MASTER OF SCIENCE IN
FINANCE

MASTERS FINAL WORK
PROJECT

INVESTMENT POLICY STATEMENT:
RODRIGUES' FAMILY

TIAGO PEDRO DOS SANTOS

JULY 2025

MASTER OF SCIENCE IN

FINANCE

MASTERS FINAL WORK

PROJECT

INVESTMENT POLICY STATEMENT:

RODRIGUES' FAMILY

TIAGO PEDRO DOS SANTOS

PEDRO RINO VIEIRA

JULY 2025

Abstract

This Investment Policy Statement (IPS) has been developed to reflect the financial objectives and constraints of the Rodrigues family, composed of Carlos and Sofia Rodrigues. The formulation of this IPS follows the couple's decision to invest a recently inherited sum of $61,229.91, with the overarching goal of achieving financial independence and enabling early retirement.

To meet their long-term objective of accumulating $450,000 in real terms over a 20-year horizon, the investment strategy is required to deliver an average annual real rate of return of 12%. In alignment with their values and risk preferences, the Rodrigues family has expressed a desire to limit their investment universe to large-cap and mega-cap companies, explicitly excluding exposure to the Oil and Gas sector. Furthermore, the use of leverage and short-selling techniques is not permitted within the scope of this investment strategy.

The Strategic Asset Allocation (SAA) adopted reflects a value-oriented approach, favouring equity over fixed-income instruments. Accordingly, 79.30% of the portfolio is allocated to U.S. equities, while the remaining 20.70% is invested in U.S. Treasury Notes and U.S. money market instruments. This allocation takes into consideration the family's financial situation—characterized by stable income, no liquidity needs, favourable tax status, relatively young age, and high tolerance of risk.

The investment philosophy underpinning this IPS is rooted in value investing principles. The security selection process is guided by rigorous fundamental screening, and portfolio construction is informed by the principles of Modern Portfolio Theory (MPT), with the objective of optimizing the risk-return profile. The final portfolio comprises 12 equity securities and is expected to yield an annual return of 12%, with an estimated volatility of 15.05% and a Sharpe ratio of 0.5.

To ensure prudent risk management, the IPS incorporates various risk mitigation tools, including Historical Parametric and Monte Carlo Simulation-based VaR.

Resumo

A presente *IPS* foi elaborada com o objetivo de refletir os objetivos financeiros e as restrições da família Rodrigues, composta por Carlos e Sofia Rodrigues. A formulação desta DPI surge na sequência da decisão do casal de investir um montante recentemente herdado, no valor de $61.229,91, tendo como meta principal alcançar a independência financeira e possibilitar uma reforma antecipada.

Para atingir o objetivo de acumular $450.000, após aplicada a taxa, num horizonte de 20 anos, a estratégia de investimento deverá proporcionar uma taxa média anual de retorno real de 12%. Em conformidade com os seus valores e preferências de risco, a família Rodrigues manifestou a intenção de restringir o seu universo de investimento a empresas de grande e muito grande capitalização bolsista, excluindo explicitamente qualquer exposição ao setor de Petróleo e Gás. Adicionalmente, não é permitida a utilização de alavancagem nem de estratégias de venda a descoberto no âmbito da presente política de investimento.

A *SAA* adotada reflete uma abordagem orientada para o valor, privilegiando ações em detrimento de instrumentos de rendimento fixo. Assim, 79,30% da carteira está alocada a ações de empresas dos EUA, sendo os restantes 20,70% investidos em Títulos do Tesouro dos EUA. Esta distribuição teve em consideração a situação financeira da família, idade relativamente jovem e uma elevada tolerância ao risco.

A filosofia de investimento desta *IPS* baseia-se nos princípios da estratégia de investimento em valor. O processo de seleção de ativos é orientado por uma análise fundamentalista rigorosa, enquanto a construção da carteira assenta nos princípios da Teoria Moderna do Portefólio (MPT), com o objetivo de otimizar o perfil risco-retorno. A carteira é composta por 12 ações, estimando-se um retorno anual de 12%, com uma volatilidade de 15,05% e um índice de Sharpe de 0,5.

