 1 valuing their net worth above 500K. Nonetheless, this is not very significant to our study because we are interested in measuring the financial rating as a factor in determining financial performance. However, this gives us an indication that the risk capacity for group 2 is a bit stronger than group 1. Risk capacity allows financial managers to understand how much investors could invest in based on their net worth and ability to enter into specific investment schemes. The risk capacity of the investors is the prime consideration for most financial firms because it is measurable through assets and income and is a very strong indicator of which financial product the financial advisor will eventually recommend. In the case of the 300 investors, their net worth helps greatly understand how much they could spare to invest.

Table 27: Group 1 Liquid Net Worth

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	<25K	20	13.3	13.3	13.3
	25K-50K	44	29.3	29.3	42.7
	50K-100K	44	29.3	29.3	72.0
	100K-250K	23	15.3	15.3	87.3
	250K-500K	11	7.3	7.3	94.7
	>500K	8	5.3	5.3	100.0
	Total	150	100.0	100.0	

Table 28: Group 2: What is Liquid Net Worth

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	<25K	21	14.0	14.0	14.0
	25K-50K	51	34.0	34.0	48.0
	50K-100K	26	17.3	17.3	65.3
	100K-250K	32	21.3	21.3	86.7
	250K-500K	14	9.3	9.3	96.0
	>500K	6	4.0	4.0	100.0
	Total	150	100.0	100.0	

The second question of the risk profiling questionnaire was to determine the liquid net worth (assets that can readily be converted to cash). Both groups (with and without behavioral questions) answered this question, and the difference was that the group that had not been asked behavioral questions (group 1) had a lower liquidity threshold in general than the group that had been asked behavioral questions (group 2) with more than 52 respondents in group 2 valuing their liquidity above 100K compared to 42 respondents in group 1 valuing their liquidity above 100K. Liquidity is crucial for understanding risk profiles, because when liquid assets are low, there is more emphasis or prediction that investors will liquidate their investments first when responding to financial crises or unexpected expenditures which in turn will affect which investments should an investor have with such narrow or unpredictable time horizon.

Table 29: Group 1 Household Income

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	<50K	19	12.7	12.7	12.7
	50K-100K	44	29.3	29.3	42.0
	100K-150K	40	26.7	26.7	68.7
	250K-500K	34	22.7	22.7	91.3
	>500K	13	8.7	8.7	100.0
	Total	150	100.0	100.0	

Table 30: Group 2 Household Income

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	<50K	25	16.7	16.7	16.7
	50K-100K	47	31.3	31.3	48.0
	100K-150K	42	28.0	28.0	76.0
	250K-500K	27	18.0	18.0	94.0
	>500K	9	6.0	6.0	100.0
	Total	150	100.0	100.0	

The second question of the risk profiling questionnaire was to determine the current household income. Both groups (with and without behavioral questions) answered this question, and the difference was that the group that had not been asked behavioral questions (group 1) had a higher household income in general than the group that had been asked behavioral questions (group 2) with more than 78 respondents in group 2 valuing their household income above 100K compared to 87 respondents in group 1 valuing their household income above 100K. Household income is a good measure of risk capacity, because it allows investors to resort to a steady stream of income through their household which provides them with a financial cushion outside of their investments and savings.

Table 31: Group 1 Income Tax Bracket

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	10	19	12.7	12.7	12.7
	15	41	27.3	27.3	40.0
	25	40	26.7	26.7	66.7
	28	42	28.0	28.0	94.7
	33	6	4.0	4.0	98.7
	35	2	1.3	1.3	100.0
	Total	150	100.0	100.0	

Table 32: Group 2 Income Tax Bracket

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	10	14	9.3	9.3	9.3
	15	28	18.7	18.7	28.0
	25	42	28.0	28.0	56.0
	28	48	32.0	32.0	88.0
	33	15	10.0	10.0	98.0
	35	3	2.0	2.0	100.0
	Total	150	100.0	100.0	

The fourth question of the risk profiling questionnaire was to determine the income tax bracket. Both groups (with and without behavioral questions) answered this question, and the difference was that the group that had not been asked behavioral questions (group 1) had a lower tax bracket in general than the group that had been asked behavioral questions (group 2) with more than 66 respondents in group 2 stating that their tax bracket is above 25% compared to 50 respondents in group 1 stating that their tax bracket is above 25%. The income tax bracket is a determinant of income, the higher the tax bracket the higher the income or inversely.

What is noted from both groups is that, in general, group 2 or the group with behavioral questions has a higher risk capacity based on the answers and comparisons between group 1 and group 2. Higher risk capacity may indicate higher tolerance to risk but does not quite capture risk appetite, aversion, and willingness to partake in riskier investments. With higher risk capacity, the level and complexity of investments may change and that is something financial advisors take into account when proposing financial investments and allocating assets.

In this section we describe the differences noted between the two groups on time horizon which is defined the time an investor is willing to wait in order to retrieve their investment or have a return on their investment. Both groups show different results in terms of time horizon and as per the questionnaire, the time horizon was the second section which delved into investment objectives, time to begin taking money from investments and reliance on investments returns.

Table 33: Group 1 Investment Objective

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Preserve Principal	21	14.0	14.0	14.0
	Income	48	32.0	32.0	46.0
	Income & Growth	34	22.7	22.7	68.7
	Growth	33	22.0	22.0	90.7
	Aggressive Growth	14	9.3	9.3	100.0
	Total	150	100.0	100.0	

Table 34: Group 2 Investment Objective

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Preserve Principal	17	11.3	11.3	11.3
	Income	51	34.0	34.0	45.3
	Income & Growth	33	22.0	22.0	67.3
	Growth	37	24.7	24.7	92.0
	Aggressive Growth	12	8.0	8.0	100.0
	Total	150	100.0	100.0	

The first question of the goals section in the risk profiling questionnaire was to determine the investment objective. Both groups (with and without behavioral questions) answered this question, and the difference was that the group that had not been asked behavioral questions (group 1) had almost the same objectives as the group that had been asked behavioral questions (group 2) with more than 84 respondents in group 2 who described income and income and growth as their

investment objectives compared with to 82 respondents in group 1 described income and income and growth as their investment objectives. Nonetheless, this is not very significant to our study because we are interested in measuring the financial rating as a factor in determining financial performance. However, this gives us an indication that even when group 2 and group 1 responses could be somewhat similar, that does not necessarily mean their asset allocation strategies will be similar because of the different levels of risk capacity and risk tolerance.

Table 35: Group 1 Duration for Taking Money Out

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Less than 1 year	19	12.7	12.7	12.7
	1-3 years	46	30.7	30.7	43.3
	4-6 years	41	27.3	27.3	70.7
	7-10 years	28	18.7	18.7	89.3
	More than 10 years	16	10.7	10.7	100.0
	Total	150	100.0	100.0	

Table 36: Group 2 Duration for Taking Money Out

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Less than 1 year	24	16.0	16.0	16.0
	1-3 years	42	28.0	28.0	44.0
	4-6 years	38	25.3	25.3	69.3
	7-10 years	28	18.7	18.7	88.0
	More than 10 years	18	12.0	12.0	100.0
	Total	150	100.0	100.0	

The second question of the goals section in the risk profiling questionnaire was to determine when will the investors start withdrawing money from their investments. Both groups (with and without behavioral questions) answered this question, and the difference was that the group that had not been asked behavioral questions (group 1) had almost the same time horizon as the group that had been asked behavioral questions (group 2) with more than 66 respondents in group 2 who would withdraw money from their investment between 0-3 years compared with to 64 respondents in group 1 who would withdraw money from their investment between 0-3 years. This is one of the more important questions related to the time horizon investors have and has a direct impact on the type of assets their financial advisors would advise them to invest in.

Table 37: Group 1 Reliance on Investment

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Heavily	27	18.0	18.0	18.0
	Slightly	58	38.7	38.7	56.7
	Moderately	43	28.7	28.7	85.3
	Not at all	22	14.7	14.7	100.0
	Total	150	100.0	100.0	

Table 38: Group 2 Reliance on Investment

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Heavily	36	24.0	24.0	24.0
	Slightly	40	26.7	26.7	50.7
	Moderately	55	36.7	36.7	87.3
	Not at all	19	12.7	12.7	100.0
	Total	150	100.0	100.0	

The third question of the goals section in the risk profiling questionnaire was to determine how much investors rely on income from their investments. Both groups (with and without behavioral questions) answered this question, and the difference was that the group that had not been asked behavioral questions (group 1) relies relatively less and more moderately on their investments to generate income than the group that had been asked behavioral questions (group 2). More than 36 respondents in group 2 stated that they rely heavily on income from their investment accounts compared with 27 respondents in group 1 who would rely heavily on income from their investment accounts. Moreover, in group 1 there are more investor who would rely slightly on their income from investment accounts than in group 2. This is an important question gauging how much investors are able to withstand an investment time horizon based on their ability not to withdraw income from their investments. In other words, are they able not to touch their investments and re-invest their returns or are they dependent on the income generated from their investment accounts? This is an interesting question to financial advisors who can use it to determine the asset allocation or asset class that best matches the ability for investors to generate more income or more returns with varying levels of maturity dates and in turn this allows investors to also have a say in how much earnings they would like to withdraw at given time periods instead of having to pay higher interests when they need the income. One of the questions on income is

the household income which is also a determinant of how much they would eventually rely on money from investment accounts.

4.5.3: Risk Tolerance

In this section we describe the differences noted between the two groups on risk tolerance which is defined as to what extent in both time and resources is an investor is willing to bare in terms of risk in order to have a return on their investment. Both groups show different results in terms of risk tolerance and as per the questionnaire, the risk tolerance was the third section which delved into investment experience but also had behavioral finance questions that were only asked to group 2 and not to group 1.

