Lisbon School of Economics & Management
Universidade de Lisboa

MASTER'S OF SCIENCE IN

FINANCE

MASTER'S FINAL WORK

PROJECT

INVESTMENT POLICY STATEMENT FOR INDIVIDUAL INVESTORS:

MR. AND MRS. MENDES

PEDRO LOPES CORREIA

JUNE, 2024

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PROFESSOR FLORENCE PINTO BASTO

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Abstract

This Investment Policy Statement (IPS) serves as a way to effectively communicate with the client and create a strategy to achieve the investment objective.

Mr. and Mrs. Mendes will be aiming to transform their initial capital of 300,000.00€ to 450,00.00€, which, accounting for a 2.1% yearly inflation turns to 614,608.62€.

With a moderately conservative risk tolerance, the ultimate goal is to provide for the children's future.

The investment philosophy focuses on value investing through Stocks. The goal is to maximize the Sharpe ratio, whilst minimizing losses over 5%. The strategy excludes leverage and short-selling investments, and there are no specific liquidity needs. The proposed portfolio aims to achieve an expected annual return of approximately 6.93% with a standard deviation of 10.33% and a Sharpe ratio of 0.41.

The client will receive quarterly performance reports to ensure openness as well as frequent risk evaluations grounded in quarterly financial reports. If deemed necessary, the advisor reserves the right to rebalance the portfolio at any time to maintain optimal performance.

A risk analysis was performed, employing Value-at-Risk (VaR) and Expected Shortfall to assess potential risks. A risk matrix was also created in order to identify and prioritize potential risks in the 15 year-horizon.

JEL classification:C6; G11.

Keywords: Risk Analysis; Stocks; Sharpe Ratio; Value Investing; Risk Tolerance; Value at Risk.

Resumo

Este IPS serve como um meio para comunicar eficazmente com o cliente e e criar uma estratégia para atingir o objetivo de investimento.

O objetivo do Sr. e da Sra. Mendes é transformar o seu capital inicial de 300.000,00€ em 450.00,00€, o que, tendo em conta uma inflação anual de 2,1%, se transforma em 614.608,62€.

Com uma tolerância ao risco moderadamente conservadora, o objetivo final é assegurar o futuro das crianças.

A filosofia de investimento centra-se no investimento em valor através de acções. O objetivo é maximizar o Índice de Sharpe, ao mesmo tempo minimizando as perdas superiores a 5%.

A estratégia exclui investimentos com alavancagem e vendas a descoberto, e não há necessidades específicas de liquidez. A carteira proposta visa atingir um retorno anual esperado de aproximadamente 6,93% com um desvio padrão de 10,33% e um índice de Sharpe de 0,41.

O cliente receberá relatórios trimestrais de desempenho de modo a garantir transparência, bem como avaliações de risco frequentes baseadas em relatórios financeiros trimestrais. Se for considerado necessário, o consultor reserva-se o direito de reequilibrar a carteira em qualquer altura para manter um desempenho ótimo.

Foi efectuada uma análise de risco, utilizando o Value-at-Risk (VaR) e o Expected Shortfall para avaliar os riscos potenciais. Foi também criada uma matriz de risco para identificar e dar prioridade aos riscos potenciais no horizonte de 15 anos.

Classificação JEL: C6; G11.

Palavras-Chave: Análise de Risco; Ações; Índice de Sharpe; Investimento em Valor; Tolerância ao Risco; Value at Risk.

Acknowledgements

I would like to start by thanking everyone who was a part of this academic journey, not only during the Master's Final Work but all of the master's in itself.

Start by thanking my Mom, without her I wouldn't be here (literally), thank you for all the support and confidence you have shown me over the years, providing me with the conditions needed for my success, and to my Dad, who I'm sure would be proud to see me where I am now.

To my girlfriend Helena, who somehow still hasn't gotten tired of my endless ramblings about research and late-night study sessions. Your love, patience, and understanding have been my greatest sources of strength. I promise I'll stop using our dinner dates to discuss weird Value at Risk metrics and Solver issues I was having.

To my sister, who I'm sure is never going to read this, thanks for the lunches you made me during this period, I was probably one frozen pizza away from a heart attack.

To my uncles, who I usually go to Benfica games with, this is it, from now on I promise to start paying a few post-game dinners here and there.

To my grandmother and godmother who are going through a difficult time right now, I hope you know that your support has been immense during this period even with everything going on, another thanks because one isn't enough to my grandmother for always being the kindest and most caring person there is.

To the rest of my family, including my new 6-month-old cousin, thank you all!

To all my friends whom I have known for probably all my life and I'm pretty sure still don't quite know what I do or what my MFW is about, thank you for all the laughs during these years, I could probably have done it without you, but it would have been much more boring.

To all the amazing people I met during the Master's, with whom I faced all the challenges and celebrated every little victory, here's hoping that next semester we finally master the art of studying with a reasonable amount of time to spare.

To all the people I also met during my bachelor's who continued being friends throughout my master's, many thanks to you guys as well.

Finally, many thanks to the Master's coordination for allowing me to embark on this experience, which, although hard, it was the best master's program I could have taken. Also, to Professor Florence Pinto Basto, my supervisor, thank you for all the advice, valuable insights, and support in the process of writing this MFW.

Thank you all

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1 Executive Summary

1.1 Scope and Purpose

The investment advisor utilizes the Investment Policy Statement (IPS) to communicate effectively with the client. It is the responsibility of the advisor to consistently update the IPS, including advice from tax and legal experts. Any changes or deviations from the statement are promptly communicated to clients, who have the final say on approving the IPS and its modifications. Acting as a fiduciary, the advisor provides unbiased guidance, openly reveals any conflicts of interest, and complies with the regulations set forth by the CFA (Chartered Financial Analyst) standards.

1.2 Governance

In pursuit of optimal outcomes, the IPS precisely delineates different responsibilities. The advisor is responsible for formulating and maintaining the IPS, providing updates on progress, and offering recommendations for solutions. Simultaneously, clients diligently review the IPS periodically. The advisor suggests asset allocation decisions, which require client approval. Additionally, the advisor undertakes the responsibility for both risk management and ongoing monitoring.

1.3 Investment Return and Risk

The IPS has been created to achieve a minimum yearly investment return of 6.18% over a 15-year horizon using Equities and fixed income for asset allocation. The Risk tolerance being moderately conservative allows for a 5% maximum loss limit.

The advisor will apply a variety of risk metrics to create an ideal plan and strengthen the resilience of the portfolio, all while accounting for a 2.1% annual rate of inflation. The Portfolio is expected to deliver a 6.93% return and a standard deviation of 10.33%.

1.4 Risk Management

Following CFA's Global Investment Performance Standards (GIPS®), the advisor will offer performance assessment and report. The clients will receive regular reports that include risk assessments and any necessary adjustments. Risk metrics updates will be offered every quarter. When necessary, the advisor will suggest rebalancing the portfolio.

2 Investment Policy Statement

2.1 Scope and Purpose

Concerning their investment strategy, this document designated as an IPS establishes efficient communication between the financial advisor and the individuals, Mr. Alexandre Mendes and Mrs. Camila Mendes. The parties involved in this financial arrangement are Mrs. Camila Mendes, a corporate lawyer, and Mr. Alexandre Mendes, a software engineer. Even though they are familiar with the fundamentals of the market and the main asset classes, they seek guidance in constructing a well-diversified portfolio.

Currently living in Braga, Portugal, the couple in their late twenties do not have children, although they plan to have two in the near future. Their goal comes from a recent inheritance: a collection of paintings from Mr. Alexandre's late mother, which includes works by well-known artists like Manuel Cargaleiro. Their investment capital is derived from this collection, valued at 300,000.00€ (three hundred thousand euros).

3.1.2 Structure:

I oversee and offer strategic direction for Mr. and Mrs. Mendes' investing ventures as their exclusive financial advisor. Throughout this process, I consult with their tax and legal consultants. I will make sure that the Investment Policy Statement (IPS) is followed, and I will notify Mr. and Mrs. Mendes of any modifications or violations as soon as possible. The final word on whether to approve the IPS and any changes belongs to the client.

In my capacity as the advisor, I uphold a fiduciary duty and always act in the client's best interests. I follow the Asset Manager Code of Professional Conduct established by the CFA Institute, declare any conflicts of interest, and provide truthful and transparent reports. As the authorized investment advisor for Mr. and Mrs. Mendes, I must assess and keep an eye on any risks associated with investments. I'll put together a financial report for them every quarter that will act as the formal record of the investment policy and the foundation for evaluating risk.

2.2 Governance

A governance system is necessary to guarantee the efficacy and accountability of the financial advice operations in accordance with the Investment Policy Statement (IPS). Both the financial advisor and the customer have defined roles and duties, which is essential for building trust and a positive working relationship. The IPS must be developed, implemented, and maintained by the financial advisor in compliance with the client's financial goals, risk tolerance, and limits. The governance structure's core component is a comprehensive approach to risk management, which takes market and intrinsic risks into account and matches the investment strategy with the client's risk profile.

The client will receive quarterly performance reports to ensure openness. The client's interests are given priority when suggested corrective actions deviate from the set standards. Every quarter, the effectiveness of the IPS is evaluated through periodic assessments, and any necessary adjustments are suggested based on the client's changing risk tolerance and limits

as well as changes in market conditions. It is recommended that clients actively participate in the IPS review process to guarantee accuracy and alignment with changing risk tolerance and financial objectives. In the event of unforeseen circumstances, the advisor rebalances the portfolio weights as deemed necessary. The financial advisor, who is skilled in the selection and management of financial assets for the best possible portfolio performance, has the authority to appoint and dismiss overseers of financial assets.

The best financial assets and asset allocation plans are suggested, and regular portfolio rebalancing is carried out to keep the client's financial objectives and risk tolerance in line. Clients are better equipped to make decisions about their investment portfolios when they have access to comprehensive information, such as percentages invested in each asset class, projected returns, correlations, tax implications, and inflation estimates. Frequent risk evaluations grounded in quarterly financial reports guarantee ongoing compliance with legal and ethical requirements as well as alignment with the client's financial goals.

Financial advising activities are committed to upholding certain principles to maintain a relationship based on trust, transparency, and the pursuit of the client's financial well-being. These principles include acting in the client's best interests, avoiding conflicts of interest, and strictly adhering to industry regulations.

2.3 Investment, Return and Risk Objectives

2.3.1 Investment Objective

The Investment Policy Statement (IPS) outlines the investment objectives, which aim to provide sufficient income over 15 years, with a target of approximately €450,000.00 by 2039. The fund's goal is to safeguard the financial future of the client's children and cover various expenses, starting with an initial capital of €300,000.00 The specific objectives are as follows: allocate €20,000.00 for each child's future car purchase, with an average budget of €10,000.00 per vehicle, and €30,000.00 for possible school and university expenses for the client's children. Additionally, a provision of €100,000.00 has been made to cover potential expenses, including an anticipated housing admission fee of €50,000.00 per child. Despite being labeled as 'retirement savings,' these funds are primarily focused on achieving long-term financial goals and security. This is especially relevant considering that the clients are in their late twenties and are not planning to retire anytime soon. This ensures that the original capital of €300,000 is preserved and strategically grown to meet evolving financial demands and goals beyond the 15-year investment period.