Com vista a assegurar uma gestão prudente do risco, esta *IPS* incorpora diversas ferramentas de mitigação de risco, nomeadamente a análise do *VaR* Paramétrico, Histórico e a simulação de Monte Carlo.

Classificação JEL: C6; G11.

Palavras-Chave: Gestão de Ativos; Teoria da Carteira; *IPS*; *SAA*; Investimento em Valor; Seleção de Títulos; MPT; Índice de Sharpe; *VaR*;

Acknowledgements

I would like to express my deepest and most sincere gratitude to all the people that supported me in this period and that have been fundamental to the completion of this project.

First and foremost, I am profoundly thankful to my whole family, my parents, my sisters, my cousins, my grandparents, my aunts and uncle for having always been there and encouraged me. Your constant support, love and belief in me have been my steady motivation throughout this journey, none of this would have happened without you. Thank you from the bottom of my heart for having been there for me.

To all my friends thank you for all the years of friendship and for always supporting me and having my back.

I would like to extend my thanks to the faculty and staff of ISEG, whose resources and guidance have been instrumental in shaping my academic journey.

Finally, I would also like to show my gratitude and appreciation to my supervisor, Pedro Rino Vieira, for his guidance, expertise, and mentorship. His valuable experience, insights and feedback have been pivotal in shaping this research.

To all of you, thank you for being pillars of support. Your impact on this project will be forever cherished.

Table of Contents

Abbreviations

B/M Book-to-Market Ratio

CAL Capital Allocation Line

ECB European Central Bank

EF Efficient Frontier

Fed Federal Reserve

GDP Gross Domestic Product

GICS Global Industry Classification Standard

IMF Internacional Monetary Fund

IOS Investment Opportunity Set

IPS Investment Policy Statement

MPT Modern Portfolio Theory

NASDAQ National Association of Securities Dealers Automated Quotations

P/B Price to Book Ratio

P/E Price Earnings Ratio

P/S Price to Sales Ratio

S&P 500 Standard & Poor's 500

SAA Strategic Asset Allocation

T-Notes Treasury Notes

US United States

USD US Dollars

VAR Value at Risk

WEO World Economic Outlook

List of Figures

List of Tables

1 Executive Summary

1.1 Scope and Purpose

This IPS is a statement between TS Investments and the Rodrigues family, outlining the general goals and objectives of their investment plan. The family has received an inheritance of $61,229.91, and their primary objective is to invest these funds to achieve financial independence so both can retire earlier.

1.2 Governance

TS Investments is dedicated to safeguarding the interests of Mr. and Ms. Rodrigues through a structured Investment Policy Statement (IPS) that outlines clear responsibilities for both the advisory team and the clients. The firm is responsible for guiding the development of the IPS, providing periodic recommendations, and delivering quarterly performance evaluations to ensure alignment with the clients' investment goals.

1.3 Investment Return and Risk

The investment plan outlined by Mr. and Ms. Rodrigues aims to achieve an annual rate of return of 12% over a 20-year timeframe. Their primary preference is to invest in large and mega-cap companies and to not invest in oil and gas companies. The portfolio designed for the investors is structured to meet their target return of $450,000 after taxes, considering their constraints and their ability to take and tolerate risk.

1.4 Risk Management

TS Investments conducts quarterly and annual portfolio performance evaluations to ensure alignment with the clients' objectives. The firm applies comprehensive risk management tools, including standard deviation, Value at Risk (VaR), and a Risk Assessment Matrix. An annual review of asset allocation is performed to detect significant deviations caused by market changes. If needed, rebalancing is proposed and executed only with the express approval of Mr. and Ms. Rodrigues.