Table 39: Group 1 Investment Experience

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	None	32	21.3	21.3	21.3
	Limited	53	35.3	35.3	56.7
	Moderate	41	27.3	27.3	84.0
	Extensive	24	16.0	16.0	100.0
	Total	150	100.0	100.0	

Table 40: Group 2 Investment Experience

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	None	34	22.7	22.7	22.7
	Limited	53	35.3	35.3	58.0
	Moderate	42	28.0	28.0	86.0
	Extensive	21	14.0	14.0	100.0
	Total	150	100.0	100.0	

The first question of the risk tolerance section in the risk profiling questionnaire was to determine the investment experience investors had. Both groups (with and without behavioral questions) answered this question, and the difference was that the group that had not been asked behavioral questions (group 1) had almost the same investment experience as the group that had been asked behavioral questions (group 2) with more than 34 respondents in group 2 who had no experience in investments compared with 32 respondents in group 1 who had no investment experience either. Additionally, 42 respondents in group 2 had moderate investment experience, compared with 41 respondents in group 1 with limited investment experience. The fact that those differences are not significant and that there is a good level of similarity between both groups on

investment experience demonstrated that the sampling methodology is randomized and while this question is important for financial advisors, it will be the advisors that will be proposing the asset allocation types taking into consideration the investors' knowledge. Investment experience helps investors navigate the complex world of financial products and understand not only the nomenclature of finance but also the changes, patterns, and trends in the market.

Table 41: Group 1 Risk Tolerance

		Frequency	Percent
Valid	Conservative	42	28%
	Moderate	40	26.6%
	Moderately Conservative	51	34%
	Moderately Aggressive	15	10%
	Aggressive	2	1.4$
	Total	150	100%

Table 42: Group 2 Risk Tolerance

		Frequency	Percent
Valid	Conservative	17	11.3%
	Moderate	41	27.3%
	Moderately Conservative	34	22.7%
	Moderately Aggressive	37	24.7%
	Aggressive	21	14%
	Total	150	100.0

The second question of the risk tolerance section in the risk profiling questionnaire was to determine the risk tolerance that investors had. Both groups (with and without behavioral questions) answered this question, and the difference was that the group that had not been asked behavioral questions (group 1) is less aggressive and leans towards a more moderate to conservative risk tolerance with 15 respondents indicating a moderately aggressive risk tolerance versus 37 respondents in group 2 who indicated a moderately aggressive risk tolerance. The majority of group 2 respondents (112) cluster along the 3 segments between moderate to moderately aggressive whereas the majority of group 1 respondents (133) cluster along the 3 segments between conservative to moderate. This is one of the most important questions in this study and normally in a risk profiling questionnaire because it allows financial advisors to assess the risk tolerance of investors and how much are they willing to risk in order to attain their

objectives. The difference between both groups is not very significant but it is informative and sufficient to understand that both groups have different stance on risk tolerance.

4.5.4: Financial Yield

In this section we describe the differences noted between the two groups on the yield, return or financial performance which is measured by the earnings or returns of the investors based on their financial performance over 1 year. Both groups show different results in terms of earnings and based on their asset allocation strategies it would be reasonable to assume that there will be differences. In the below section we look at the data on both group's earnings and year-on-year percentage change in their financial performance in order to assess the differences and which group had more returns.

Table 43: Group 1 YoY Investment Yield Change (%)

Risk Profile Rating	Number of Investors	Asset Allocation Rating	Asset Class (Largest Investment)	Average 2021 Yield ($M) (by Asset Allocation Cluster)	Average 2022 Yield ($M) (by Asset Allocation Cluster)	YoY Investment Yield %Change
Conservative	42	Conservative	Money Market	$52.7	$54.1	3%
Moderately Conservative	51	Balanced	Fixed Income	$58.4	$56.8	-3%
Moderate	40	Balanced	ETFs	$72.1	$79.4	10%
Moderately Aggressive	15	Growth	ETFs	$31.8	$36.2	14%
Aggressive	2	Aggressive	ETFs	$0.72	$0.93	29%
TOTAL	150	-	-	$215.7	$227.4	5%

Table 44: Group 2 YoY Investment Yield Change (%)

Risk Profile Rating	Number of Investors	Asset Allocation Rating	Asset Class (Largest Investment)	Average 2021 Yield ($M) (by Asset Allocation Cluster)	Average 2022 Yield ($M) (by Asset Allocation Cluster)	YoY Investment Yield %Change
Conservative	17	Conservative	Money Market	$43.7	$44.6	2%
Moderately Conservative	34	Balanced	Fixed Income	$61.7	$65.2	6%
Moderate	41	Growth	ETFs	$81.3	$93.1	15%
Moderately Aggressive	37	Growth	ETFs	$71.4	$86.8	22%
Aggressive	21	Aggressive	ETFs	$4.06	$5.39	33%
TOTAL	150	-	-	$262.2	$295.1	13%

With these two tables above we can note that overall the portfolio of group 2 combined (the group with behavioral finance questions) had higher earnings in 2022 on average compared with the portfolio of group 1 in 2022 which earned $227.4Mn versus $295.1Mn. In terms of the combined year-on-year yield percentage change, group 1 portfolio had a total of 5% change between 2021 and 2022, whereas group 2 had a total of 13% change for the same years. This would allow us to assume that overall, group 2 saw a better financial performance than group 1 within the same period. However, there are categories of investors in both groups that did better in each risk profile rating. Conservative investors in group 1 did better than their counterparts and numbered 42 investors whose largest investments were in money market funds and made a positive 3% yield in 2022, compared with the conservative investors of group 2, numbering 17 investors whose largest investments were also in money market funds and made a positive 2% yield in 2022. Moderately conservative investors in group 1 did much worse than their counterparts and numbered 51 investors whose largest investments were in fixed income and made a negative 3% yield in 2022, compared with the moderately conservative investors of group 2, numbering 34 investors whose largest investments were also in fixed income and made a positive 6% yield in 2022. This figure represents quite a change in both earnings and can be attributed to different time horizons or other factors, but it does represent a significant discrepancy between two groups of the same disposition and rating. Moderate investors in group 1 did a bit worse than their counterparts and numbered 40 investors whose largest investments were in ETFs and made a positive 10% yield in 2022, compared with the moderate investors of group 2, numbering 41 investors whose largest investments were also in ETFs and made a positive 15% yield in 2022. The significant difference of 5% between both yields could be well attribute to the asset allocation strategy which was fixed on growth for group 2 but was balanced for group 1. This could well be very significant for our study because it could allow us to assume that the asset allocation strategy plays a more important role in earnings than the risk profile rating alone. Moderately aggressive investors in group 1 did well but not as good as their counterparts and numbered 15 investors whose largest investments were in ETFs and made a positive 14% yield in 2022, compared with the moderately aggressive investors of group 2, numbering 37 investors whose largest investments were also in ETFs and made a positive 22% yield in 2022. This large difference of 8% yield between both groups could be attributed to several factors but a crucial point is also the time horizon of investments that can play a part in how much would one earn when devising an asset allocation strategy that is focused on growth, which is the case for both groups. Finally, aggressive investors in group 1 did fairly well as their counterparts and numbered 2 investors whose largest investments were in ETFs and

made a positive 29% yield in 2022, compared with the aggressive investors of group 2, numbering 21 investors whose largest investments were also in ETFs and made a positive 33% yield in 2022.

4.5.5: Client Retention

In this section we describe the differences noted between the two groups on the retention of investors, which is measured by the number of investors retained after 1 year between 2021 and 2022. Both groups show different results in terms of retention and based on their asset earnings, it would be reasonable to assume that there will be differences. In the below section we look at the data on both group's retention change in order to assess the differences and which group had better or worse retention rates. Retention in this study is an important factor because it allows us to see whether the investor was satisfied with the investment advice. Nonetheless, even with positive earnings, many investors whose preferences and priorities are based on time horizons, risk capacity, risk appetite and are different than other investors, may choose to withdraw or liquidate their investments because of several factors. This is normal in many market activities where, even if financial goals are not attained, investors will still leave their market positions and change their strategies or asset allocations in favor of other priorities.

Table 45: Group 1 Investor Retention (by Numbers)

Risk Profile Rating	Number of Investors	Asset Allocation Rating	Asset Class (Largest Investment)	YoY Investment Yield %Change	Number of Investors (by 01 Feb 2022) - Retention
Conservative	42	Conservative	Money Market	3%	37
Moderately Conservative	51	Balanced	Fixed Income	-3%	33
Moderate	40	Balanced	ETFs	10%	35
Moderately Aggressive	15	Growth	ETFs	14%	11
Aggressive	2	Aggressive	ETFs	29%	2
TOTAL	150	-	-	5%	118

Risk Profile Rating	Number of Investors	Asset Allocation Rating	Asset Class (Largest Investment)	YoY Investment Yield %Change	Number of Investors (by 01 Feb 2022) - Retention
Conservative	17	Conservative	Money Market	2%	13
Moderately Conservative	34	Balanced	Fixed Income	6%	32
Moderate	41	Growth	ETFs	15%	41
Moderately Aggressive	37	Growth	ETFs	22%	35
Aggressive	21	Aggressive	ETFs	33%	16
TOTAL	150	-	-	13%	137

With these two tables above we can note that overall the retention rate or numbers of group 1 combined (the group with behavioral finance questions) had lower retention of investors in 2022 compared with the retention of investors of group 2 in 2022; group 1 lost 32 more investors than group 2 with each group respectively losing 32 investors for group 1 and 13 investors for group 2. This would allow us to assume that overall, group 2 saw a better retention than group 1 within the same period. However, there are categories of investors in both groups that did better in each risk profile rating. Conservative investors in group 1 did slightly worse than their counterparts and numbered 42 investors whose largest investments were in money market funds and lost 5 investors in 2022, compared with the conservative investors of group 2, numbering 17 investors whose largest investments were also in money market funds and lost 4 investors 2022. Moderately conservative investors in group 1 did much worse than their counterparts and numbered 51 investors whose largest investments were in fixed income and lost 18 investors in 2022, compared with the moderately conservative investors of group 2, numbering 34 investors whose largest investments were also in fixed income and only lost 2 investors in 2022. This figure represents quite a change in retention numbers and can be attributed to the sharp drop in yield percentage change for group 1 (-3%) compared with group 2's YoY yield of 6%. Moderate investors in group 1 did worse than their counterparts and numbered 40 investors whose largest investments were in ETFs and lost 5 investors in 2022, compared with the moderate investors of group 2, numbering 41 investors whose largest investments were also in ETFs who had not lost any investors in 2022. This difference of 5 between both groups could be well attributed to the time horizon or asset allocation strategy which was fixed on growth for group 2 but was balanced for group 1.