The target amount of €450,000.00 has been determined, taking into consideration inflation and taxes on investment earnings. Inflation is an economic factor that reduces the value of money over time, so the target amount needs to be higher to maintain the same purchasing power in the future. Additionally, taxes on investment earnings, such as capital gains tax or income tax, can impact the final amount received by the investor.

2.3.2 Return, Distribution and Risk Requirements

It is expected that inflation will decrease over the next few years according to the most recent project by the European Central Bank, though at a slower pace than what has been observed

recently. The impact of the ECB's monetary policy and the easing of cost pressures are expected to drive headline inflation down from 5.4% in 2023 to 2.7% in 2024 and further to 2.1% in 2025, ultimately reaching 1.9% in 2026. Therefore, achieving the monetary policy goal of approximately 2% inflation seems highly feasible. This has prompted the selection of a slightly inflation rate of 2.1% to account for unforeseen events.

In order to achieve a target of nearly €450,000.00 by 2039 with an initial investment capital of €300,000.00 a total investment performance of approximately 6.18% annual real rate of return is needed, accounting for a 2.1% inflation rate and a 28% capital gains tax. Considering the calculated average inflation rate over the 15-year investing period, the initial portfolio goal of €450,000.00 should be adjusted to €614,608.62. Therefore, compounding the invested funds at this adjusted rate over the 15-year term will position us to successfully reach the goal.

These results will be achieved by finding the right balance between risky and risk-free assets to maximize returns while minimizing risk.

2.3.3 Portfolio Policy

The Equity Asset Allocation Plan prioritizes transparency and joint evaluations by advisors and clients. Each equity class's effectiveness will be evaluated through extensive testing of optimization methods such as Mean-Variance Theory (MVT) and Modern Portfolio Theory (MPT), resulting in agreement on a single optimal distribution, which refers to the specific allocation of assets within each equity class that is deemed most effective based on our evaluation criteria, represents the ideal balance of risk and return for that particular equity class, tailored to meet the client's financial objectives and risk tolerance. Predetermined maximum and minimum ranges will be established within each class to allow for flexible asset allocation. The advisory team will ensure compliance with preset limits by closely following the Asset Allocation Plan.

Quarterly reports will be issued to clients, providing comprehensive updates from the investment manager. These reports will detail current equity allocations and verify compliance with authorized ceilings which will be explained in the chapter 4.2.3. This ongoing monitoring and reporting approach preserves alignment with the client's financial objectives and risk tolerance within an equity-based portfolio.

2.3.4 Investor’s Risk Tolerance

The client's balanced financial profile has been considered in the formulation of the investing plan. The asset allocation strategy, which has a 15-year time horizon and limits the scope of investments to stocks, places a high value on openness and dynamic modifications that are assessed in concert with advisors and customers regularly.

To ensure that a single, optimal allocation for the asset class is finalized inside the portfolio, each equity class is put under a testing process applying a variety of optimization models, as explained in chapter 2.3.3, to evaluate performance.

Predetermined maximum and minimum limits have been established to allow for flexibility in the equity allocation. The advisory team is dedicated to upholding the asset allocation plan, making sure that real equity proposals do not exceed the stated boundaries.

The clients have a conservative tolerance for risk and potential capital loss, as they have a Moderately Conservative risk profile according to a questionnaire by Equitable Life of Canada (Appendix 2).

From this questionnaire we can notice that the family is looking for a long-term investment (15 years), that they prefer stability over the possibility of achieving a higher income and, as a preference, they would like to minimize as much as possible the losses over 5%.

The portfolio aims to provide a mix of long-term capital growth and income, with the expectation of some fluctuations in investment returns. Clients with a long-term investment outlook should be comfortable with such fluctuations and willing to accept minor losses.

Nonetheless, a strategy to define the portfolio will exist due to the main focus on value stocks. The portfolio will be diversified by considering a range of sectors, industries, and geographic areas.

2.3.5 Relevant Constraints

A quarterly report containing a summary of the performance of each asset class will be provided to the client.

Before addressing the constraints in the investment by the couple, it is important to note that in Portugal, as a general rule, capital gains will be subject to tax at a flat rate of 28% and both dividends and interest are also subjected to a flat tax rate of 28%.

In terms of liquidity, given the family's stable income source, they are comfortable with the practice of reinvesting all dividends and interest income generated by their investments. This approach aligns with their long-term investment objectives and financial strategy. Based on the clients' current financial situation and their careers, there are minimal liquidity restrictions. This means that there is no immediate need to withdraw funds. However, in the event of unusual market conditions, assets may need to be converted to cash for rebalancing purposes.

None of the investments under this IPS include leverage strategies. There is no specified restriction on the percentage amount of investment denominated in a foreign currency. If any payments are received in a currency other than Euros, they will be converted to Euros using the current exchange rate. When choosing stocks, ESG criteria may be considered, but it is not the most important consideration in the selection process.

This investment will primarily involve stocks, which will incur various fees and costs such as transaction, management, and currency conversion fees. As per the client's request, the investment will focus exclusively on companies based in Europe and the United States. Additionally, it is crucial to evaluate expectations regarding future exchange rates between the Euro (EUR), US Dollar (USD), Polish zloty (PLN), and Danish krone (DKK), as fluctuations in these rates can significantly impact the value of investments. An appreciation of the USD, PLN, or DKK against the EUR could enhance the returns on investments when converted back to EUR, while a depreciation could diminish them. Conversely, investments denominated in EUR may be affected similarly by EUR appreciation or depreciation. Monitoring and managing exchange rate risks for all relevant currencies will therefore be an integral part of the investment strategyThis IPS is subject to the supervision and regulation of the Portuguese tax

authority "Autoridade Tributária" and the Portuguese securities exchange commission "Comissão do Mercado de Valores Mobiliários."

2.4 Risk Management

Each stock in the portfolio will be evaluated separately by the advisor, who will also assess the overall performance of the suggested portfolio. By the end of each quarter, a report that complies with the CFA Institute's Global Investment Performance Standards will be sent. One of the main duties as the clients' chosen advisor is to continuously examine and monitor any potential risks related to their stock investments.

In addition to the performance report, the advisor will provide quarterly updates on certain risk metrics, such as the Sharpe Ratio (SR) , the annualized standard deviation of portfolio returns, Parametric VaR, Conditional VaR(CvaR), as well as a comparison with the defined Benchmark. Every quarter, the equity allocation will be reviewed, and changes will be suggested to keep the intended allocation and reduce risks.

3 Investment Design

3.1 Investment Philosophy

An investor's investment philosophy is a set of beliefs that guide their approach to financial decision-making. It forms the foundation for an investor's risk management process, portfolio development, and opportunity analysis. An investment philosophy helps investors navigate the complexities of financial markets by providing a framework for decision-making in different market conditions.

Mr. Alexandre Mendes and Mrs. Camila Mendes' investment philosophy is based on value investing, which fits their risk tolerance and long-term objectives. This strategy involves investing in value equities because they are resilient to market downturns. Value investing was popularized by Graham (1949)and later adopted by Warren Buffet. It involves using fundamental analysis to determine the intrinsic value of a stock. If the intrinsic value is higher than the market price, investors are advised to purchase and hold the stock as per Graham (1949). Value stocks are from stable industries that are less susceptible to shifts in the economy. They also frequently yield high dividends, making them a reliable source of income in volatile markets.

Value stocks are generally more resilient and less susceptible to economic downturns when compared to growth stocks, which aligns with Mr. and Mrs. Mendes' risk aversion.

Their investment approach looks for low-cost assets that have the potential to grow in value over time and generate income. The main focus is on consumer staples, energy, financials, industrials, and materials. This enhances the overall stability and risk mitigation of the portfolio, ensuring a well-rounded and strategically diversified investment approach.

Cussen (2023)suggests that value stocks are priced lower than the broader market, have low P/E ratios, are relatively stable with low volatility, and have high dividend yields.

As per Graham (1949) periodic losses can’t be avoided, but thanks to value investing, it is possible to minimize them. The ability to minimize losses leads to market-beating returns over long periods. Graham (1949) coined the term "margin of safety" as a cornerstone principle for investors, emphasizing the importance of leaving ample room for error and cautioning against premature actions based solely on perceived valuation. Instead, he advocated a conservative approach, advising investors to wait until a stock fall significantly below its fair value to mitigate potential risks.

On the other hand, growth stocks are often priced at a premium based on future growth expectations This can lead to price declines during economic downturns when these expectations become less certain.

According to Morgan Stanley's report for 2022, the performance of growth stocks versus value stocks is heavily influenced by interest rates. Throughout the pandemic, there has been a strong correlation between the relative performance of growth and value stocks and interest rates. Growth stocks are considered high duration, with cash flows projected further into the future. Conversely, value stocks are considered low duration, with more immediate cash flows. Consequently, changes in interest rates can significantly impact the performance of growth and value stocks. Growth stocks are more sensitive to changes in discount rates compared to

value stocks. The reason is that their projected cash flows are more vulnerable to changes in discount rates because they are farther in the future.

As per the Morgan Stanley (2022) report, Growth indexes tend to favor the technology and consumer discretionary sectors over the Value sector. The report cites the technological prowess of tech firms, including network effects, switching costs, feedback loops, and patents, which create entry barriers for new players. Additionally, the emergence of "Big Tech" players has resulted in concentrated market share and increased global government scrutiny on antitrust concerns, drawing attention to the entry barriers. Similarly, the consumer discretionary sector also benefits from digital technology. Conversely, the report notes that Financials are the least represented sector in Growth indexes relative to Value. These sector-specific insights can aid investors in determining their preferred investment style based on sector exposure.

	MSCI WORLD	MSCI USA	MSCI EUROPE	MSCI JAPAN	MSCI EMERG. MARKETS
Technology	12.5%	16.2%	7.6%	5.2%	9.1%
Consumer Disc.	8.5%	10.6%	6.9%	0.8%	9.5%
Consumer Stap.	2.8%	-4.3%	18.3%	7.8%	7.6%
Comm. Svcs.	3.5%	7.3%	-4.5%	1.5%	5.3%
Health Care	2.4%	-0.2%	7.3%	4.8%	3.5%
Industrials	3.2%	0.7%	8.0%	3.5%	-1.0%
Materials	0.1%	-0.9%	0.2%	-0.2%	-5.7%
Real Estate	-1.5%	-0.9%	-1.5%	0.5%	-0.9%
Utilities	-5.6%	-6.1%	-7.1%	-2.3%	-1.7%
Energy	-7.0%	-7.1%	-11.4%	-1.8%	-8.5%
Financials	-18.9%	-15.4%	-23.7%	-19.6%	-17.1%

MORE GROWTH

MORE VALUE

10-year average of quarterly data through second quarter 2021.
Source: Bloomberg, Morgan Stanley.