2 Investment Policy Statement

2.1 Scope and Purpose

This Investment Policy Statement (IPS) formalizes the agreement between Tiago Santos, a portfolio manager at TS Investments, and his clients, Mr. and Ms. Rodrigues. It outlines the general goals and objectives of their investment, providing a clear framework for the strategies to be employed in achieving these objectives. The IPS specifies essential components such as strategic asset allocation, risk tolerance, and liquidity requirements, ensuring that all investment activities remain aligned with the clients' needs and priorities.

The IPS pertains to the personal assets of the Rodrigues family, which includes Carlos Rodrigues, his wife Sofia Rodrigues. Residing in Florida, United States since 2013, the family maintains a strong financial foundation, living in their own apartment and carrying no outstanding debt. Carlos Rodrigues, aged 38, natural from Lisbon, has a master's in accounting and now works as an accountant in a well-established company, while Sofia Rodrigues, aged 35, natural from Aveiro, has a bachelor's in applied mathematics and now is a high school teacher.

The impetus for developing this IPS was the receipt of a 61,229.91$ inheritance from Mr. Rodrigues' late father. Aware of the importance of this financial opportunity, the Rodrigues family decided to invest the inheritance with a specific purpose: to achieve financial independence so both can retire earlier. They have established a clear investment goal of achieving a total return of 450,000$ after taxes within a twenty-year period.

This decision follows a prior unsuccessful attempt at independent investing, during which the family incurred substantial losses in the stock market. Learning from this experience, they have chosen to adopt a more structured and professional approach to investment management. By partnering with TS Investments, the Rodrigues family seeks to ensure that their financial goals are achieved through a carefully designed and well-executed portfolio.

TS Investments has been entrusted to construct a tailored investment plan that considers the Rodrigues family's objectives, risk tolerance, and specific constraints. The firm will apply its expertise to develop a disciplined investment strategy aimed at preserving and growing the family's capital while maintaining alignment with their clearly defined goals. Through regular monitoring and adjustments, TS Investments will work to safeguard the family's financial future and help them achieve their aspirations of growing their wealth to enjoy their retirement life.

2.2 Governance

TS Investments is committed to prioritizing the interests of Mr. and Ms. Rodrigues as outlined in this Investment Policy Statement (IPS). The firm seeks to establish a clear framework of roles and responsibilities to enable effective monitoring of all portfolio management activities by both the clients and the advisory team.

As the primary advisors, TS Investments holds responsibility for assisting Mr. and Ms. Rodrigues in the formulation of the IPS, providing recommendations for necessary adjustments over time, and monitoring and reporting on the portfolio's performance. Performance updates and evaluations will be communicated at least quarterly, ensuring that all actions align with the clients' investment objectives and preferences. The investment policy will incorporate insights from a detailed risk assessment using the investor profile questionnaire. TS Investments will ensure that the risk profile of the portfolio remains consistent with the established risk management guidelines, promptly identifying and addressing any deviations that exceed the acceptable limits. A comprehensive quarterly report will be provided, summarizing the portfolio's performance, highlighting any variances in risk positions.

Given the extended timeframe of the investment, revising the IPS may also be necessary. Hence, TS Investments' responsibility is to monitor the preferences of the clients and assess whether the portfolio remains aligned with its target asset allocation and long-term objectives. On an annual basis, any necessary rebalancing actions to restore the original allocation will be propose if significant drift has occurred due to market fluctuations. These proposed adjustments will be clearly outlined and discussed with Rodrigues Family, who will retain final approval authority.

2.3 Investment, Return and Risk Objectives

2.3.1 Investment Objective

The Investment Policy Statement (IPS) is designed to complement the income earned of Mr. and Ms. Rodrigues, ensuring they can meet their ongoing living expenses while accumulating the financial resources necessary to achieve financial independence once they retire. The main goal of the investment is to meet the expected annual return of the investors. To achieve this goal, they have committed an initial investment of 61229.91$, with the aim of realizing a total return of 450,000$ after taxes over a 20-year horizon. Considering the capital gains tax rate in the United States of 15% and an anticipated inflation rate of 3.5%, the required annual rate of return to meet this objective has been calculated at 12%.