Moderately aggressive investors in group 1 did slightly worse than their counterparts and numbered 15 investors whose largest investments were in ETFs and lost 4 investors in 2022, compared with the moderately aggressive investors of group 2, numbering 37 investors whose largest investments were also in ETFs and lost only 2 investors in 2022. Finally, aggressive investors in group 1 did fairly better than their counterparts and numbered 2 investors whose largest investments were in ETFs and retained both of their investors in 2022, compared with the aggressive investors of group 2, numbering 21 investors whose largest investments were also in ETFs and lost 4 investors in 2022.

4.6 Qualitative Method: Interviews

As part of the qualitative analysis of this study, an interview was held with three of MultiBank's financial advisors about their opinions, practices and insights on behavioral finance and risk profiling. The interview asks 5 questions to determine whether there is a positive relationship between behavioral finance questions and risk profiling. The 5 questions attempt to explore whether there is value in including behavioral questions, the results of including behavioral questions, the risk profiling process validity, and the reliability of behavioral questions in contrast with financial results. The questions are interrelated and provide insights about what financial advisors think are the most significant components of a risk profile questionnaire, additionally the interviews attempt to assess how financial advisors perceive risk tolerance and how accurate, in their view, the measure of risk tolerance according to their previous experience. The interviews also question financial advisors on the reliability of behavioral questions such as: what an investor would choose or prefer when making a financial decision. Additionally, this qualitative part also asks financial advisors and managers their thought on whether there is value in including behavioral questions to investors to determine investment suitability. Finally, it asks whether previous experimentation in behavioral questions on risk profiles had yielded any results and what were those results.

On the first question related to the financial advisors' views on which are the most significant components of a risk profile questionnaire, most advisors stated that risk capacity is the very first and key foundation and component in understanding the risk profile of the client. The advisors explained that risk is not necessarily something to avoid or the enemy, it is a natural part of investing and of life in general and must not be avoided but rather should be managed. Risk is what keeps investors and managers together because they both have to identify it, manage it, and turn it into an opportunity whenever possible. The advisors continued on the components of a risk

profile questionnaire by stating that the second key component is the client's goals and their objectives: are they looking for a quick win? Are they interested in a savings and/or retirement plan? These factors affect the investment decision. Once capacity and goals are clear, risk tolerance is the third and most important component in operationalizing the investment strategy because the financial advisor cannot operate without the client's consent and if their risk tolerance continuously changes, it puts their investments at risk. One must know oneself as one advisor stated but it is also the job of the financial advisor to bring out the elements that the investors do not know about themselves; what are they comfortable or not comfortable with? To what extent can they withhold turbulence? What is their view on risk-return, how good do they know the products they have invested in or the companies they have shares in? etc. These aspects are essential when explaining the investment strategy and abiding by it.

On the second question, the financial advisors were asked to determine how accurate the measure of risk tolerance is according to their previous experience. While two advisors noted that risk tolerance is measure is still highly subjective, one financial advisor stated that risk tolerance is not a science and cannot be taken as a metric but rather as a shifting construct. The three advisors agreed that the current practices to measure risk tolerance differ from one company to the other and that the adaptation of certain criteria or metrics do not necessarily add value but rather shifts the focus from the investment strategy to the financial plan. One advisor mentioned that questions targeting personality and behavior tend to inform her of what the client wants today or tomorrow but most clients do not know what they want in the future and that presents a problem because the financial advisor cannot anticipate personal preferences in investment strategies, but can anticipate risk strategies based on risk capacity, goals, and time horizon. One example was provided about investments in bonds and currencies where one advisor mentioned that conservative clients are comfortable investing in long term assets like bonds until they start making more income and with an increase in their income their strategy changes and becomes less conservative. These examples illustrate changes in behaviors due to external factors one cannot anticipate. The advisors added that the rating score of a risk profile is as accurate as the client's situation today because it is a snapshot in time, but that overall, if clients were interested in longer term investments, behavioral questions, scenario-based choices, and gamification in risk profiling is a solid measure to understand the person's reactions, perceptions, and goals and consequently their risk tolerance. One advisor added that measuring risk tolerance in the questionnaire is often a yes or no question and it is misleading, it requires more exploration and adding behavioral questions is a better way to assess risk appetite, tolerance, attitude, etc.

On the third question, the financial advisors were asked to determine how reliable behavioral questions are in risk profiles; questions such as what an investor would choose or prefer when making a financial decision. Most financial advisors agreed that these types of questions are undoubtedly better than the traditional ones found in many companies that are only yes or no questions. One advisor stated that the reliability of the questionnaire and its questions is eventually in the earnings of the investors. He explained that if an investor's behavior is riskier as in would choose a higher risk – return axiom, it is very evident that they will be open to discussing more risky ventures and even consider them as part of their asset allocation but with some investors, behavioral questions tell you in advance how risk averse they are and how to frame the conversation in a way to steer off riskier investments. The advisors added that these questions provide you with an overview but cannot be taken in their entirety as a statement of personality or an investment guide because what is more important is building trust through conversation and through talking them through their investment options based on their risk profile not because of their risk profile. Another advisor added that the reliability of behavioral questions is not something that an advisor trusts because there are always new ways to gauge risk tolerance whether through surveys, through spending habits, through conversation, etc. but they provide an element of value in the final assessment because investors often talk much about their goals but when presented with behavioral scenarios, their choices may be different than their goals or would steer them away from their objectives.

On the fourth question, they financial advisors were asked if they thought that there is value in including behavioral questions to investors to determine investment suitability. Most financial advisors agreed that behavioral questions are necessary to determine the risk tolerance but not mandatory. They agreed that without the behavioral questions, investors would not know what future cases or choices they will be presented with and will often be scared or worried when markets face volatility. But when presented with options and scenarios, investors feel more confident about the type of events they would be faced with and are able to better control their reactions. On the issue of suitability, one advisor stated that investment strategies are built on capacity and financial standing as in they cannot offer high return products to investors who score high on risk tolerance but low on risk capacity because it works against the ethical safeguarding of investor's assets and rights. Suitability of investment is a matter of combining different elements, including risk appetite but one should not forget that this represents one element of the strategy and should not be amplified to overtake other factors. One advisor added that suitability in investments can change based on goals, but if risk capacity and goals do not change, change in

risk tolerance has little impact on changing an investment strategy because the job of a financial advisor is to manage present and future risk based on current financial situation and not on current risk tolerance levels.

Finally, on the fifth question, the financial advisors were asked whether previous experimentation in behavioral questions on risk profiles, yielded any results. Most advisors agreed that their company, MultiBank, is one of the most accepting financial firms in Hong Kong to experiment with their clients on risk and its mitigation and that has definitely yielded results. The advisors agreed that behavioral questions helped their firm acquire more investors who trusted the process, but also lost fewer investors because the suitability of their proposed investments matched the investors' goals and prospects. They mentioned that many investors were satisfied with answering behavioral questions and recommended that approach because it helped them understand their own choices and what that means in terms of a financial plan or investment strategy. One advisor mentioned that MultiBank has been testing this approach for more than 2 years and it has seen growth in its fixed income investor segment albeit that most investors who are interested are still conservative investors because they are worried of the outcomes of volatile markets.

4.7 Discussion of Findings

By conducting the Pearson Chi Square test in this study, we were able to determine that the Chi Square test alone is not sufficient to confirm the hypothesis that including behavioral finance questions will have a better risk profiling because we had to demonstrate the suitability of the proposed investments through the yield of the control group (group 2). Through the previous sections, we were able to go we were able to go through the different variations and sections of this study, to ensure that we had covered all the requirements of the risk profiling questionnaire. We started by analyzing the risk capacity component of the risk profiling questionnaire we then turned into the risk time horizon we then analyzed the risk tolerance of both groups of investors totaling 300 investors that were split into two groups. Those two groups had different yields or earnings in over one year between 2021 and 2022 and we had also analyzed those yields for the specific reason to uncover whether the risk profile rating administered by the financial advisor was suitable and matched well with the asset allocation strategy devised by the advisor for their clients. That data allows us to interpret the results of both groups and be able to determine whether there was any impact on suitability of investments between both groups. In terms of risk capacity, the group with behavioral questions (group 2) has a higher risk capacity based on the answers and

comparisons between group 1 and group 2. Higher risk capacity may indicate higher tolerance to risk but does not quite capture risk appetite, aversion, and willingness to partake in riskier investments. With higher risk capacity, the level and complexity of investments may change and that is something financial advisors take into account when proposing financial investments and allocating assets. What is interesting is when we see how group 2 performed based on their risk capacity when we analyze their yields; group 2's YoY percentage change of investments between 2021 and 2022 was higher than group 1 by 8% (13% YoY on average for group 2 versus 5% YoY on average for group 1). While this difference was not higher across all rating profile categories, it was most evident in the moderately conservative and moderate ratings where group 2 performed better yields in both categories (6% group 2 versus -3% group 1 moderately conservative; 15% group 2 versus 10% group 1 for moderate). This is also highlighted by the difference in the asset allocation strategy for group 2 which was focused on growth for the moderate category whereas group 1's asset allocation strategy was balanced. In terms of time horizon, it was noted that both groups had relatively the same time horizons and when asked when they would like to withdraw money from their investments, the majority of both groups answered between 0-3 years.