Figure 1 - Sector Analysis

Source: Bloomberg, Morgan Stanley

The Investment Policy Statement (IPS) has identified diversified equity portfolios as the chosen financial instrument for investment. This decision intends to leverage the advantages of a diverse investment environment in the stock market. The equity portfolio is composed of various equity classes, including those in Energy, healthcare, and other industries, thus providing a comprehensive and well-balanced investment approach in the specialized stock market. The equity portfolio provides the potential for more diversification and trading flexibility, which can be managed actively or passively. In this case, an active strategy will be pursued to outperform the market.

The investment strategy, which includes a range of asset classes, aims to achieve a risk-aware and well-balanced portfolio. It is influenced by the principles of effective portfolio management, optimizing profits while controlling risk exposure. The investment objectives listed in the IPS will be accomplished by Mr. Alexandre Mendes and Mrs. Camila Mendes by carefully selecting stocks that align with their investment philosophy and managing equity assets dynamically. This offers a solid and customized plan to Mr. Alexandre Mendes and Mrs. Camila Mendes.

However, investing in stocks has its drawbacks alongside its benefits. According to Conde (2023), these are key disadvantages to consider:

Firstly, volatility and risk are inherent in the stock markets, with prices fluctuating rapidly due to various factors such as economic events or company performance. This volatility can be nerve-wracking for investors, especially those with a low risk tolerance. Sudden market downturns can result in significant portfolio losses, emphasizing the need to assess risk tolerance carefully.

Secondly, successful stock investing demands a considerable amount of time and knowledge. Investors need to research individual stocks or rely on expert advice, and understanding a company's financial health is crucial. Furthermore, keeping up with market trends and news is time-consuming but necessary for wise investment choices.

Finally, it is essential to take into account the tax implications associated with stock investments. Proceeds from the sale of stocks may be subject to capital gains taxes; for example, in Portugal, this rate is, currently, 28%. Understanding these tax regulations is crucial for optimizing returns and mitigating unexpected tax liabilities.

3.2 Strategic Asset Allocation

Defined by Vanguard (2022) , Strategic Asset Allocation involves setting target allocations across various asset classes and rebalancing the multi-asset portfolio regularly to stay close to the assigned allocation through all market conditions. Investors using strategic asset allocation can expect safer, long-term growth, maintaining stability and alignment with goals over the chosen time-horizon.

The advisor will now present the macroeconomic assumptions that guided the investment decisions with the macroeconomic briefing

3.2.1 Macroeconomic Briefing:

The global economy has demonstrated resilience in 2023, exceeding even the most optimistic projections, as related by Goldman Sachs' (2024) Macro Outlook. Notably, GDP growth is poised to surpass consensus forecasts, exceeding expectations by 1 percentage point globally and 2 percentage points in the United States.

Concurrently, core inflation has experienced a notable decline from 6% in 2022 to a sequential 3% across economies that previously witnessed a post-COVID price surge.

Further disinflation is anticipated over the coming year. Despite the well-advanced normalization in product and labor markets, the full disinflationary impact is still unfolding. Projections indicate that core inflation is expected to retreat to the range of 2-2.5% by the close of 2024, according to Goldman Sachs (2024)

Recession risks remain limited, with a reaffirmed 15% probability of a recession in the United States. The global growth trajectory in 2024 is anticipated to benefit from several tailwinds, including robust real household income growth, reduced drag from monetary and fiscal tightening, a resurgence in manufacturing activity, and an increased willingness among central banks to implement insurance cuts if growth decelerates.

While many major developed market central banks may have concluded their hiking cycles, rate cuts are not anticipated until the latter half of 2024, assuming a robust global economic scenario. Once rates stabilize, central banks are expected to maintain policy rates above their current estimates of long-run sustainable levels.

The market outlook is intricate, characterized by compressed risk premia and well-priced markets aligned with central projections, Goldman Sachs (2024). Anticipated returns in rates, credit, equities, and commodities are expected to outperform cash in 2024, prompting a shift from the cash-focused approach of 2023.

The transition to a higher interest rate environment, despite the disturbance, presents the prospect of significantly improved forward returns on fixed-income assets. The critical question revolves around whether a return to the pre-Global Financial Crisis rate environment represents an equilibrium. The likelihood of this being the case is higher in the United States than in Europe, where the potential re-emergence of sovereign stress introduces additional complexities.

The U.S. 10-year Treasury yields, a benchmark for fixed-income markets, and therefore a good indicator of what has been happening and what should be expected, have shown significant movement. It reached its peak at 5% in mid-October and has since declined by 1%, this decrease in yields reflects, among others, two things: investors will potentially accept lower return on their investment, as they are becoming more risk averse due to the economy expectations, and secondly it indicates slower economic growth and lower inflation, as lower yields may affect consumer and business borrowing costs, consequently decreasing investments and spending.

With no clear contender challenging the US growth narrative, the dollar is anticipated to maintain its strength.

As per Goldman Sachs (2024), figure 2 portrays a consistent downtrend in the unemployment rate across economies boasting high-quality labor market data from 2022 to 2023. Remarkably, the current unemployment rate is approximately ½ Percentage Point (pp) below its pre-pandemic level, and this positive trajectory is evident even in key economies characterized by notably low real GDP growth, such as the Euro area.

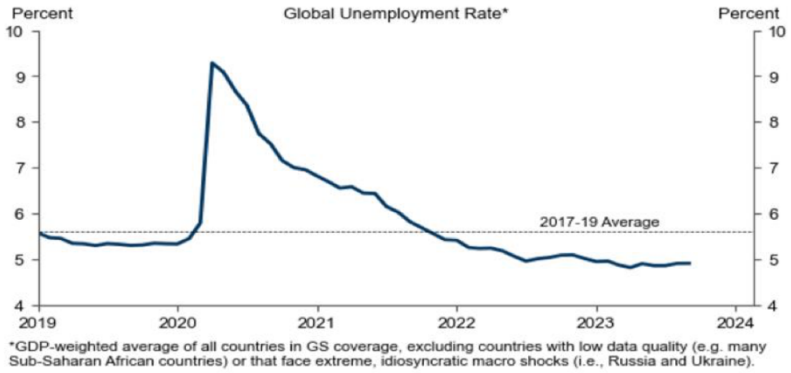


Figure 2 - Global Unemployment Rate

Source: Goldman Sachs Global Investment Research

These encouraging trends are especially significant considering the unexpected negative shocks encountered during this period. Both short-term and long-term interest rates surged significantly beyond market expectations. This surge is partly attributed to superior-than-anticipated growth data and, to some extent, to more hawkish central bank reaction functions, particularly in the early months of the year. Additionally, there was a brief yet impactful episode of banking sector instability in the US and Europe during the spring. Despite these challenges, the Israel-Hamas war, while highlighting growing global security risks, has not exerted a major influence on oil prices, financial markets, or the broader real economy outside the Middle East.

3.2.1.1 Equity Market Outlook

Upon further analysis of the equity market, in 2022, the S&P 500 slid close to 20% in the wake of the Fed's decision to hike interest rates rapidly. However, equity markets advanced in 2023, recovering some lost ground.

The long-term return expectations for equities remain positive. However, they have slightly declined from last year. The bullish market trend has led to increased cyclical headwinds. Currently, valuations are hindering returns more than margins, which were less of a problem last year.

According to J.P. Morgan (2024),the expected return on U.S. large-cap stocks has declined from 7.9% to 7.0%, while the expected return on U.S. small-cap stocks has decreased from 8.1% to 7.2%. Both changes can be attributed to valuation pressures. The forecast anticipates that small-cap stocks will continue to have a reduced premium in comparison to large-cap stocks due to less favorable sector composition and profitability dynamics, which favors the philosophy of value investing. Additionally, the trend of companies remaining private for longer has contributed to this change.

It is generalized among its peers that there will be an annual decrease in the equities market, leading to a closer return to the ones achieved in the Fixed-income market, which may lead some people to invest more in bonds. According to J.P. Morgan (2024), the Global Aggregate bond forecast jumps 40bps to 5.1%.

The stock market in the US has seen positive growth, particularly due to the rise of technology companies. However, this trend is historically associated with economic slowdowns. To invest wisely, it's important to focus on large-cap companies that have stable earnings, strong

balance sheets, and advantageous relative prices. Regarding small caps, the recommendations differ, as these have been experiencing significant valuation resets, which means that their value is being adjusted. While tech mega-cap stocks may generate market excitement, value investors prioritize businesses that have a proven track record of profitability and resilience, especially during economic downturns. It's important to focus on quality in established companies, as they are better positioned to withstand economic challenges and deliver consistent returns over the long term. (J.P. Morgan, 2024)

Given the warning signs of softening consumer trends, rising geopolitical risks, and uncertainty surrounding global earnings growth, defensive investing strategies become paramount. Value investors should seek refuge in companies with established market positions, resilient business models, and attractive valuations. By adhering to these principles, value investors aim to achieve superior risk-adjusted returns over time. (J.P. Morgan, 2024)

Furthermore, non-U.S. equities are predicted to outperform U.S. equities due to higher dividend yields.

3.2.3 Asset Allocation

The asset allocation strategy aims to balance the client's return objectives with their risk tolerance and investment constraints. After analyzing the client's preferences, we've determined that no allocation will be attributed to liquidity, as the client does not require immediate access to funds. However, in certain market circumstances, assets may need to be converted to liquidity until rebalancing is performed.
The portfolio will not include investments in commodities and alternative investments.
Without imposing any restrictions on the optimal allocation between risky assets and risk-free assets, the final step involves distributing capital between these categories to meet the targeted return objective. After the weights are distributed, the minimum and maximum allocation will be determined following a study by Vanguard (2024) that looked at the maximal difference in equity exposure for funds in each of the Investment Association (IA) sectors1: cautious (maximum 40% equity), moderate (40%-60% equity), aggressive (at least 60% equity) and flexible (0% to 100% equity) To establish the degree to which flexible funds exercise their freedom to make significant tactical changes to asset allocation. The analysis concluded that flexible funds recorded the highest average difference in maximum and minimum equity market exposure, with a median difference of 33% compared to 25% for aggressive allocation funds, 23% for moderate, and 19% for cautious. While our strategy is more aligned with moderate allocation, understanding these ranges helps in setting appropriate minimum and maximum equity allocations for better risk management.
The table below outlines the asset allocation ranges for a moderate portfolio. Based on an optimal equity allocation of 42.85% and considering the typical average difference of 23% in maximum and minimum equity exposure for moderate funds, the equity allocation can range from 31.35% to 54.35%, while the risk-free asset allocation will correspondingly range from 45.65% to 68.65%.