2.3.2 Investor's Risk Tolerance and Constraints

The investor's risk tolerance and constraints are critical factors in developing an effective investment policy statement. To understand the client's risk profile, a risk tolerance assessment was conducted through a comprehensive questionnaire. The results indicated that the investors have a high-risk tolerance, with a result that also indicates that their portfolio should be composed 80% with stocks and 20% with bonds. As per the calculations done in chapter 3.4, it will allocate 20.70% of their portfolio to US T-Notes/US money market and allocate the remaining 79.30% to US equities. A high-risk tolerance combined with the high ability to take risk, by the fact that both have establish jobs and they have no debt, reflects their willingness to accept significant market volatility or the potential for capital losses, emphasizing an investment strategy that prioritizes returns over capital preservation.

The investors have also outlined specific constraints that must be respected in the construction of their portfolio. Firstly, they have expressed a preference for securities originating from large and mega cap companies because these companies are typically well-established with proven business models, making them less volatile and more resilient during economic downturns. Secondly, liquidity is not a concern for the couple as they are in a strong financial position and do not anticipate any need to access the invested funds during the investment horizon. Thirdly, they express to not invest in any oil or gas companies. Lastly, the investors have prohibited short selling.

These parameters highlight the need for a carefully constructed investment portfolio that adheres to the couple's high-risk tolerance and respects their clearly defined constraints, all while aiming to achieve the targeted rate of return over the specified investment horizon.

2.4 Risk Management

To ensure a thorough evaluation of portfolio performance, TS Investments prioritizes the establishment of clear performance measurement and reporting frameworks. As previously detailed, an internal reporting system has been developed to provide comprehensive insights into the portfolio's progress, including achieved returns and deviations from the benchmark, with evaluations conducted on both a quarterly and annual basis. These regular performance assessments are essential for guiding investment decisions and maintaining alignment with the client's stated objectives.

TS Investments acknowledges the critical importance of utilizing appropriate metrics to deliver a holistic assessment of the portfolio's risk exposure. TS Investments' risk management strategy incorporates several key measurements, including the risk calculated as the annualized standard deviation of portfolio returns relative to the specified benchmark, Value at Risk (VaR) which is defined as the predicted probability of the client´s portfolio falling below a certain threshold given a certain level over the time horizon of the investment and Risk Assessment Matrix to achieve a nuanced evaluation of risk. The VaR risk management techniques to be performed include Parametric, Historical and Monte Carlo Simulation.

TS Investments is dedicated to ensuring the optimal management of the portfolio's asset allocation in line with the clients' long-term objectives. On the first business day of each year, a formal review of the portfolio's asset allocation will be conducted. If market movements have caused significant deviation from the target allocation defined in this IPS, TS Investments will propose rebalancing transactions to restore the intended allocation and maintain the desired risk/return profile. Any rebalancing of the portfolio will only be performed after obtaining the express authorization of Mr. and Ms. Rodrigues.

3 Investment Design

3.1 Investment Philosophy

According to Damodaran (2012), an investment philosophy provides a structured framework for understanding market dynamics, encompassing their mechanisms, inefficiencies, and common patterns of investor behaviour. It is grounded in a set of core principles that inform market behaviour and decision-making processes. A robust investment philosophy integrates empirical market evidence while aligning with the specific objectives, risk tolerance, and unique characteristics of individual investors.

The absence of a well-defined investment philosophy often results in inconsistent strategy shifts, which can lead to elevated transaction costs and financial losses. In contrast, a clear and consistent investment philosophy promotes discipline and coherence in decision-making, enhancing the long-term effectiveness and sustainability of investment strategies.