Moreover, both groups had relatively the same answer on their investment objective which ranged between income and income & growth. Interestingly, group 1 stated that the majority of the investors relied slightly less than group 2 on income from the investments, whereas group 2 stated that they would relied more heavily on money or income from their investments. Perhaps this is one of the reasons why the financial advisors at MultiBank decided to design a growth strategy for group 2's moderates rather than a balanced portfolio as they did for group 1. Nonetheless, the yield results fared better for group 2 moderate investors than group 1. This particular point is of high interest, because it allows us to safely assume that the asset allocation strategy played a factor in changing the yield for group 2 versus group 1 and that even though both investors had similar risk profile ratings, their yields were largely different due to the change in the asset allocation strategy. What is also more interesting is when we delve deeper into the risk tolerance of both groups, we can note that group 2 is more open to taking risks than group 1 due to their answer on describing their own risk tolerance. The answer of both groups seems to be consistent with their asset allocation strategy where group 1 has a more balanced approach to their portfolio and group 2 has a portfolio more focused on growth and trading ETFs. In terms of retention, the results have been quite discouraging for MultiBank in general because they ended up losing in total for both groups combined about 45 investors (32 investors for group 1 and 13 investors for group 2). Nevertheless, it is important to note that both groups had a positive yield

in general and that retention may be affected by several factors more importantly by time horizon and risk appetite which is also their reliance on income from investments. Nonetheless, group 2 lost less investors than group 1 and we can safely assume that this was because of the better yield performance of group 2. Evidently, the responses of group 2 on the behavioral finance questions also indicated a somewhat more moderate stance towards risk and these questions, as financial advisors describe in the interviews, were pointers to how investors interpret the world and its events and how solid a rating for a risk profile would be. The interviews also help uncover some of the findings that the financial advisors have shared especially their agreement that behavioral finance questions are undoubtedly better than the traditional ones found in many companies that are only yes or no questions. They also state that the reliability of the questionnaire and its questions is eventually in the earnings of the investors, which is seen here for group 2 as being positive and exceeding the yields of group 1. Therefore, the findings from the survey are consistent with the results from the YoY Yield percentage change and from the interviews that were conducted as part of this study and we could safely assume, that even though the Pearson Chi Square test result was not conclusive in rejecting the null hypothesis, the findings that are coupled with the Chi Square test can help provide an alternative hypothesis or confirm the initial H1.

4.8 Hypothesis Confirmation

In an attempt to understand whether the risk profiling questionnaire required an overhaul and whether the inclusion of behavioral finance question, from the lens of behavioral finance, could be the answer to forecasting or predicting better risk profiles, our hypothesis for this study was as follows:

- Ha: Inclusion of behavioral finance questions into a risk profile has a positive impact on proposed investment(s)
- H0: Inclusion of behavioral finance questions into a risk profile does not have an impact on proposed investment(s)

Traditional risk profile questionnaires, as described previously, focus heavily on the financial goals, time horizon and current assets to determine suitability of proposed investments; that is to say the foundation of traditional risk profiling questionnaires has been the combination of risk capacity, time horizon and risk tolerance with little information as to how the interchange between those sections is structured and how risk tolerance is assessed or measured. In this study we

proposed to add few behavioral finance questions to an existing risk profile and compare whether it had any change on the same sample in determining suitability but more importantly on the yield of the investors based on their portfolio's performance or investment. To achieve this, we had to go through several assessments and conclusions.

Initially, we started with the Pearson Chi Square test to determine if the rating score of the risk profile had a positive impact on the risk tolerance of investors; in other words, did the introduction of those behavioral finance questions change the rating of the investors' risk profile? What we were able to establish was that the group that answered behavioral finance questions (group 2) had p value of 0.531 which is much higher than <0.05 and this result meant that there is a 50% chance that the inclusion of these questions could have had a positive impact on the risk rating.

From this result, we then proceeded to determine whether the yield of group 1 and group 2 had differences and we reviewed the results based on the risk profile rating and asset allocation categories. What we were able to establish from the Year-on-Year Investment Yield Change (%) was that group 2 fared better overall in terms of financial earnings after 1 year of having administered these questions and what was interesting in these results is that the selected asset allocation strategy in one category made a very effective and positive impact on group 2 and earned them a much higher yield than group 1. We then conducted a two sided t test on financial return to establish whether there was a statistical significance and we found that the p value of $0.022 < 0.05$ and that meant that there is significance to reject the null hypothesis. To back our hypothesis, we then proceeded to determine whether the risk profile rating which helped select the asset allocation strategy and consequently generate earnings was enough to retain investors. What we were able to establish through the retention results was that both groups lost investors even when both groups had overall positive earnings, but group 2 lost less investors compared to group 1, and this could have been due to the asset class and asset allocation strategy which was focused on growth for group 2 in the moderate category for example versus a balanced approach for group 1 in the same category. This is an important point, because it helps establish that overall the inclusion of behavioral finance questions into a risk profile has a positive impact on proposed investment(s) by financial advisors because when we first started our study, our assumption was that the impact was measured by the yield, earnings, or financial performance. However, what was noted through the quantitative approach of this study was that impact was multifactorial and multidimensional in the sense that the impact was not only linked to the yield or the earnings of the investor, but also to the way the financial advisor selected the asset allocation strategy of the investor and how that impacted the earning capacity.

In the broader sense, what we were able to establish in this study is that the inclusion of behavioral finance questions into a risk profile questionnaire had the ability to help the financial advisors with the rating score of the risk profile but also, and mainly, to select the appropriate and suitable asset allocation strategy that helped generate a higher yield. This was proven through the results of the YoY (%) change between group 1 and group 2 after having ascertained through the Pearson Chi Square test that the null hypothesis had a 50% chance of being rejected and through the t test results. What is also more compelling, are the qualitative results of this study through the interviews with financial advisors who also had stated that suitability in investments can change based on investment goals and objectives, but if risk capacity and objectives do not change, changes in risk tolerance has little impact on changing an investment strategy because the job of a financial advisor is to manage present and future risk based on current financial situation and not on current risk tolerance levels. This particular point on risk tolerance has been re-affirmed in our analysis: risk tolerance informs the financial advisor on the asset allocation strategy but cannot help in acquiring or investing more aggressively if the risk capacity which includes net worth, household income, reliance on money from investments, time horizon, etc. are not aligned with the asset allocation strategy. Moreover, the financial advisors agreed that behavioral questions helped their firm acquire more investors who trusted the process, but also lost fewer investors because the suitability of their proposed investments matched the investors' goals and prospects and this was also evident when we saw that group 1 had lost more investors than group 2 for many reasons, even when most of group 1 risk profile categories had made positive earnings.

For all these reasons above, it is safe to assume that the null hypothesis, which is the inclusion of behavioral finance questions into a risk profile does not have an impact on proposed investment(s), is rejected. It is rejected because we had been able to note and prove that there were changes between group 1 and group 2 and that the group that had answered behavioral finance questions fared better in terms of yield and retention than the group that did not answer behavioral finance questions. We were also able to confirm that a positive impact had been observed between both groups and that impact was deemed positive with group 2 having better financial results through the investment yield (% Change) and through the fewer lost investors. For these reasons, we can confirm that the hypothesis of our study, that the inclusion of behavioral finance questions into a risk profile does have an impact on proposed investment(s) and the impact we observed in this study was positive.

Chapter V: Conclusion & Recommendations

5.1 Critical Analysis :

Every investor has a purpose, an objective, and a reason why they want to risk their income or savings to generate more money. Most of the times the objective is obviously to make more money and while that is quite a simple goal, it is quite challenging to achieve when navigating the complex world of finance. Financial instruments and products are numerous and understanding which product to choose from or where and how to invest is a full time job for many individuals. Sometimes the solution is to work with a financial advisor or a financial institution, a portfolio manager and so on and this requires setting aside time and resources, but it is possibly the smartest thing to do before venturing by one's own and getting lost and confused in this large propensity of products and financial services. Working with a financial advisor has many perks but it also has its cons too, because many financial firms and managers regard the investors' resources as another stream of income that they can bundle or cluster into a global portfolio based on the financial advisor's choice and knowledge with little effort to understand their clients and how they prefer to be managed, or their investments and savings to be managed. When it comes to risk profiling, we have seen in this paper the different variations of risk, the heuristics, and perceptions of risks through the lens of behavioral finance and psychology and have also seen how risk profiling through the use of the existing questionnaires is standing in the way of the actual knowledge and reconnaissance a financial advisor must do and have to build trust with investors.

There's a lot of homework to be done by the investor before meeting a financial advisor, because one must understand themselves and how they react to the world and how they perceive it. Of course, a financial plan or an investment strategy is not a therapy session or psychological counselling, but many of our personality traits affect how we behave with money, with savings, with spending and with life in general. There's also homework on the side of the financial advisor because risk profiling, while being a regulatory tool, is also a guide to knowing how to truly achieve the investor's needs and goals. We have argued sizably in this paper on the structure of the questionnaire and how risk tolerance is often interpreted loosely without any framework or definition that can really pin it down and measure it. There will always be many other interpretations but what we have found in this study is that risk tolerance is a mere guide to a better financial performance and an individual's risk profile should consider the overall picture which encompasses risk appetite, risk capacity, investment objectives and time horizon. As situations change, so does the behavior and we have seen this happen when investors in both groups decided

to forfeit their positions after either cashing out or liquidating their investments and we were able to demonstrate that behavioral finance questions have a more concrete way of helping the rating of a risk profile and subsequently the investor with selecting an asset allocation strategy that fits their current needs as well as their longer term needs and goals.