[1] The IA sectors mentioned in the context refer to the Investment Association sectors, which categorize funds based on their investment strategies and asset allocation

Asset Type	Minimum Allocation	Central Allocation	Maximum Allocation
Equities	31.35%	42.85%	54.35%
Risk-Free Asset	45.65%	57.15%	68.65%

Table 1-Final Allocation Constraints

Source: Author

Equity and Risk-Free Asset allocation:
The equity class will constitute 42.85% of the total portfolio. This allocation is selected to harness growth potential and meet the client's long-term return objectives. Our approach involves diversifying investments across various sectors and geographies to mitigate risk and optimize returns. Equities with strong financial metrics, including favorable P/E, P/BV and Current ratios, credit ratings, and dividend yields, ensure resilience and performance in varied market scenarios, especially in a perspective of Value investing.
The remaining 57.15% of the portfolio will be allocated to risk-free assets. This conservative allocation is intended to safeguard capital and reduce overall portfolio volatility. It serves as a stable foundation amidst market fluctuations, aligning with the client's risk profile while allowing strategic growth opportunities through equity investments.
Exclusion of Commodities and Alternative Investments:
No investments in commodities and alternative investments will be made. This decision is grounded in our current market analysis and reflects the client's preference for traditional asset classes. Commodities and alternatives often exhibit higher volatility, which may not align with the client's risk tolerance or long-term financial objectives.
While commodities, as highlighted by Banton (2022), can offer superior returns, they also rank among the more volatile asset classes available due to their higher standard deviation compared to most other equity investments. Similarly, as Forbes (2022) noted, alternative investments can experience extreme volatility in their rates of return. This volatility underscores the importance of aligning investment choices with the client's risk profile and long-term financial goals.
A more detailed approach with the weights of each security adjusted to the thresholds will be presented in Appendix 6.

3.3 Security Selection

Equity Screening Process:

To ensure that the stocks selected for the portfolio align with the client's value investing goals, a thorough screening process is followed based on Graham, (1949), Winvesta (2022), and the macroeconomic briefing presented in Chapter 3.2.

This process is based on the principles of value investing, a strategy championed by Benjamin Graham. It involves finding stocks that are undervalued but have strong fundamentals.

Value investing is a strategy that involves purchasing undervalued securities through comprehensive fundamental analysis, to identify opportunities in the stock market.

- Quality Rating: The Quality Rating assesses stocks based on their S&P Earnings and Dividend Rating, along with average ratings from S&P, Moody's, and Fitch, suggesting that companies rated 'B' or better are considered safe investments. This rating system focuses on historical performance and growth potential, emphasizing stability and value over market prominence
- Current Ratio: Companies with a current ratio (current assets divided by current liabilities) greater than 1.30 are selected to ensure liquidity and financial health. While what is considered a good current ratio can vary by industry and historical performance, a ratio between 1.2 and 2 is typically seen as healthy. This means the company has more than enough current assets to cover its current liabilities. (Freshbooks, 2024)
- Positive Earnings Per Share: Companies with consistently positive EPS over the past five years and no earnings deficits are targeted to avoid high-risk investments
- Price to Earnings Per Share (P/E) Ratio: Companies with P/E ratios of 9.0 or less are preferred as they are generally undervalued and present bargain investment opportunities, according to (Winvesta, 2022)
- Price to Book Value (P/BV): Companies with P/BV ratios less than 1.20 are chosen, as it provides a good indication of a company's underlying value. However, as per Jason (2024), some value investors may adopt a less stringent benchmark, considering stocks with P/BV ratios of up to 3.0 as acceptable.
- Dividends: Preference is given to companies that have consistently paid dividends for the last five years, providing potential income while waiting for market appreciation

The screening process ensures that only high-quality, financially sound companies with attractive valuation metrics are included in the portfolio. This approach aligns with the client's investment goals and aims to maximize long-term returns. In addition to these screens, a limit of 30% per sector will be applied to the portfolio, mainly to avoid overexposure to cyclical sectors, which is explained below in the Industry focus section.

The advisor believes that there is no point in having specific restrictions between equities, primarily because predicting future market movements is inherently uncertain However, to ensure a balanced and diversified portfolio, a maximum and minimum allocation for each equity has been established at 15% and 2.5%, respectively. However, these allocations may need to be adjusted due to constraints outlined in Table 1. For instance, with a final risky portfolio allocation of 42.85%, the minimum allocation per security would be 1.07% (2.5% of 42.85%). Similarly, if equities compose the minimum allocation (31.35%), the minimum weight per security would be 0.78% (2.5% of 31.35%). The same logic applies to the maximum allocation scenario.

Additional Considerations:

- Market Capitalization: The selected companies were sorted by those with the lowest valuation ratios while maintaining the highest market capitalizations. This approach ensures investing in medium or large-cap stocks that offer stability and potential for growth.
- Sector and Regional Diversification: To maintain a diversified portfolio, we made exceptions to diversify across different sectors and regions as necessary. We used screening filters to track various types of assets, sectors, and regions. In the equity class, our focus spans across the US and Europe. Europe holds a slightly overweight position in our portfolio due to the overvaluation of the USD and comparatively lower valuations in the European market. The macroeconomic environment in Europe has

shown improvement, with signs of increasing economic activity and stabilizing energy prices. Elevated consumer savings and wage growth, adjusted for inflation, further support consumer spending, enhancing the potential for selected European equities.

Industry Focus

Investments are concentrated in established industries known for their enduring value, such as manufacturing, consumer goods, and utilities. These sectors have demonstrated resilience over time and offer stability and consistent returns amidst changing economic conditions. There are four stocks in the automotive sector. The automotive industry is known for its cyclical nature, as big-ticket purchases such as cars can be easily postponed by private customers when the immediate future seems uncertain.DHL Group (2020). The auto industry may face challenges during a recession as consumers scale back on big-ticket purchases Faster Capital (2024) which is why there will be an industry cap of 30% in the automotive sector.

Fees and Costs

Investing in equities will have various associated expenses, such as brokerage fees, commission fees, and currency conversion fees. As per the client's request, the investment will be limited to companies based in Europe and the United States to ensure diversification and alignment with the client's long-term investment goals.

Following the screening process outlined above, the portfolio manager has successfully chosen 15 investments from 7 sectors according to Fidelity Investments (n.d.): Consumer Discretionary, Real Estate, Energy, Materials, Information Technology, and Utilities, as illustrated in Table 2. Although most of these companies are located in Europe, there are different currencies of investments involved, meaning that currency risk has not been fully eliminated. The portfolio manager will be in charge of managing that risk.

Company Name	Ticker Symbol	Sector	Country of Headquarters
Mercedes-Benz Group AG	MBGn.DE	Consumer Discretionary	Germany
Porsche Automobil Holding SE	PSHG_p.DE	Consumer Discretionary	Germany
Lithia Motors Inc	LAD.N	Consumer Discretionary	USA
Stellantis NV	STLAM.MI	Consumer Discretionary	Netherlands
Repsol SA	REP.MC	Energy	Spain
OMV AG	OMVV.VI	Energy	Austria
Orlen SA	PKN.WA	Energy	Poland

Buzzi SpA	BZU.MI	Materials	Italy
Fomento de Construcciones y contratas SA	FCC.MC	Industrials	Spain
Avnet Inc	AVT.OQ	Information Technology	USA
Teleperformance SE	TEPRF.PA	Information technology	France
Fortum Oyj	FORTUM.HE	Utilities	Finland
Shurgard Self Storage Ltd	SHUR.BR	Real Estate	Luxembourg
AP Moeller - Maersk A/S	MAERSKb.CO	Industrials	Denmark
Mosaic Co	MOS.N	Materials	USA

Table 2 - Selected Stocks

Source: Author

3.4 Portfolio Composition

3.4.1 Modern Portfolio Theory (MPT) and Mean-Variance Theory (MVT)

Modern Portfolio Theory (MPT) and Mean-Variance Theory (MVT) are foundational concepts in finance that were pioneered by Harry Markowitz in the 1950s (CFI Team, 2020). These theories provide a mathematical framework for investors to construct portfolios that maximize expected return for a given level of risk.

The key insights of MPT according to Scott (2023) are:

- Investors should consider an asset's contribution to the overall portfolio's risk and return, not just the asset's individual risk and return
- Diversification is crucial - owning a portfolio of uncorrelated assets reduces risk compared to holding a single asset
- The efficient frontier is the set of optimal portfolios that maximize expected return for each level of risk

MPT assumes investors are risk-averse and prefer higher returns for lower risk. The theory uses variance or standard deviation as a measure of risk. While influential, MPT has been criticized for relying on the efficient market hypothesis and using historical volatility as a proxy for risk. Extensions like post-modern portfolio theory attempt to address some of these limitations. Overall, MPT and MVT provide a systematic approach for investors to build diversified portfolios aligned with their risk tolerance and return objectives. By optimizing the risk-return tradeoff, investors can construct efficient portfolios to meet their financial goals.

3.4.2 Methodology

In order to select the best securities, we need to gather the monthly closing prices for the last five years. We will use this data to calculate the standard deviation and expected return for each stock. The data we used is the Daily Adjusted Price between 01/05/2019 and 01/04/2024, which we obtained from the Yahoo Finance platform. After converting the monthly closing prices to Average Annual Return (R) for each security, we were able to calculate the Standard Deviation(σ) and build our Variance Covariance Matrix.

The Efficient Frontier (EF) is represented by the hyperbola on the graph. This frontier encompasses the range of optimal portfolios, from the Minimum Variance (MV) Portfolio to the portfolio that maximizes the Sharpe Ratio[2], to find both these portfolios, the Excel Add-in Solver was used. Any points on the hyperbola that fall below the Minimum Variance portfolio are considered sub-optimal, as there are points with the same standard deviation (risk) but higher expected returns on the upper part of the Efficient Frontier. Portfolios that are situated inside the efficient frontier are also considered non-optimal, as there are other portfolios with the same expected return but lower risk on the Efficient Frontier hyperbola.

The Efficient Frontier (EF) is given by the following equations:

$$\sigma^{2}_{PP} = \frac{AR^2 - 2BRp + C}{A - B^2}$$

$$\text{Where}$$

$$A = 1' V^{-1} 1$$

$$B = 1' V^{-1} R$$

$$C = R' V^{-1} R$$

(1)

In pursuit of the optimal portfolio, our strategy involved identifying the intersection point between the Capital Allocation Line (CAL) of the Risky portfolio that, due to restrictions, lies inside the Efficient Frontier, with the Safety-first frontier.

Using Roy's safety-first criterion, which, according to Roy (1952) sets a minimum required return for a given risk level, aims to minimize the probability of returns falling below a specified Return Level (RL). In this case, based on the questionnaire available in Appendix 2, the family's threshold was set at 5%. Portfolios lying on this line ensure the highest level of return while given the 5% level of safety.

Given the threshold level provided by the family in the questionnaire, the Roy Portfolio is given by:

$$Min \Pr(R_p < R_L)$$

$$R_L = -5\%.$$

(2)

[2] The Sharpe ratio calculates how much excess return you receive for the extra volatility you endure for holding a riskier asset.

Upon plotting the portfolios, it became evident that the Roy portfolio intersected with the Capital Allocation Line. This intersection signifies a convergence of our safety-first approach with the desired risk-return profile. The benefits of this intersection are twofold:

1. Risk Management: By incorporating Roy's safety-first criterion, we ensure that the portfolio minimizes the probability of returns falling below the 5% threshold.
2. Optimized Returns: The intersection of the CAL with the Roy portfolio and our targeted risky portfolio means that we achieve a portfolio that not only minimizes downside risk but also offers an attractive risk-adjusted return.

Therefore, the chosen portfolio is the one where the CAL intersects both the Roy portfolio and our targeted risky portfolio within the Efficient Frontier.