The investment philosophy adopted in this IPS is value investing. Value investing is an investment philosophy that involves picking stocks that appear to be trading for less than their intrinsic or book value. Value investors actively ferret out stocks they think the stock market is underestimating. They believe the market is not always efficient, resulting in stock price movements that do not correspond to a company's long-term fundamentals.

Since Graham and Dodd (1934) in that value investing is pointed as able to produce superior stock returns than growth investing and the overall market. A more simplistic way of value investing is to invest in stocks with low price-earnings (P/E) and price-to-book (P/B) earnings.

An important part of value investing is the fundamental analysis that helps to identify businesses with strong financial, stable earnings, and consistent cash flows, and the strategy is to invest in those that are trading at a discount to their intrinsic value, which can help produce long-term returns. According to Klarman (2023), by controlling risk

and limiting loss through extensive fundamental analysis, strict discipline, and endless patience, value investors can expect good results with limited downside.

The strategy implemented in this IPS it is a long-term passive strategy. Similarly to prominent investors like Benjamin Graham and Warren Buffett the investments in this IPS are aiming for a long-term time horizon. Damodaran (2012) says that to be a successful passive investor you should have a long-time horizon, a wise choice of the screens, to diversify the portfolio and to watch out for taxes and transaction costs. Passive value investors who buy stocks in companies that they believe are undervalued may have to wait years for the market correction to occur and for the growth prospect to become a reality.

Considering the risk-profile and the objective of the investment of the Rodrigues Family, this philosophy and strategy surge naturally as the best choice. Value stocks are frequently linked to solid and well-established businesses operating in stable industries. Chan & Lakonishok (2004) shows us that even after considering the experience of the late 1990s, value investing generates superior returns over growth investing and common measures of risk do not support the argument that the return differential is a result of the higher riskiness of value stocks. La Porta et al. (1997) maintain their theory that the superior performance of value investing is the result of expectational errors made by irrational market participants.

The personality traits and individual strengths of Mr. and Ms. Rodrigues significantly influence the selection of an appropriate investment philosophy and strategy. Given the couple's relatively young age, a long-term, buy-and-hold approach aligns well with their investment horizon and risk tolerance. Furthermore, the financial advisor has considered various personal financial factors, such as employment stability, available investable assets, liquidity requirements, and tax considerations, which are crucial in determining a suitable investment strategy. In the specific case of Mr. and Ms. Rodrigues, their high income substantially exceeds their regular expenses. This financial surplus affords them considerable flexibility in the choice and implementation of a long-term investment philosophy.

3.2 Strategic Asset Allocation

3.2.1 Macroeconomic Analysis

3.2.1.1 Global Projections

On the monetary policy front, both the Federal Reserve (Fed) and the European Central Bank (ECB) are expected to pursue interest rate cuts throughout 2025, albeit at different paces. In the United States, the federal funds rate is projected to decline to 4.0 percent by the end of 2025, gradually normalizing to 2.9 percent by 2028. This reflects efforts to balance slowing growth with the Fed's inflation and employment mandates. Meanwhile, the ECB is anticipated to take a more aggressive approach, with an expected reduction of 100 basis points in total during 2025, representing two more 25 basis point cuts than in the assumptions underlying the October 2024 WEO bringing its policy rate to 2.0 percent by mid-year, in response to below-target inflation and persistently weak growth.
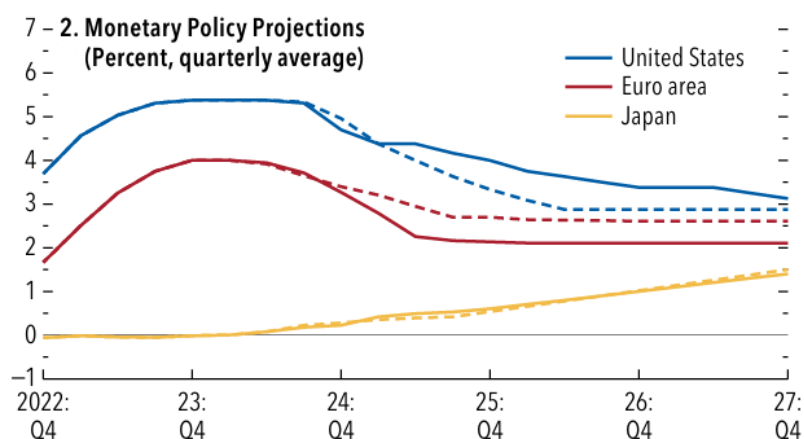
Figure 1 - Monetary Policy projections Source: IMF WEO April 2025