It goes without saying that investing in financial markets is an inherent risk and carries a huge financial burden, sometimes with disastrous consequences, when major events lead to immediate and unanticipated shocks and volatility in markets, securities, and assets. There has been many events across time that witnessed this precipitation and many of these examples ended up spiraling down and causing havoc like for example the stock market crashes of October 19, 1987 and October 27, 1997 and other events like the credit default swaps which led to the global financial downturn of the late 2000's. All these examples and more were accompanied by the swelling of market volatility, and it had a great impact on the psychology of investors and bankers alike. But on a fundamental level, these events also change the way security prices are structured as more and more trends and patterns emerge from highly-leveraged funds that had defunct as well as changes to dynamic portfolios that are highly impacted by price fluctuations and follow market trends continuously. The way that the volatility continues to increase in financial markets as a result of major domestic and global events is increasing because of the many plights and crises happening across the world but also happening in stock markets themselves that are also open to more foreign direct investments. When small price changes occur, investors notice these changes rapidly when selecting a portfolio, but normal investors can only consider so much without the right and proper advice from financial and portfolio managers because accounting to the impeding consequences of major events is not immediately understood and how it will impact markets would normally be opaque until related events start coming together. Because structuring a portfolio that is suitable for high returns is not similar as that for lower returns, the type of investors and asset classes create a problem that must be solved by either the investor, acting on their own will or the financial advisor selecting the portfolio strategy. The existence of major events replicate and sometimes duplicate risk and makes the job of setting up a standard portfolio that is shock resistant to be very challenging and almost impossible.

Since risk is multivariate, multifactorial, and multidimensional, it does not conform to the rules of supply and demand especially when major events compound the risk-return axiom. When such events occur and investment values fluctuate, investors do not have control over their investment yields or value, and they may at times consider these fluctuations as incurred losses or assets that are illiquid due to their reaction or willingness to buy-and-hold their position to ride out

the volatility. That is the situation for most investors ranging between the conservative to the moderate who are less open to take leveraged or short positions. Such events affect investors with lower levels of risk aversion and risk tolerance more than moderately aggressive to aggressive investors and therefore portfolio strategies are not built using on singular model but are built to be prone to fluctuations based on risk profiles, capacity, and tolerance. jumps in both prices and volatility have important effects on optimal portfolios. What we have found through this study is that the classical portfolio choice models or traditional risk profiling strategies only work if all time horizons and risk capacities are similar but that is not true in the real world because, and also backed by the literature (See Liu, et al., 2003), if investors suspect a chance of a sudden market downturn, their portfolio behaviors and risk tolerance could be very different from their earlier investment strategies and risk tolerance levels. So risk changes the dynamic in the real world drastically, and that is why financial advisors play a crucial role in setting up dynamic portfolio strategies rather than standard portfolios that cannot withstand market fluctuations, but it comes at the cost of building the optimal portfolio for investors based on their own risk profiles. When talking of optimal portfolio that optimize asset allocation strategies based on risk profiles, the ability for a financial or portfolio manager to come up with such an optimal design is a challenging and complicated process as it has to account for the complexities of financial instruments. Looking at only few products in the marketplace today, portfolios that are equity-based include a massive volume and number of industries, fields, and countries. If we look at portfolios that are founded on fixed-income they can include a variety of treasury and security bonds of different maturities that belong to issuers of varying risk and in numerous currencies. Add to that the complexity of publicly traded equity and debt and institutional portfolios which include asset classes that carry a mix of private equity, private credit, venture capital, real estate, etc. Nonetheless, the savviness of financial advisors can help manage these risks and troubled waters of the financial world by modelling portfolios based on risk allocation rather than asset allocation and therefore targeting the risk profiles in a more friendly approach that optimizes return over risk without excessive exposure to high risk events. In other words, risk factors become more studied than asset classes and portfolios are structured based on risk rather than on asset types.

What is important however is that this study was able to provide a framework for how a behavioral finance operationalization can take place via a questionnaire or a tool and if that can actually improve the validity and reliability of the financial advice. While the behavioral questions themselves are open for restructuring and redesign, the key contribution of this study was that it can actually be implemented and measured via financial performance and retention. By bringing

in a more practical approach to behavioral finance through the inclusion of subset questions, we were able to assess if those responses to these behavioral finance questions actually made a difference in how the risk score was rated and how that had an impact on the portfolio's asset allocation and consequently the financial performance and retention.

5.2 Recommendations:

There are several conclusions one can draw from this study especially on the interplay between asset classes, risk profiles and portfolio strategies but perhaps the most important point is the one related to the relationship between risk profile rating and asset allocation strategy as we uncovered in this study. Therefore, the three recommendations we put forth are the inclusion of behavioral finance questions into the risk profile questionnaire, the structuring and creation of dynamic asset allocations and the continuous communication with investors to build trust and knowledge. To start, these recommendations can evidently be seen as generalized but they can be developed further based on the organizational culture of each bank, fund or portfolio manager, investment bank, financial institution, etc. Organizational culture and customer or investor relationship management plays a big role in how investors or clients respond or choose how and where to invest and whom to work with. While general and overarching, these recommendations can provide a foundation for future acceleration of risk profiling and better selection of investments.

A. Include Behavioral Finance Questions

While this study has shown that there is a positive impact on investors when behavioral finance questions are included in a risk profiling questionnaire, including any type of behavioral finance question(s) is simply not enough. Every financial institution must first acknowledge what type of firm they are, what is their own risk profile, what investments do they encourage and which they do not. Even with the knowledge of financially competent advisors, risk profiling is not a full proof method, it is a guide and a compass, but it should not be the foundation of asset and portfolio management. By understanding its own ability, direction, strategy and limitations, a firm can be more realistic with its own clients and able to focus its efforts on giving its investors what they need and want without compromising their own value offering or strategy. How does this fit with the risk profiling approach? A risk profiling questionnaire has to also embody and include questions of significant evidence to the firm; the traditional questions on risk capacity, tolerance, time horizon are foundational, but more personalization is required. Customizing the questionnaire, the rating, the analysis is fully a function of the financial manager and thus the

financial manager and the firm must customize their own questions. For example, would you invest in your children's education or provide them capital for their own venture? This is a type of question that can be very telling in terms of how the investor views the world and the value of capital. Before going into the behavioral finance questions, the questionnaire is a journey of discovery for both the investor and the financial manager, and they must both take from it what is essential to devise an investment strategy; it should not be a KYC form for regulation or due diligence but a guide for financial planning. In terms of behavioral finance questions, in this study we used scenario based questions as shown by MultiBank because they wanted a more succinct view of how investors rationalize their decisions and what do they place value on the most. Nonetheless, there is no one winning formula for how behavioral questions should be tailored or asked but there are few rules or guidance to improve the way such questions are asked. Financial managers should not be involved alone in designing these questionnaires and they must be design by behavioral finance professionals who can reduce bias, guessing and other confusing or misleading question types. A second important guidance is to blend scenario based questions with other types of questions so that the investor is not stuck in an assessment format and has to try to do their best on each section. A third guidance is to gamify the questionnaire and not rely on soft copy, digital or paper based formats because gamification of questionnaires and questions in general require more interaction, and this helps investors remove stressors and actually provide a more seamless and customizable experience. This definitely requires more research and resources, but it helps the customer experience, and the evidence is emerging (See Bayuk & Aurora Altobello, 2019) that gamification improves customer financial literacy, emotional and cognitive engagement, etc. The fourth guidance is to design questions that can be revisited in the future without compromising the reliability, validity and standardization of the questionnaire, because many investors can be in one state of mind today that would be different later and the testing should be repeated in the future as another way to gauge changes in direction and investment strategy.

B. Creating Dynamic Asset Allocation

According to the corporate finance institute (CFI, 2022), a dynamic asset allocation is an investment strategy that involves a dynamic and proactive action by financial advisors and portfolio managers that requires the adjustment of the weights or distribution in an investor's portfolio based on the market performance or the performance of securities. This requires an assessment of current market performance and the respective performance of each asset class. It is basically the calibration of the portfolio based on market conditions and performance of assets. In

general, this type of asset allocation is used to mitigate ever changing risks in volatile markets and unlike the strategic asset allocation strategy, a dynamic asset allocation does not involve a variety of assets and therefore, this allows portfolio managers to have a degree of flexibility in choosing investments. But this also requires portfolio managers to be very active in researching and tracking market trends and activity and consequently, for this dynamic strategy to succeed it does not only depend on the market's conditions but also on the ability of the portfolio manager to make good and fast investment decisions that address changes in the market. While not all risk profiles can be comfortable with a dynamic asset allocation, but normally investors focused on income and growth and who are in the moderate to moderately aggressive zones, should have the ability to be offered such a strategy with built-in customization of asset types and classes. There are many advantages to adopting a dynamic asset allocation for each risk profile but in general there are some solid reasons why this strategy can alleviate some of the pressures from investors who want to see better results with the same or a bit more of risk. Firstly, the returns can possibly provide higher performance and yields because of the regular adjustments and readjustment in the type and variety of assets within the investment portfolio. By making adjustment to the portfolio, portfolio manager can better prevent losses from unexpected market downturns and capture the upswings to increase yields. When this strategy is employed and proactively implemented, it can also be used to beat the market and constantly monitoring the trends and patterns for better investment decisions. Secondly, it is called a dynamic asset allocation strategy because of its flexibility as it can rapidly respond to changes in the market and have the ability to mitigate and protect against perceived and existing risks. This strategy fits the needs of cautious and somewhat riskier investors who are concerned with global events and are risk averse or who are dependent on their investment portfolio to generate or support household income. Inversely, there are also disadvantages to this strategy mainly because of the associated transaction costs which can be high during rapid market conditions and exiting from one asset to another or selling or buying one security or the next can add up quickly and offset or diminish any gains. Another disadvantage is at the cost of the firm and financial management; the dynamic nature of asset allocation requires rigid control and monitoring of the investment portfolio and a continuous check in on emerging market trends. Therefore, this strategy requires skills, competence, attention, experience, and knowledge of by professional portfolio managers and need for additional staffing and resources for examples additional assistants on the team and researchers, etc.