The intersection was computed as follows:

$$m_{ROY}x + b_{ROY} = m_{CAL}x + b_{CAL}$$

$$x = \frac{b_{CAL} - b_{ROY}}{m_{ROY}m_{CAL}}$$

$$y = m_{ROY}x + b_{ROY} \tag{3}$$

3.4.3 Portfolio Composition

Incorporating the 15-year German Government Bond as the risk-free asset, we can determine the allocation between the risk-free asset and the risky portfolio based on the provided graph and data. The point of intersection where the Capital Allocation Line meets Roy's safety-first criterion line on the graph yields a return of 6.93% and a standard deviation of 10.360%.

Given the risk-free rate of 2.674% and the characteristics of the risky portfolio, which has a return of 12.6% and a standard deviation of 24.7%, we can compute the allocation weights. Our analysis indicates that approximately 42.85% of the combined portfolio is invested in the risky asset, while the remaining 57.15% is allocated to the risk-free asset. This combination enables us to achieve the specified return and standard deviation as illustrated on the graph.

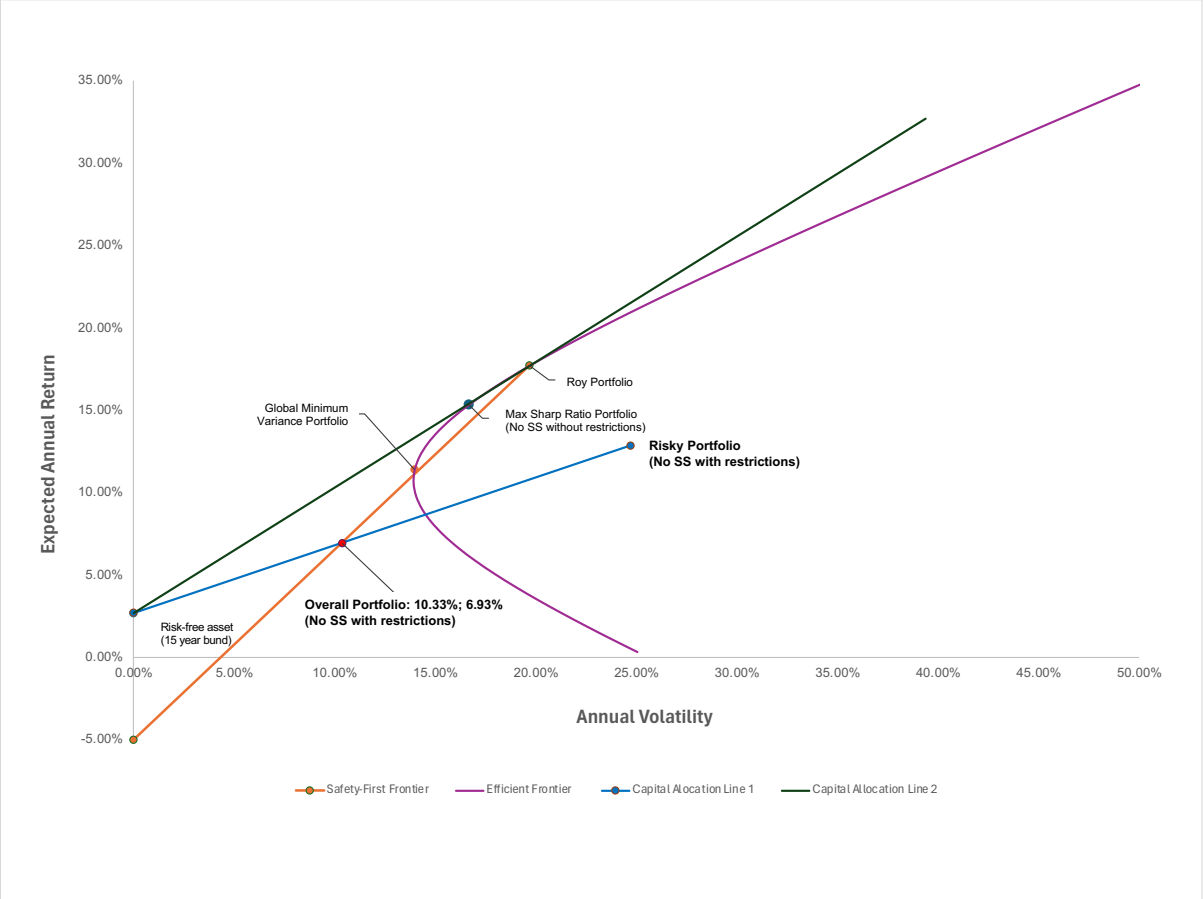


Figure 3 - Volatility & Return Portfolios

Source: Author

3.5 Expected Performance

The portfolio was designed to achieve the client's desired level of risk and return, while also adhering to to the constraint that short-selling is not allowed. Table 3 below illustrates the composition of the optimal portfolio and its respective performance.

Final Portfolio	
Mean	6.93%
Standard Deviation	10.33%
Sharp Ratio	0.41
% Risky Asset	42.85%
%Risk-Free Asset	57.15%

Table 3 - Final Portfolio Overview

Source: Author

Upon comparing the performance of the risky final portfolio with the benchmark, it becomes evident that the monthly returns of our risky portfolio over the last 5 years surpass those of the

benchmark, represented by the MSCI Europe Value net Index. This index encompasses large and mid-cap securities with value style characteristics across 15 Developed Markets countries in Europe. The "Net" aspect of the index signifies that it includes the reinvestment of dividends after the deduction of applicable withholding taxes, providing a more realistic representation of total investor returns

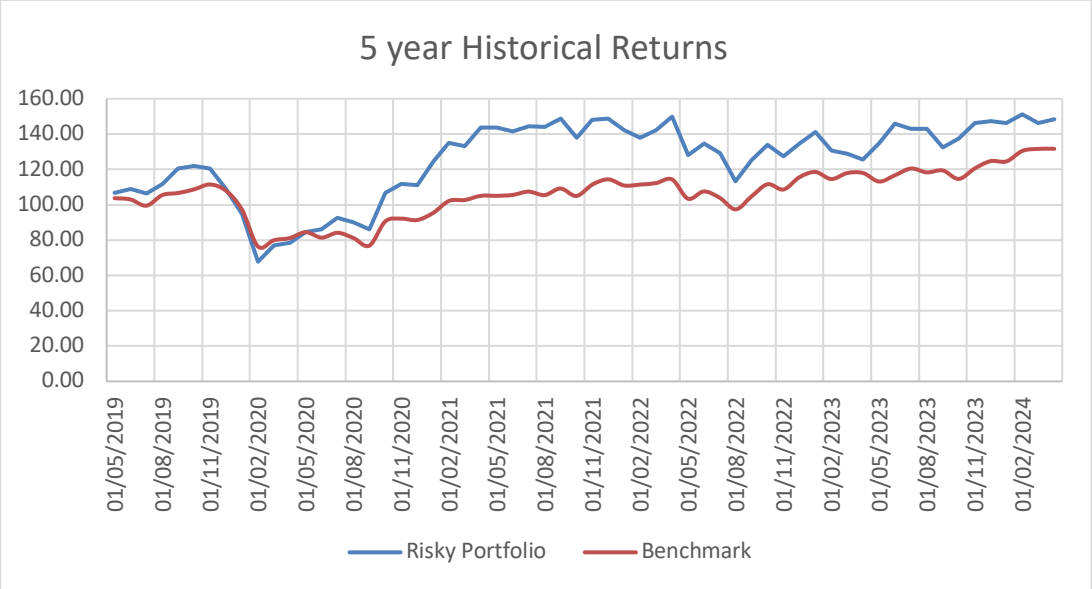


Figure 4 - Performance Against Benchmark

Source: Author

After analyzing the historical return data, we can see the differences in returns from the benchmark and from the risky portfolio, had we invested 100€ on the risky portfolio we would have 148.38€, in comparison, had we invested the same amount on the benchmark used we would have 131.68€

Finally, a 15-year Monte Carlo simulation with 10,000 iterations was conducted to assess the portfolio's potential future performance. Assuming returns follow a normal distribution and with mean and standard deviation equal to the annual returns of the final portfolio, which are 6.93% and 10.33% respectively. According to the simulation in Figure 5, the portfolio is expected to return 331€ for every 100€ invested, if we adjust those values for the family's amount to invest (300,000.00€), we will get a return of 939,061.00€

Figure 5 - Simulation of Performance

Source: Author

A Histogram was also depicted using the Monte Carlo simulation with the possible outcome of the results of the final portfolio after 15 years. In Figure 6, the distribution of portfolio values exhibits a right skew. The tallest bar represents the mode, indicating the most frequent portfolio value.

The majority of portfolio values fall between 708.589€ and 760.589€ suggesting this is the most likely range. However, the graph extends further to the right, showing that there are simulations where the portfolio could achieve even higher values.

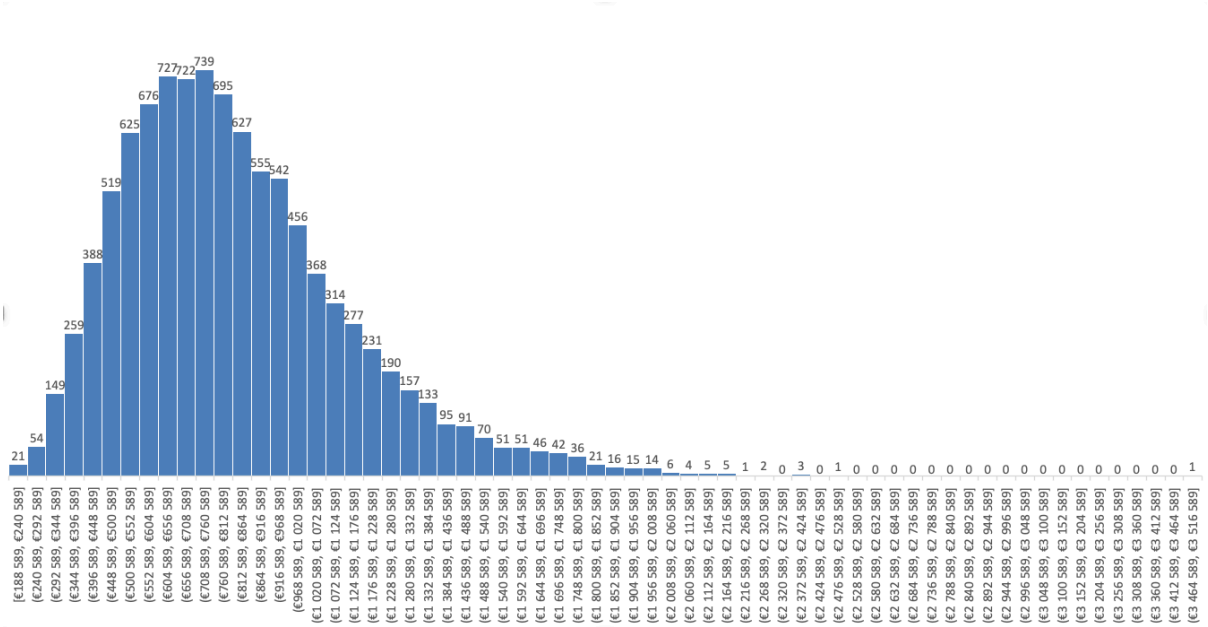


Figure 6 - 15th year expected values.