On the fiscal side, advanced economies are projected to undergo moderate fiscal consolidation between 2025 and 2026, following a period of expansive fiscal support triggered by the pandemic and the Ukraine conflict. In the United States, the structural fiscal balance is set to improve by 1 percentage point of GDP in 2025. Nevertheless, public debt is expected to continue rising under current policies—from 121 percent of GDP in 2024 to 130 percent by 2030—driven by persistent deficits, rising interest payments, and structural expenditure pressures. In the euro area, Germany's primary

deficit is forecasted to widen by 1 percent of GDP by 2030 relative to 2024, with the increase linked to defense and infrastructure spending.
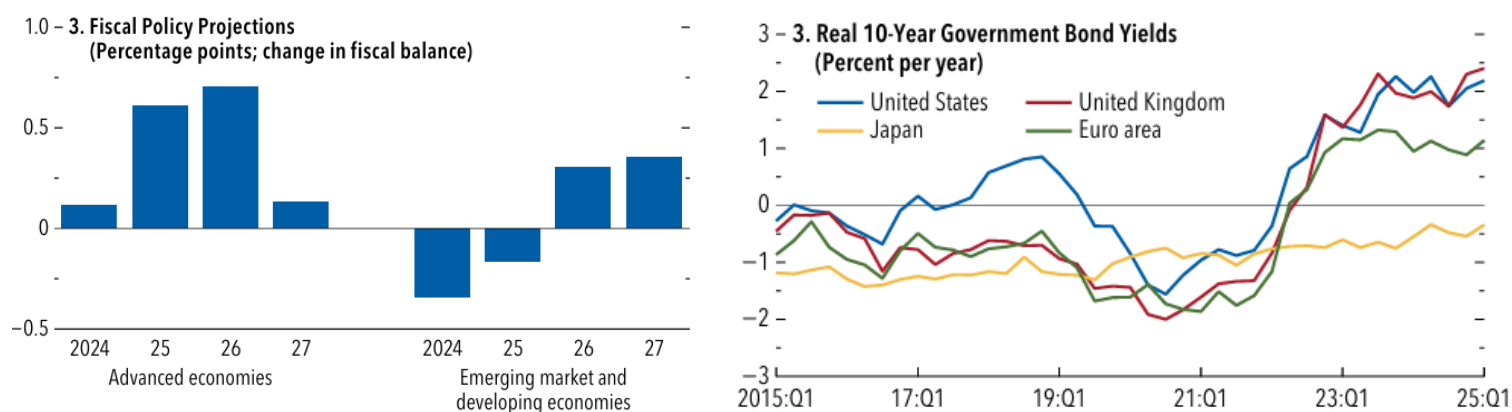
Figure 2 - Fiscal Policy Projections & Real 10-Year Government Bond Yields Source: IMF WEO April 2025

Furthermore, the fiscal space available to policymakers has narrowed considerably. Despite progress in reducing pandemic-era deficits, budgetary imbalances persist, and stabilizing debt trajectories will likely require substantial fiscal adjustments, both in terms of revenue generation and expenditure rationalization.

Lastly, long-term government bond yields in advanced economies have risen significantly, marking a shift from the prolonged low-yield environment of the post-2008 era. In the United States, rising yields reflect increased Treasury issuance, higher inflation expectations, and elevated risk premiums.