C. Building & Maintaining Trust

Financial firms and portfolio managers need to emphasize building and designing strategies that will cement and maintain the trust of investors because they are the clients and stakeholders that will set the overall tone and organizational value because they either enable or discontinue their trust in a financial institution through time. The trust of investors is the one value that cannot be purchased or hedged; it is concretely and truly driven by the financial institutions unique value proposition and investment strategy, as well as its risk appetite. It is therefore crucial that the values and proposals of said financial institutions be clear from the outset and that they stick by their values and strategies especially in market downturns. Reputational risk has always been a major factor in eroding trust because as heavily as a firm can invest time and resources in building its image, brand and reputation, their credibility can be eroded in days and weeks. The examples of eroded trust that has been the downfall of many financial firms are many (Enron, AIG, Lehman Brothers, etc.) and what has been learned over time is that investor trust plays out very rapidly on the markets today. The most threating factor that breaches the trust of investors happens when there is a broken financial relationship between the investor and the portfolio managers or the financial firm. The breakdown of this relationship could be attributed to sudden performance events and inconsistent financial results that insinuate give that the manager or management does not have a solid understanding, a contingency plan or ability to handle or come up with a strong response to risk events. Moreover, trust can be depleted when financial firms and managers attempt to acquire businesses or other assets that are not aligned with the financial institution's strategy and direction.

Another factor that diminishes trust and reduces the investor's appetite to deal with a financial firm is the sole focus on delivering financial results while disregarding ethical organizational behavior and culture and disregarding positive business practices that enable growth. Investors expect integrity while earning returns and expect a fairness in trading and cannot continue to support unethical practices or investments that enable negative repercussions on local or global scales. The expectation is that investors know that the firm has a solid ethical proposition and an integrity to carry out Environmental, Social and Governance (ESG) principles and commitments that are evidenced in the firm's actions and reports. If a financial firm justifies all the means, including negative ones, to increase returns they will see a quick pushback by investors who are fast in discounting firms that do not care about their brand image and promises. A more concrete example or eroding trust is when financial institutions are stuck in the past. In general, investors acknowledge and understand that financial firms in this day and age, that continue to use legacy business models and transactions and do not upgrade their ICT services and infrastructures are not

nearly close to innovation and that gives the impression that such financial firms can become too vulnerable and not up to speed with global changes. The leadership of financial institutions must embrace changes in technology and society and understand that clients determine the pace, speed, direction but also the need for a faster and more robust and seamless transactions. Therefore, it is important for financial institutions and firms to focus on three areas that build and maintain trust while also focusing on generating additional returns.

The first pillar is to deliver consistent financial results not to only provide earnings and returns but to also ensure consistency, integrity, and transparency and to ingrain in the mindset of investors the idea that the firm or the portfolio manager is protecting their assets and helping their investments grow. This is evidently a continuous process for portfolio managers that requires a lot of communication and evidenced based actions. But it is also at the heart of the company's mission statement and should be an integral part of the value proposition; to build and maintain trust and protect and grow the investments. Managing risk and opportunities is a constant motto and that can be accomplished through information technology and portfolio managers must show their clients the ability of the firm to stand by its promises on risk mitigation by any means especially once financial institutions and management can move beyond qualitative assessment risk and identify risk in all directions, forms, and types. The second pillar is to continuously look forward by taking on a holistic approach and view of the operational landscape. For example, when systemic global risks are perpetuating like climate change, financial institutions must prioritize businesses or investments that protect the environment and be forward looking in their approach on risk assessments and understanding how to adjust or calibrate their strategies and investment decisions to position themselves closer to greener energy or protective environmental practices. The re-allocation of investments based on Environmental, Social and Governance (ESG) principles requires often to address downside risks and seize opportunities. On the governance side, financial firms must create working groups and task forces to improve the suitability of their products and adopt policies that favor what they stand for. Lastly, having an agile, responsive, user-friendly, and digitally enabled company draws the line between a modern, forward-looking financial firm and a firm stuck in traditional processes. Embracing change and innovation are values that should be embedded in the organizational behavior and culture especially when fintech is heavily and increasingly on the rise and investors' patience and expectations are thin and high. Advanced research systems, Artificial Intelligence, stress-testing tools, data analytics and processing, etc. all those tools and services enable a company to be really prepared and on the edge

of financial and technological innovation and fare better in the competitive financial industry space.

5.3 Limitations of the Study:

The limitations of this study are based on the quantitative and qualitative methodology and questionnaire. The first limitation is that the study was conducted based on financial company in Hong Kong and therefore we cannot overgeneralize that the behavioral financial questions included in risk profiling practices outside the Hong Kong market is a good idea for risk profiling because more samples need to be taken from different markets and countries. The second limitation is on the use of the paper or digital paper formats for the questionnaires: the survey or questionnaires were sent to the investor's dashboards to be downloaded as a word template, this could be better automated and therefore the limitation of the study cannot assess whether other forms of questionnaires especially gamification could be a better way to solicit more accurate scenarios or results. Another limitation is the financial rating score; since risk profile scoring methodologies are not standardized, we cannot assume that other scoring models of risk profiles can yield similar results, but we had to work with what we had access to. The returns, yield or earnings of investors were measured over a period of 1 year within a pandemic cycle caused by COVID-19 so the responses could either be more conservative or less conservative in general and the returns could also be affected by the pandemic which is a non-controlled factor and not accounted for. An additional limitation in the study is the composure and state of mind of investors when filling out a questionnaire, for example they could be more optimistic, or could falsely report their risk capacity or time horizon, etc. Such questionnaires must be conducted over time and not within a single timed session.

5.4 Additional Research:

We found during this study that behavioral finance questions can have a positive impact on the proposed investments of financial companies. Nonetheless, more evidence is required on what type of behavioral finance questions, which scenarios to include, how to test against bias, how to come up with a risk profile rating through a consistent methodology and whether artificial intelligence can actually do a better job in predicting risk profiles and allocating assets than portfolio managers. All these questions and more should be researched for the improvement of the risk mitigation and for the financial industry as a whole.

Bibliography

Alemanni, B. & Uberti, P., 2019. What Are Investors Afraid of? Finding the Big Bad Wolf. *International Journal of Financial Studies,* 7(3), pp. 1-12.

Baker, B. a. W., 2011. Benchmarks as limits to arbitrage: Understanding the low-volatility anomaly. *Financial Analysts Journal,* Issue 67, pp. 40-54.

Bayuk, J. & Aurora Altobello, S., 2019. Can gamification improve financial behavior? The moderating role of app expertise. *International Journal of Bank Marketing,* 37(4), pp. 951-975.

Briggs, R., 2019. Normative Theories of Rational Choice: Expected Utility. In: E. N. Zalta, ed. *The Stanford Encyclopedia of Philosophy.* Fall 2019 ed. s.l.:Metaphysics Research Lab, Stanford University.

Buchner, A., 2014. Risk Management for Private Equity Funds. *Journal of Risk,* 19(6), pp. 1-32.

Business Insider, 2020. *Understand the difference between 2 types of risk.* [Online]
Available at: https://www.businessinsider.com/difference-between-risk-tolerance-vs-risk-capacity-investing-2020-10
[Accessed 1 April 2022].

Campbell, J., 1987. Stock returns and the term structure. *Journal of Financial Economics,* 2(18), pp. 373-399.

CFA, 2022. *What is Portfolio Risk and how is it calculated?.* [Online]
Available at: https://www.cfajournal.org/portfolio-risk/
[Accessed 10 May 2022].

CFI, 2022. *Asset Allocation.* [Online]
Available at: https://corporatefinanceinstitute.com/resources/knowledge/strategy/asset-allocation/
[Accessed 14 March 2022].

Comply Advantage, 2022. *KYC Risk Rating.* [Online]
Available at: https://complyadvantage.com/insights/kyc/kyc-risk-rating/#:~:text=What%20is%20KYC%20Risk%20Rating,of%20them%20is%20equally%20important.
[Accessed 19 February 2022].

Davies, G., 2017. *New Vistas in Risk Profiling,* Charlottesville: CFA Institute Research Foundation.

Davies, G. & Brooks, P., 2014. Risk Tolerance: Essential, Behavioural and Misunderstood. *Journal of Risk Management in Financial Institutions,* Volume 2, pp. 110-113.

De Bondt, W. F. M. & Thaler, R., 1994. *Financial Decision-Making in Markets and Firms: A Behavioral Perspective.* Cambridge, Massachusets, National Bureau of Economic Research.

Diller; Jäckel, 2015. *Risk in Private Equity. New insights into the risk of a portfolio of private equity funds.,* London: BVCA.

ESMA, 2014. *ASSESSMENT OF SUITABILITY AND APPROPRIATENESS AND REPORTING TO CLIENTS.* [Online]
Available at: https://www.esma.europa.eu/databases-library/interactive-single-rulebook/clone-mifid-ii/article-25-0
[Accessed 11 March 2022].

Financial Industry Regulatory Authority, 2022. *The Reality of Investment Risk.* [Online]
Available at: https://www.finra.org/investors/learn-to-invest/key-investing-concepts/reality-investment-risk
[Accessed 12 January 2022].

Financial Ombudsman Service, 2015. *Paper presented at the Financial Planning Association National Congress.* Brisbane, FOS.

FINRA, 2015. *FINRA Rule 2111 (Suitability) FAQ.* [Online]
Available at: https://www.finra.org/rules-guidance/key-topics/suitability/faq
[Accessed 17 March 2022].