Source: Author

After 10,000 iterations, Figure 6 indicates the following percentiles for our portfolio returns by the end of our investment horizon:

- 5th percentile: 95% chance of exceeding 403,528.70€

- 25th percentile: 75% chance of surpassing 586,287.52€

- 75th percentile: 25% chance of exceeding 989,425.76€

- 95th percentile: 5% chance of achieving more than 1,414,949.64€

3.6 Risk Analysis

Understanding and managing risk is important for any investment portfolio. This chapter looks at different methods used to measure and reduce risk, giving a comprehensive overview of risk assessment techniques. We will start by exploring Parametric Value at Risk (VaR), which uses statistical parameters to estimate potential losses, the Conditional Value-at-Risk (Cvar), and the Monte Carlo VaR, a method that uses random sampling to simulate different possible outcomes.

Finally, we will conclude with a Risk Matrix, which is a tool that evaluates potential future risks and their impacts on the portfolio's performance.

3.6.1 Parametric VaR and Conditional VaR

Value-at-risk (VaR) is a statistical method used to estimate the potential losses an asset, portfolio, or firm could incur over a specific period. The parametric approach to VaR relies on mean-variance analysis to predict future outcomes based on historical data. While the calculation of parametric VaR is straightforward, it assumes that potential outcomes are normally distributed around the mean according to Investopedia Team (2021) .

This analysis was made by assuming a Normal distribution with mean equal to 6.93% and volatility equal to 10.33%, which is the result of our overall portfolio. In Table 4 we can see the annualized and daily parametric Value at risk.

Parametric Value at Risk				
Percentiles	**VaR (%)**	**VaR (€)**	**Cvar (%)**	**Cvar (€)**
0.1%	24.99%	74 985.00€	27.86%	83,520.00€
1%	17.10%	51,300.00€	23.84%	71,520.00€
5%	10.06%	30,180.00€	14.37%	43,110.00€

Table 4 - Parametric Value at Risk

Source: Author

At the 0.1% percentile, the Value at Risk (VaR) indicates that there is a very small chance (0.1%) that the portfolio could lose more than 24.99% of its value, equating to a potential loss of -74,985.00€. Furthermore, if losses exceed this VaR threshold, the expected loss, represented by the Conditional VaR (CVaR), is approximately 27.86%, amounting to -83,520.00€. This highlights the extent of potential extreme losses that, although highly unlikely, can have a significant impact on the portfolio

According to the table, there is a 1% chance that the investment portfolio will lose more than 17.10% over one year or more than 51,300.00€ in value. Additionally, if losses exceed this

1% VaR threshold, the expected loss (Conditional VaR) is approximately 23.84% or 71,520.00€. Such extreme losses are unlikely, occurring only 1% of the time, which translates into a 99% confidence that the loss will not exceed the 17.10% VaR threshold.

The table tells us that there is a 5% chance that the portfolio will lose more than 10.06%. if the loss exceeds this 5% VaR threshold, the expected loss is approximately 14.37%, which corresponds to the conditional VaR.

3.6.2 Historical Value at Risk

According to Tramplin (2024) Historical VaR, is a method for calculating Value at Risk that utilizes historical data to estimate potential investment or portfolio losses.

This method entails analyzing the historical returns of the investment or portfolio over a specified period to gauge the likelihood of facing a certain level of loss in the future.

Historical VaR is predicated on the belief that past market behavior serves as a reliable indicator of future market behavior. It differs from other VaR calculation methods, such as Parametric VaR and Monte Carlo VaR, in that it does not assume anything about the distribution of returns.

To simulate the historical returns of the previously weighted risky portfolio, each asset's lognormal returns were multiplied by the optimal weight allocated to that security. This process is applied to all the data used in previous calculations.

Percentile	Historical VaR (%)	Historical VaR (€)	CVaR(%)	CvaR(€)
0.1%	27.78%	83,336.73€	28.59%	85,782.40€
1%	20.44%	61,325.79€	24.52%	73,554.09€
5%	12.37%	37,107.89€	17.09%	51,274.89€

Table 5-Historical VaR

Source: Author

At a 95% confidence level, the VaR tells us that the portfolio might lose around 12.37% of its total value. That's equivalent to 37,107.89€. So, there's about a 5% chance that the portfolio could lose more than that during the specified period. dditionally, considering the Conditional VaR (CVaR), which represents the expected loss beyond the VaR threshold, it is approximately 17.09%, amounting to 51,274.89€

Upon elevating the confidence level to 99%, the associated risk similarly increases. The Historical VaR reveals a potential loss of 20.44% of the portfolio's value, amounting to approximately 61,325.79€. This indicates a 1% likelihood of the portfolio experiencing a loss surpassing this amount. Moreover, the Conditional VaR (CVaR) is estimated 24.52%, corresponding to 73,554.09€."

Furthermore, with a confidence level of 99.9%, the Historical VaR suggests a substantial loss of 27.78% of the portfolio's value, equivalent to 83,336.73€.At this confidence level, there exists only a 0.1% probability of the portfolio incurring a loss exceeding this figure, if the losses exceed this value, the expected loss would be of 28.59%, which equates to a monetary loss of 85,782.40€.

3.6.3 Monte Carlo VaR

Monte Carlo Value at Risk (MC VaR) is a technique used to estimate the potential loss of a portfolio over a specific time frame at a given confidence level. It involves producing numerous hypothetical scenarios of the portfolio's value based on the statistical properties of its underlying assets and then calculating the distribution of the portfolio's value under these scenarios.

A Monte Carlo simulation was conducted over the investment horizon period, assuming a normal distribution with a mean of 6.93% and a standard deviation of 10.33%.

Upon analyzing the histograms in Figure 7, it becomes evident that despite the mean return being 7%, as indicated in Table 5, the standard deviation of these returns exhibits significant dispersion. This observation suggests that even with a portfolio comprising a 57% investment in a risk-free asset, the outcomes can vary considerably within a one-year time horizon.

Moreover, it is anticipated that the distribution of returns yields positive values annually, with over 80% of instances resulting in returns exceeding 5.33%.

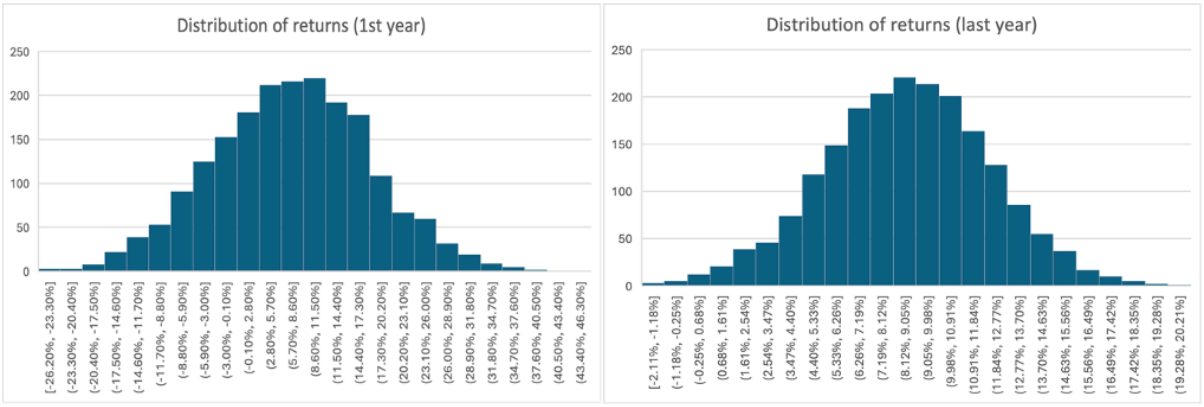


Figure 7 - Distribution of Annual Returns

Source: Author

To offer a clearer perspective of the risks in question, as well as of the possible results, we present the Monte Carlo simulation results for both the first year and for the fifteenth year of the portfolio's performance. Table 5 contains basic statistics including Monte Carlo VaR percentiles, mean return, standard deviation, compounded return, annualized return, and the range of return. The percentiles signify the Value at Risk (VaR) at various confidence levels, reflecting the maximum potential losses over specific time frames.

It's important to remember that a longer time horizon decreases the annual standard deviation of the portfolio, making it more resilient against short-term market fluctuations. Even if an event

cause returns to decrease, a 15-year time horizon allows the portfolio to recover from those downturns.

This effect is revealed by the simulation results which show higher risk and more volatility in terms of short-term (1st year) than long-term (15th year). Over a long period of investment, the returns on this portfolio are predicted to stabilize, indicating reduced downside risk as well as more consistency in median returns. The 15-year outcome figures depict a more dependable and steady growth expectation, which demonstrates how valuable long-term strategies may be.

Monte Carlo Simulation Results for Portfolio Returns		
Metric	**1st Year simulation**	**Last Year simulation**
Percentile		
1%	15.82%	1.10%
5%	10.60%	3.04%
50%	6.57%	8.66%
95%	22.92%	14.26%
Descriptive statistics		
Mean	7.01%	8.76%
Standard Deviation	10.22%	3.24%
Cumulative Return	-	252.66%
Annualized Return	-	8.76%
Range (Min - Max)	26,20% to 46,30%	2,11% to 20,21%

Table 6- Monte Carlo VaR and Portfolio Metrics

Source: Author

When comparing the 1st-year and 15th-year simulations, it becomes evident how the potential returns of a portfolio change over time.

In the 1st-year simulation, the 5th percentile return is 10.60%, indicating a 5% chance that the portfolio will experience a loss worse than this threshold. However, the best-case scenario shows a potential return on investment of 22.92%, indicating the possibility of high short-term profits.

Conversely, in the 15th-year simulation, the risk and return profiles are more moderate. The downside risk, represented by the fifth percentile return of 1.10%, is lower over the long term.

This suggests that even during unfavorable times, some gains can still be expected from this type of investment. On the other hand, the upper bound sits at about 14.26%

There has been an increase in the mean return which indicates an increase in expected returns over time, the range of returns also narrows significantly, illustrating a decrease in volatility and a more stable performance over time.

This analysis demonstrates how the risk characteristics of portfolios change as they mature, indicating a lower probability of losses and more consistent cash flows over longer investment periods.

Risk Matrix

A risk matrix is utilized as a tool for evaluating potential risks that an investor may encounter over the course of their 15-year time horizon. The table presented below outlines the possible risks identified in reports from Blackrock (2024), S&P Global (2024) and Moodys(2023). While these institutions have highlighted numerous risks, the focus will be on prioritizing the ones that are most relevant to the portfolio, whilst assessing the implications and impact these would have on different asset classes and sectors.

Risks	Implications	Impact
European fragmentation (1)	This fragmentation could lead to persistent economic uncertainty, which could negatively impact the European economy and, in turn, lead to lower investor confidence and potentially lower stock prices of Euro equities	Increased demand for high-quality government bonds, like German government bonds, can provide stability and steady return
Global conflicts (2)	In the case of the Israel-Hamas conflict, the initial reaction was a sharp sell-off in stocks, but the market quickly recovered as the situation stabilized. In the case of the Ukraine-Russia conflict, the impact on equities was more significant, with the S&P 500 index falling more than 7% in the days and weeks immediately following the incursion. However, the market quickly recovered	Could affect European economies via lower regional trade, tighter financial conditions, higher energy prices and lower consumer confidence Goldman Sachs (2024) .
Technological Advancements and AI Integration (3)	Artificial intelligence's efficiency improvements have the potential to enhance profit margins significantly. By automating tasks, businesses can reduce their costs.	Developed market companies stand to benefit particularly, as semiconductors play a crucial role in powering AI technologies.
Climate change (4)	With high demand for capital-intensive projects, companies from the renewables sector may face challenges securing loans from banks, especially amidst high interest rates. Which, in the end, can diminish the free cash flow	Can impact companies with ESG focus.
Global recession (5)	Companies suffer from reduced demand, lower revenues, limited access to capital, and disruptions in operations during economic downturns. Unemployment could also lead to decreased productivity and potential disruption in operations	Can impact more developed countries.
Major cyber attacks (6)	The repercussions of persistent cyberattacks could have a wide-reaching impact on financial markets and the economy. Government networks, private sector networks and infrastructure are all susceptible to hacking and espionage.	Equities especially in sectors such as Financial Tech Healthcare and energy

Table 7 - 15-Year Horizon Risk

Source: Based on Blackrock (2024), S&P Global (2024) and Moody's (2023)

In Figure 8, we present a risk matrix that emphasizes the probability and impact of these risks, measured on a scale from one to five. The probability of these events occurring in the next 15 years was derived from the previously mentioned sources and the impact represents the author's perception of the effect these events would have on the portfolio.

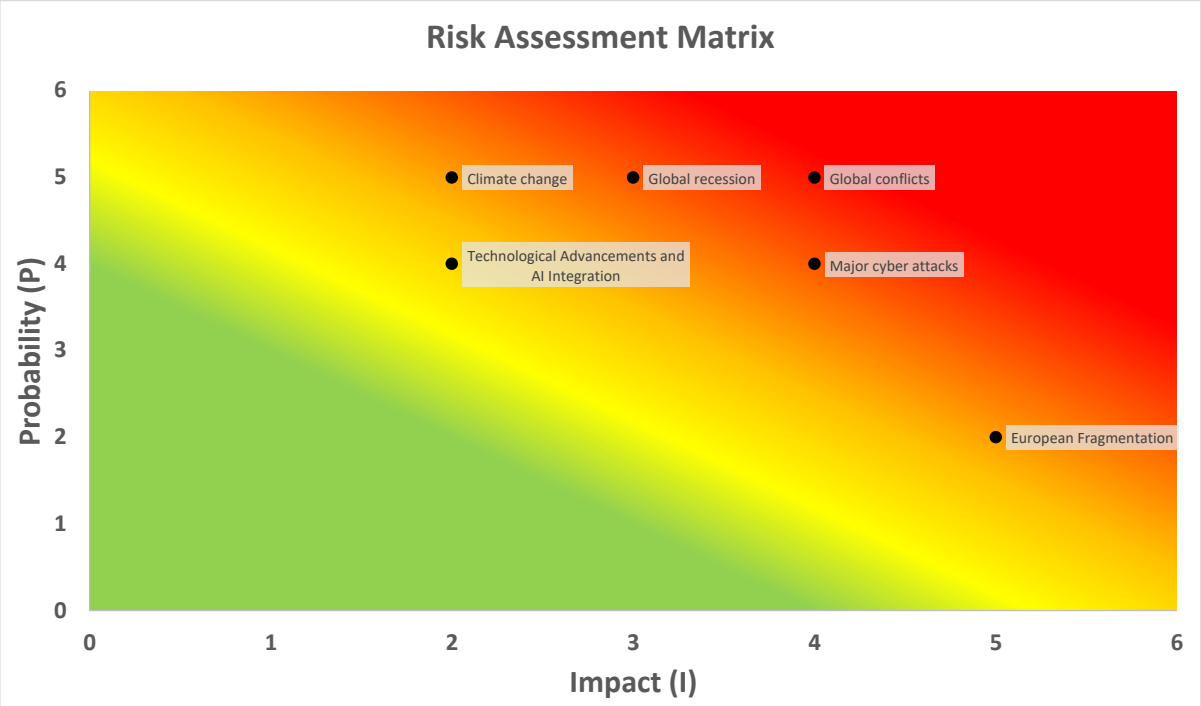


Figure 8 - Risk Matrix

Source: Author

An assessment of how each event could affect the overall portfolio is presented below:

European Fragmentation: Given the portfolio's significant exposure to European companies (e.g., Mercedes-Benz, Stellantis, Repsol), European fragmentation could severely disrupt markets, trade, and regulatory environments, but, over a 15-year time horizon the probability is relatively low

Global Conflicts: High impact and higher probability than European fragmentation, these conflicts can lead to widespread economic disruption, affecting global supply chains, energy prices, and investor confidence. Companies like AP Moeller - Maersk A/S (logistics) and energy firms (Repsol, OMV) are particularly vulnerable.

Technological Advancements and AI Integration: Moderate impact and high probability, Technological advancements and AI integration present both risks and opportunities. Companies such as Teleperformance SE and Avnet Inc could benefit from efficiency gains and new market opportunities.

Climate Change: Potentially higher impact due to sector-specific risks, namely for energy companies (Repsol, OMV), which are co,,mpanies heavily invested into fossil fuels, making them sensitive to the possible transition towards a reduction of carbon emissions and industries reliant on physical infrastructure (Buzzi SpA, Fortum Oyj),

Global Recession: Medium impact with very high probability due to economic cycles. A global recession would impact pretty much all the sectors, although more defensive sectors such as utilities and consumer staples might be more resilient. There would also be a probable demand for safer assets (15-year German Bund).

Major Cyber Attacks: High impact and probability reflect the growing cyber threat landscape. Companies across all sectors are exposed, but especially those within the technology sector are more vulnerable to these attacks (e.g. Teleperformance SE, Avnet Inc).

Appendices

Table A-1. Client's Profile (detailed)

Names	Mr. and Mrs Mendes
Age	28 Years old (both)
Children	None
Occupation / Annual Gross income	Mr. Mendes – Lawyer (27,000.00€) Mrs. Mendes - (30,000.00)
Academic background	Mr. Mendes: Master's degree in computer science and engineering Mrs. Mendes: Master's degree in law and management
Additional Information	First time Investing Small knowledge of financial Markets
Investment Constraints	• No Leverage or Short Selling • Minimize annual losses over 5% • No Liquidity Requirements • No investment in non-regulated products • Only Medium or Large Cap companies • No investments in commodities • No Allocation to Alternative Investments
Risk Profile	Moderately Conservative
Initial Amount to Invest	300,00.00€
Investment Objective	450,000.00€ (614,608.62€ in 15 years assuming 2.1% average inflation rate)
Time Horizon	15 years
Minimum Rate of Return	6.18%
Expected Average Annual Return/ Volatility of Proposed Portfolio:	6.93%/ 10.33%

Table A-2: Profiling Questionnaire

Questions	Answer	Points
Risk Tolerance		
1.Which statement best describes your investment knowledge?	Novice. My knowledge of investing is limited.	2
2.What is your total gross annual household income?	60,000€ to 99,000€	2
3.When describing your investment objectives, which statement is most important to you in achieving your goals?	Producing income with relative stability of principal.	1
4. How would you classify your current financial situation?	I have sufficient cash flow to meet my income requirements including emergencies.	4
5. Choose the statement that best describes your attitude towards investing and inflation.	I am willing to accept a low level of fluctuation in the value of my investments in order to attempt to keep pace with inflation.	2
6. You have received $100,000 from an inheritance and, on the advice of a friend, invested in a well-known equity investment fund with a 25-year track record of strong performance. After two years of volatile markets you receive your statement in the mail that your original investment is now worth $61,000. What would you do?	I would sell. I could not take the chance that this investment would decline further	0
7. Assume that you have $25,000 to invest and can choose from one of five different investment options. Each option provides the range of values that your investment may be worth in one year. Which option would you be most comfortable investing in?	As low as $24,000 and as high as $26,500.	1
8. Which of the following ranges includes your current age?	Under 34	4
	Total Score	16
Time Horizon		
9. When do you plan to start withdrawing from the amounts you are investing?	10+ years	3
10. What % of your portfolio do you expect to withdraw each year?	< 10%	4
	Total Score	7

Investor Style Matrix				
Risk Tolerance	4 to 8 points	Minimal Risk	Minimal Risk	Minimal Risk
	9 to13 points	Minimal Risk	Minimal Risk	Conservative
	14 to 18 points	Minimal Risk	Conservative	Moderate Conservative
	19 to 23 points	Minimal Risk	Moderate Conservative	Balanced
	24 to 28 points	Minimal Risk	Balanced	Growth
	29 to 33 points	Minimal Risk	Growth	Aggressive Growth
		0-2 points	3-5 points	6+ points
		Time Horizon		

Investor Style	Investment Options
Minimal risk You have a very low tolerance for risk. You are unable to tolerate any investment losses or you have a very short investment time horizon. You prefer knowing that your capital is safe. You are willing to accept lower returns to protect your capital.	100% Guaranteed (Daily Interest, Guaranteed Interest, Term Deposit Accounts) 
Conservative You have a low tolerance for risk and potential loss of capital. You have a short investment time horizon. You are willing to accept some short term fluctuations. You accept small losses in your investment portfolio in exchange for modest returns. The primary objective of your investment portfolio will be to provide income by investing primarily in funds that invest in fixed-income securities. Capital appreciation is not a priority. A small portion of your portfolio may be invested in equity funds to provide the potential for some growth to offset the effects of inflation.	• 30% Equity, 70% Fixed Income or Guaranteed 
Moderate Conservative Your tolerance for portfolio volatility and loss of capital is low. You are willing to tolerate some short-term fluctuations in your investment returns. You accept small losses of capital in exchange for modest potential capital appreciation.	• 40% Equity, 40% Fixed Income, 20% Guaranteed 
Balanced You have a moderate tolerance for risk and loss of capital. You are willing to tolerate some fluctuations in your investment returns. You will accept moderate losses of capital. You have at least a medium term investment time horizon. The objective of your portfolio will be to provide a combination of income and long term capital growth. Your portfolio will include at least 40% in fixed income investments.	• 60% Equity and 40% Fixed Income 
Growth You have a high tolerance for risk and loss of capital. You are willing to tolerate large fluctuations in your investment returns. You are willing to accept moderate to large losses of capital in exchange for potential long-term capital appreciation. You do not have any significant income requirements from your investments. You have at least a medium term investment time horizon.	• 80% Equity and 20% Fixed Income 
Aggressive Growth Your tolerance for risk, portfolio volatility and investment losses is very high. You are willing to tolerate potentially significant and sustained price fluctuations. You are willing to accept large losses of capital. You have extensive investment knowledge. You have no income requirements from your investments and have a long investment time horizon.	• 100% Equity 