Fisher, R. J., 1993. 'Social desirability bias and the validity of indirect questioning. *Journal of Consumer Research,* pp. 303-315.

Gerard, J., 2016. *New-look financial adviser fees.* [Online]
Available at:
https://www.theaustralian.com.au/subscribe/news/1/?sourceCode=TAWEB_WRE170_a
&dest=https%3A%2F%2Fwww.theaustralian.com.au%2Fbusiness%2Fwealth%2Ffinanci
al-adviser-fees--new-model-emerges%2Fnews-
story%2Fd4aae9ca311c59159eb1876d44430014&memtype=anonymous&mode
[Accessed 3 March 2022].

Grable, J., Lytton, R., O'Neill, B. & Joo, S.-H., 2006. Risk Tolerance, Projection Bias, Vividness, and Equity Prices. *The Journal of Investing,* 15(2), pp. 68-74.

Grayot, J., 2020. Dual Process Theories in Behavioral Economics and Neuroeconomics: a Critical Review. *Review of Philosophy and Psychology,* 1(11), pp. 105-136.

Guo, H. & Neely, C., 2008. Investigating the intertemporal risk–return relation in international stock markets with the component GARCH model. *Economics Letters,* 99(2), pp. 371-374.

Härle, et al., 2015. The future of bank risk management. *McKinsey Working Papers on Risk*, December.

Harris, J., 2004. Measured intelligence, achievement, openness to experience, and creativity. *Personality and individual differences,* 36(4), pp. 913-929.

Hayes, M., 2022. *Low-Risk vs High-Risk Investments.* [Online]
Available at: https://www.experian.com/blogs/ask-experian/low-vs-high-risk-investments/
[Accessed 10 May 2022].

Hoffmann, A., Post, T. & Pennings, J., 2015. How Investor Perceptions Drive Actual Trading and Risk-Taking Behavior. *Journal of Behavioral Finance,* 16(1), pp. 94-103.

Hubble, A., J.E., G. & R, D., 2012. *Investment Risk Profiling: A guide for Financial Advisors,* Charlottsville: CFA Research Institute.

Hunt, K., 2016. Investment Risk Profiling: Lessons from Psychology. *Financial Planning Research Journal,* pp. 50-63.

Hunt, K. H. M., Brimble, M. & Freudenberg, B., 2011. 'Determinants of Client-Professional Relationship Quality in the Financial Planning Setting. *Australiasian Accounting Business and Finance Journal,* 5(2), pp. 69-100.

Jacobs, B. & Levy, K., 1989. The Complexity of the Stock Market. *The Journal of Portfolio Management,* 16(1), pp. 19-27.

Kahneman, D. & Amos, T., 1979. Prospect Theory: An analysis of decision under risk. *Econometrica,* 47(2), pp. 263-292.

Karp, B., Weiss, Rifkind & LLP, W. &. G., 2018. The Financial Crisis 10 Years Later: Lessons Learned. *Harvard Law School Forum on Corporate Governance*, 5 October.

Kent, D. & Sheridan, T., 2000. *Market Efficiency in an Irrational World.* Cambridge, Massachusetts, National Bureau of Economic Research.

Kiesel, F., 2019. Old risks and new challenges: What's wrong today with credit-rating agencies?. *The Conversation*, 16 June.

Kimball, M., Sahm, C. & Shapiro, M., 2008. Imputing risk tolerance from survey responses. *Journal of the American Statistical Association,* 103(483), pp. 1028-1038.

Klement, J., 2015. *Investor Risk Profiling: An Overview.* Charlottesville: CFA Institute Research Foundation .

Kogan, N. & Wallach, M. A., 1964. *Risk taking: A study in cognition and personality.* Washington D.C.: Holt, Rinehart & Winston..

Kumar, S., Goyal, N. & Basu, R., 2018. Profiling emerging market investors: a segmentation approach. *International Journal of Bank Marketing,* 36(3), pp. 441-455.

Lehman, R., 2018. *Why the financial industry still gets client risk profiling so wrong.* [Online]
Available at: https://proactiveadvisormagazine.com/financial-industry-gets-risk-profiling-wrong/
[Accessed 22 February 2022].

Liu, J., Longstaff, F. A. & Jun, P., 2003. Dynamic Asset Allocation With Event Risk. *The Journal of Finance,* 58(1), pp. 231-259.

Lowe, J., 2021. *Plaid.com.* [Online]
Available at: https://plaid.com/resources/banking/what-is-kyc/
[Accessed 12 March 2022].

Markowitz, H., 1952. Portfolio Selection. *Journal of Finance,* Volume 7, pp. 77-91.

Martin, R., 2008. The St. Petersburg Paradox. *Stanford Encyclopedia of Philosophy*, 16 June.

MiFID, 2014. *ARTICLE 19 - SPECIFIC REQUIREMENTS FOR MTFS.* [Online]
Available at: https://www.esma.europa.eu/databases-library/interactive-single-

rulebook/mifid-ii
[Accessed 12 January 2022].

Mitroi, A. & Oproiu, A., 2014. Behavioral finance: new research trends, socionomics and investor emotions. *Theoretical and Applied Economics,* 21(4(593)), pp. 153-166.

Nguyen, L., Gallery, G. & Newton, C., 2017. The Influence of Financial Risk Tolerance on Investment Decision-Making in a Financial Advice Context. *Australasian Accounting, Business and Finance Journal,* 10(3), pp. 3-22.

Ontario Securities Commission, 2022. *Types of investment risk.* [Online]
Available at: https://www.getsmarteraboutmoney.ca/invest/investing-basics/understanding-risk/types-of-investment-risk/
[Accessed 2 February 2022].

Pompian, M., 2018. Risk Profiling through a Behavioral Finance Lens. In: J. Klement, ed. *Risk Profiling and Tolerance: Insights for the private wealth manager.* Charlottesville: CFA Institute Research Foundation, pp. 17-34.

Puri, M. & Robinson, D. T., 2007. Optimism and economic choice. *Journal of Financial Economics,* 86(1), pp. 71-99.

Ricciardi, V., 2008. The Psychology of Risk: The Behavioral Finance Perspective. *HANDBOOK OF FINANCE: VOLUME 2: INVESTMENT MANAGEMENT AND FINANCIAL MANAGEMENT,* Volume 2, pp. 85-111.

Rice, D., 2005. *Variance in Risk Tolerance Measurement—Toward a Uniform Solution,* s.l.: Golden Gate University.

Ritter, J., 2003. Behavioral Finance. *Pacific-Basin Finance Journal,* 11(10), pp. 429-437.

Rossi, A. & Timmermann, A., 2009. What is the Shape of the Risk-Return Relation?. *AFA 2010 Atlanta Meetings Paper*, 23 March.

Roszkowski, M. J., 1992. *How to Assess an Investor's Financial Risk Tolerance: The Basics.* PA: The American college.

Schuldberg, D., 2005. Eysenck Personality Questionnaire Scales and Paper-and-Pencil Tests Related to Creativity. *Psychological reports,* 97(1), pp. 180-182.

Shefrin, H. M. & Thaler, R. H., 1977. *An economic theory of self-control.* Mass.: National Bureau of Economic Research Cambridge.

Silitch, N., 2019. An Exploration of the Evolution of Risk: Past, Present and Future. In: L. Amnon & Z. Jing, eds. *Credit Risk Measurement and Management: Disruption and Evolution.* s.l.:Risk.net, pp. 7-11.

Statitsa, 2018. *Customer retention rate of businesses worldwide in 2018, by industry.* [Online]
Available at: https://www.statista.com/statistics/1041645/customer-retention-rates-by-industry-worldwide/
[Accessed 2 June 2022].

Statman, M., 1999. Behavioral Finance: Past Battles and Future Engagements. *Financial Analysts Journal,* 55(6), pp. 18-27.

The Trust Company, 2019. *HOW SHOULD I BE INVESTED?.* [Online]
Available at: https://thetrust.com/how-should-i-be-invested/
[Accessed 21 January 2022].

Thompson, E. R., 2009. 'Individual entrepreneurial intent: Construct clarification and development of an internationally reliable metric. *Entrepreneurship Theory and Practice,* 33(3), pp. 669-694.

Ulici, M., 2012. *Financial liberalization and the impact on financial market.* s.l.:s.n.

Vroman, H. W. & Reichheld, F. F., 1996. The Loyalty Effect: The Hidden Force Behind Growth, Profits, and Lasting Value. *Academy of Management Perspectives,* 10(1), pp. 88-90.

Waweru, N., Munyoki, E. & Uliana, E., 2008. The effects of behavioural factors in investment decision-making: a survey of institutional investors operating at the Nairobi Stock Exchange. *International Journal of Business and Emerging Markets,* 1(1).

Weber, M., E.U., W. & Nosic, A., 2013. Who Takes Risks When and Why: Determinants of Changes in Investor Risk Taking. *Review of Finance,* 17(3), pp. 847-883.

Wood, R. & Zaichkowsky, J., 2010. Attitudes and Trading Behavior of Stock Market Investors: A Segmentation Approach. *Journal of Behavioral Finance ,* 5(3), pp. 170-179.

Yang, S., Markoczy, L. & Qi, M., 2007. Unrealistic optimism in consumer credit card adoption. *Journal of Economic Psychology,* 28(2), pp. 170-185.

Appendices

Appendix 1: Survey

Risk Profiling Questionnaire

Investors have varying levels of risk tolerance; a significant factor is the time horizon. Investors with short time horizons are exposed to higher risks. Another determining factor of risk tolerance is the appetite for risk and how much are investors willing to risk and for how long when markets are volatile. This questionnaire has been designed to measure your risk appetite and tolerance, taking into considerations your resources, time horizon, as well as behavioral aspects to better determine the type of asset class or financial product you are comfortable with.