Source: Equitable Life Canada

Table A-3. Securities Description

Company name	Description
Mercedes-Benz Group AG	Mercedes-Benz Group AG operates as an automotive company in Germany and internationally.
Porsche Automobile Holding SE	Porsche Automobile Holding SE operates as an automobile manufacturer worldwide. It operates in two segments, Core Investments and Portfolio Investments.
Lithia Motors Inc	Lithia Motors, Inc. operates as an automotive retailer worldwide. It operates in two segments, Vehicle Operations and Financing Operations.
Stellantis NV	Stellantis N.V. engages in the design, engineering, manufacturing, distribution, and sale of automobiles and light commercial vehicles, engines, transmission systems, metallurgical products, mobility services, and production systems worldwide
Repsol SA	Repsol, S.A. operates as a multi-e energy company worldwide with several segments
OMV AG	OMV operates as an energy and chemicals company. It operates through three segments: Chemicals & Materials, Fuels & Feedstock, and Energy.
Orlen SA	Orlen S.A. operates in refining, petrochemical, energy, retail, gas, and upstream business.
Buzzi SpA	Buzzi S.p.A., together with its subsidiaries, manufactures, distributes, and sells cement, ready-mix concrete, and aggregates
Fomento de Construcciones y contratas SA	Fomento de Construcciones y Contratas, S.A., engages in the environmental services, water management, infrastructure development, and real estate businesses in Europe and internationally
Avnet Inc	Avnet, Inc., distributes electronic component technology. The company operates through two segments, Electronic Components and Farnell.
Teleperformance SE	Teleperformance SE, engages in the customers consultancy services in France and internationally.
Fortum Oyj	Fortum Oyj generates and sells electricity and heat in the Nordic countries, Germany, the UK, and internationally.
Shurgard Self Storage Ltd	Shurgard Self Storage Ltd, engages in the acquisition, development, and operation of self-storage facilities for business and personal use.
AP Moeller - Maersk A/S	A.P. Møller - Mærsk A/S, engages in the ocean transport and logistics business in Denmark and internationally,
Mosaic Co	The Mosaic Company, produces and markets concentrated phosphate and potash crop nutrients in North America and internationally.

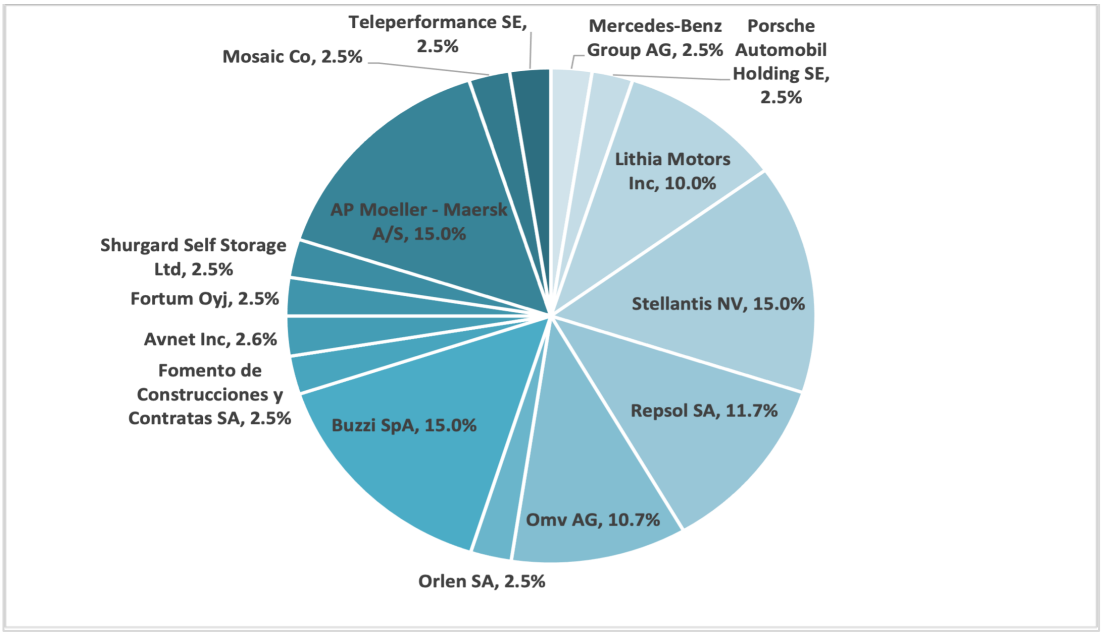
Source: Yahoo Finance

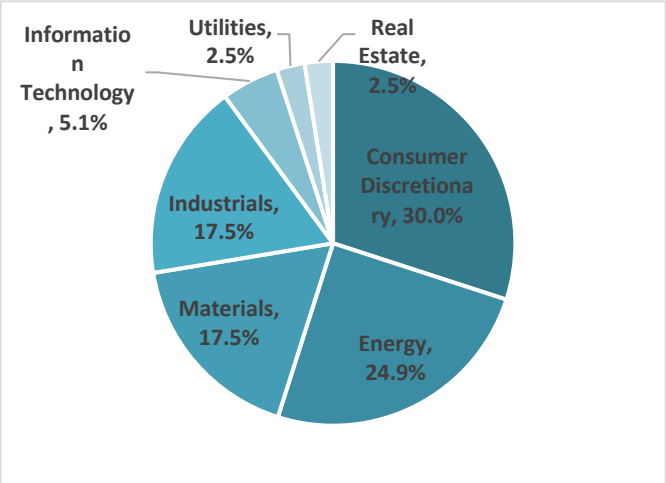
Table A-4. Equities selection screens (Data as of April 12th)

Company (Ticker)	Quality Rating	P/E Ratio	P/BV	Current Ratio	Dividend per share
Mercedes-Benz Group AG (MBGn.DE)	A	5.63	0.85	1.26	€5.42
Shurgard Self Storage Ltd (SHUR.BR)	A	6.84	1.08	1.31	€1.26
Repsol SA (REP.MC)	A-	6.28	0.71	1.54	€1.01
Orlen SA (PKN.WA)	A+	2.87	0.48	1.38	€1.06
Buzzi SpA (BZU.MI)	AA	6.61	1.12	3.24	€0.73
Teleperformance SE (TEPRF.PA)	BB	8.88	1.28	1.33	€4.79
Stellantis NV (STLAM.MI)	BB	4.21	0.93	1.24	€1.70
Lithia Motors Inc (LAD.N)	BB	7.34	1.17	1.41	€2.05
Avnet Inc (AVT.OQ)	BBB	6.7	0.93	2.53	€1.24
Fortum Oyj (FORTUM.HE)	BBB	7.23	1.29	1.98	€1.05
Fomento de Construcciones y Contratas SA (FCC.MC)	BBB	8.39	1.24	1.57	€0.53
Porsche Automobil Holding SE (PSHG_p.DE)	BBB	3.07	0.14	7.52	€2.99
AP Moeller - Maersk A/S (MAERSKb.CO)	BBB	6.31	0.16	2.5	€3.42
Mosaic Co (MOS.N)	BBB	8.89	0.85	1.22	€0.84
Omv AG (OMVV.VI)	BBB+	8.68	0.9	1.77	€4.57

Source: Refinitiv Eikon

Table A-5. Portfolio Composition





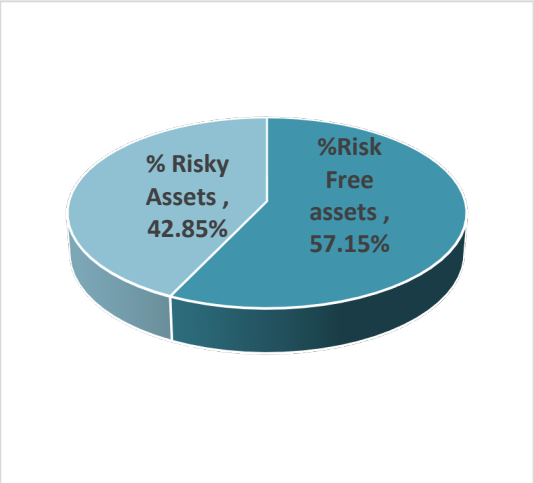


Table A-6. Risky Portfolio Weights

Company Name	Ticker Symbol	Sector	Weights		
			Minimum allocation	Initial allocation	Maximum allocation
Mercedes-Benz Group AG	MBGn.DE	Consumer Discretionary	0.78%	1.07%	1.36%
Porsche Automobil Holding SE	PSHG_p.DE	Consumer Discretionary	0.78%	1.07%	1.36%
Lithia Motors Inc	LAD.N	Consumer Discretionary	3.13%	4.28%	5.43%
Stellantis NV	STLAM.MI	Consumer Discretionary	4.70%	6.43%	8.15%
Repsol SA	REP.MC	Energy	3.65%	5.00%	6.34%
OMV AG	OMVV.VI	Energy	3.37%	4.60%	5.84
Orlen SA	PKN.WA	Energy	0.78%	1.07%	1.36%
Buzzi SpA	BZU.MI	Materials	4.70%	6.43%	8.15%
Fomento de Construcciones y contratas SA	FCC.MC	Industrials	0.78%	1.07%	1.36%
Avnet Inc	AVT.OQ	Information Technology	0.82%	1.12%	1.41%
Teleperformance SE	TEPRF.PA	Information technology	0.78%	1.07%	1.36%
Fortum Oyj	FORTUM.HE	Utilities	0.78%	1.07%	1.36%
Shurgard Self Storage Ltd	SHUR.BR	Real Estate	0.78%	1.07%	1.36%
AP Moeller - Maersk A/S	MAERSKb.CO	Industrials	4.70%	6.43%	8.15%
Mosaic Co	MOS.N	Materials	0.78%	1.07%	1.36%

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Abbreviations

AI- Artificial intelligence

CAL- Capital Allocation Line

CFA- Chartered Financial Analyst

CFI- Corporate Finance Institute

CVaR- Conditional VaR

DKK- Danish krone

ECB- European Central Bank

EF- Efficient Frontier

EPS- Earnings per Share

EUR- Euro

GIPS- Global Investment Performance Standards

IA- Investment Association

IPS- Investment Policy Statement

MC VaR- Monte Carlo Value at Risk

MVT- Mean-Variance Theory

MFW- Master's Final Work

MPT- Modern Portfolio Theory

MSCI- Morgan Stanley Capital International

MV- Minimum Variance

P/BV- Price to Book Value

P/E- Price to Earnings

PLN- Polish zloty

RL- Return Level

S&P- Standard & Poor's

SR- Sharpe Ratio

SS- Short Selling

SS- Short Selling

UK- United Kingdom

USD- US Dollar

USA- United States of America

VAR- Value at Risk

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I disclose that AI tools were employed during the development of this thesis as follows:

- AI-based research tools were used to assist in the literature review and data collection.
- AI-powered software was utilized for data analysis and visualization.
- Generative AI tools were consulted for brainstorming and outlining purposes. However, all final writing, synthesis, and critical analysis are my own work. Instances where AI contributions were significant are clearly cited and acknowledged.

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