Section I: Financials

1. What is your approximate net worth (excluding your principal residence)?

Under $100K	$100K - $300K	$300K - $500K	$500K - $750K	$750K - $1.0M	$1.0M - $3.0M	Over $3M

2. What is your liquid net worth? (Assets that can be readily converted to cash)?

Under $25K	$25K - $50K	$50K - $100K	$100K - $250K	$250K - $500K	Over $500K

3. What is your current household income?

Under $50K	$50 - $100K	$100K - $150K	$150K - $250K	$250K - $500K	Over $500K

4. What is your income tax bracket?

10%	15%	25%	28%	33%	35%

Section II: Goals

5. What is your investment objective?

☐ Preserve Principal (0)   ☐ Income and Growth (6)   ☐ Aggressive Growth (12)
☐ Income (3)   ☐ Growth (9)

6. I plan to begin taking money from my investments in

☐ Less than 1 year (0)   ☐ 4-6 years (6)   ☐ More than 10 years (12)
☐ 1-3 years (3)   ☐ 7 – 10 years (9)

7. Today, how much do you rely on income from your investment accounts?

☐ Heavily (0)   ☐ Slightly (2)   ☐ Moderately (3)   ☐ Not at all (4)

Section Score:

Section III: Risk Tolerance

8. What is your investment experience?

   ☐ None (0) ☐ Limited (2) ☐ Moderate (3) ☐ Extensive (4)

9. Indicate the response that you feel best describes your risk tolerance

Conservative (0) - Accepting of lower returns for a higher degree of stability - Seeks principal preservation and minimizing risk	Moderate (4) - Accepting of modest risks to seek higher long-term returns - Accepting of short-term losses of principal in exchange for long-term appreciation
Moderately Conservative (2) - Comfortable accepting a small degree of risk and volatility - Accepting of lower returns in exchange for minimal losses	Moderately Aggressive (6) - Willing to accept significant risk - May endure large losses in favor of potentially higher long-term returns
Aggressive (8) - Willing to accept substantial risk - Maximizing long-term returns is more important than protecting principal	

10. From September 2008 through November 2008, stocks lost over 31%. If I owned a stock investment that lost about 31% in three months, I would: (If you owned stocks during this period, please select the answer that matches your actions at that time.)

   ☐ Sell all the remaining investment (2)   ☐ Hold on to the investment and sell nothing (6)

   ☐ Sell some of the remaining investment (4) ☐ Buy more of the investment (8)

11. Which hypothetical portfolio are you most comfortable with, considering the possible range of returns, for $100,000 invested, over a 1-YEAR period?
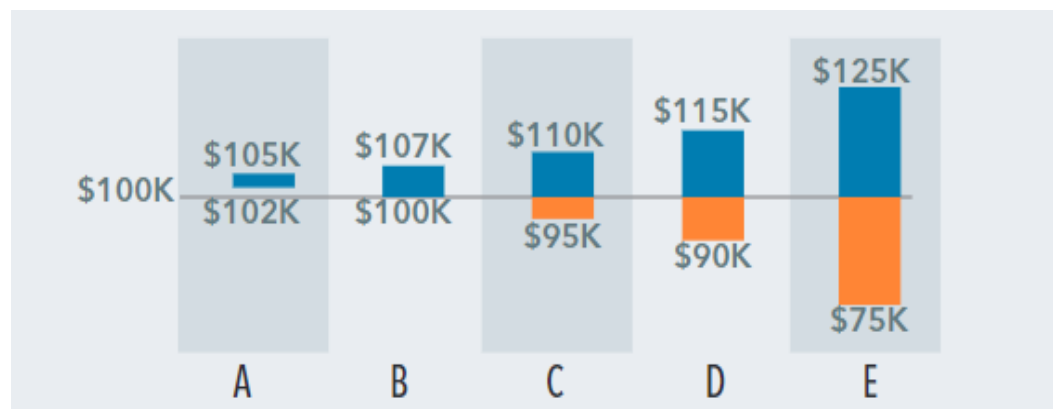
   ☐ A (0)   ☐ B (1)   ☐ C (2)   ☐ D (3)   ☐ E (4)

12. Generally, investments with the highest potential for gains carry the greatest risk of loss. Which hypothetical portfolio are you most comfortable with, considering the possible outcomes of $100,000 invested for 5-YEARS:
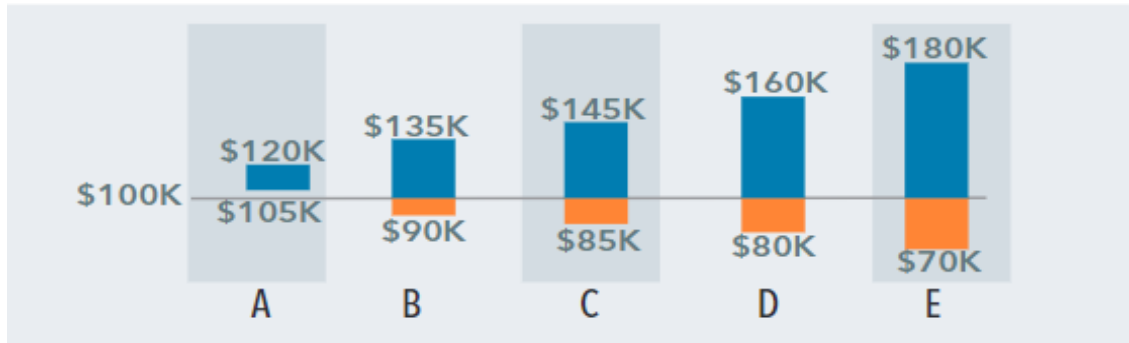
☐ A (0) ☐ B (1) ☐ C (2) ☐ D (3) ☐ E (4)

13. Historically, markets have experienced sharp, short-term downturns. If your investment portfolio lost 25% of its value over TWO DAYS, how would you react?

I would immediately move all my holdings to cash (0)	I would immediately change to strategies that are more conservative (3)
I would wait at least 3 months before deciding to make any changes (6)	I would immediately change to strategies that are more aggressive (9)
I would immediately add to my investment portfolio and buy more equities to take advantage of the lower prices (12)	

14. Historically, markets have experienced prolonged periods of declines. If your investment portfolio lost 33% of its value over the last 3 MONTHS, how would you react?

I would immediately move all my holdings to cash (0)	I would immediately change to strategies that are more conservative (3)
I would wait at least 3 months before deciding to make any changes (6)	I would immediately change to strategies that are more aggressive (9)
I would immediately add to my investment portfolio and buy more equities to take advantage of the lower prices (12)	

15. Assuming you want to invest in stocks, which one would you choose?

Companies with significant technological advancement but selling their stocks at a low price (3)	Established well-known companies that have a potentially high rate of growth (6)
"Blue chip" stocks that pay the dividend (9)	Other – Please Specify (0)

Section Score:

SCORING/RATING

SCORE 0-16: Conservative •Accepting of lower returns for a higher degree of stability •Seeks principal preservation and minimizing risk	SCORE 17-31: Moderately Conservative •Comfortable accepting a small degree of risk and volatility •Accepting of lower returns in exchange for minimal losses
SCORE 32-55: Moderate •Accepting of modest risks to seek higher long-term returns •Accepting of short-term losses of principal in exchange for long-term appreciation	SCORE 56-70: Moderately Aggressive •Willing to accept significant risk •May endure large losses in favor of potentially higher long-term returns
SCORE 71-89: Aggressive •Willing to accept substantial risk •Maximizing long-term returns is more important than protecting principal	

Appendix II: Revealed Preference Test
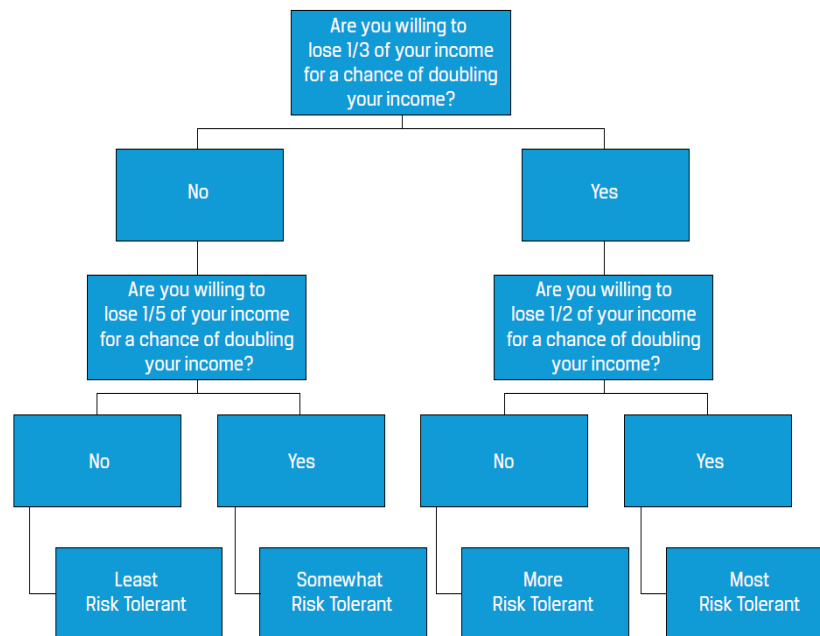

Figure 9: Revealed Preference Test

(Hubble, et al., 2012)

<p style="text-align: center;">**Appendix III: Interview Questions**</p>

- **Question 1:**

What are in your view, the most significant components of a risk profile questionnaire?

- **Question 2:**

How accurate is the measure of risk tolerance according to your previous experience?

- **Question 3:**

How reliable are behavioral questions such as: what an investor would choose or prefer when making a financial decision, to create their risk profile?

- **Question 4:**

Do you think there is value in including behavioral questions to investors to determine investment suitability?

- **Question 5:**

Has previous experimentation in behavioral questions on risk profiles, yielded any results? If so what were the results?