3.2.1.2 GDP and Inflation Forecasts

In the short-term, the global economy is projected to experience a deceleration in growth. According to the reference forecast, global GDP growth is expected to decline from 3.3 percent in 2024 to 2.8 percent in 2025, before moderately recovering to 3.0 percent in 2026. These figures represent downward revisions of 0.5 percentage point for 2025 and 0.3 percentage point for 2026 compared to the January 2025 World Economic Outlook (WEO) Update, reflecting widespread downgrades across both advanced and emerging economies. The revisions are primarily attributed to the introduction of new trade barriers, which have amplified uncertainty, dampened trade flows, and negatively affected business and consumer sentiment.

	2024	Projections		Difference from January 2025 WEO Update[1]		Difference from October 2024 WEO[1]	
		2025	2026	2025	2026	2025	2026
World Output	**3.3**	**2.8**	**3.0**	**-0.5**	**-0.3**	**-0.4**	**-0.3**
Advanced Economies	**1.8**	**1.4**	**1.5**	**-0.5**	**-0.3**	**-0.4**	**-0.3**
United States	2.8	1.8	1.7	-0.9	-0.4	-0.4	-0.3
Euro Area	0.9	0.8	1.2	-0.2	-0.2	-0.4	-0.3
Germany	-0.2	0.0	0.9	-0.3	-0.2	-0.8	-0.5
France	1.1	0.6	1.0	-0.2	-0.1	-0.5	-0.3
Italy	0.7	0.4	0.8	-0.3	-0.1	-0.4	0.1
Spain	3.2	2.5	1.8	0.2	0.0	0.4	0.0
Japan	0.1	0.6	0.6	-0.5	-0.2	-0.5	-0.2
United Kingdom	1.1	1.1	1.4	-0.5	-0.1	-0.4	-0.1
Canada	1.5	1.4	1.6	-0.6	-0.4	-1.0	-0.4
Other Advanced Economies[2]	2.2	1.8	2.0	-0.3	-0.3	-0.4	-0.3
Emerging Market and Developing Economies	**4.3**	**3.7**	**3.9**	**-0.5**	**-0.4**	**-0.5**	**-0.3**

Table 1 - Overview of the World Economic Outlook Reference Forecast (% change) Source: IMF WEO April 2025

In the United States, growth is projected to ease to 1.8 percent in 2025, marking a decline of 1 percentage point relative to 2024 and 0.9 percentage point compared to the earlier WEO forecast. This downgrade reflects heightened policy uncertainty, trade tensions, and weaker consumption dynamics, partly driven by newly imposed tariffs. Growth in 2026 is expected to remain subdued at 1.7 percent, reflecting continued moderation in private sector demand.

The euro area is similarly expected to see modest growth of 0.8 percent in 2025, with a slight improvement to 1.2 percent in 2026. The weakness in 2025 is largely attributable to trade-related uncertainty and restrictive fiscal conditions, while a modest recovery in 2026 is supported by rising real wages and expected fiscal easing in Germany following revisions to its fiscal rule.

Growth among emerging market and developing economies is also set to decline, from an estimated 4.3 percent in 2024 to 3.7 percent in 2025, before modestly rising to 3.9 percent in 2026. These forecasts represent downward revisions of 0.5 and 0.4 percentage points, respectively, relative to earlier estimates.

On the inflation front, global headline inflation is projected to decline to 4.3 percent in 2025 and further to 3.6 percent in 2026. Advanced economies are expected to reach their inflation targets sooner, with inflation falling to 2.2 percent by 2026, while inflation in emerging and developing economies is projected to decline more gradually, reaching 4.6 percent over the same horizon. Compared to the January 2025 WEO, inflation forecasts have been revised upward, particularly for the United States (+1.0

pp) and the United Kingdom (+0.7 pp), due to persistent price pressures in services, core goods, and the impact of new tariffs.
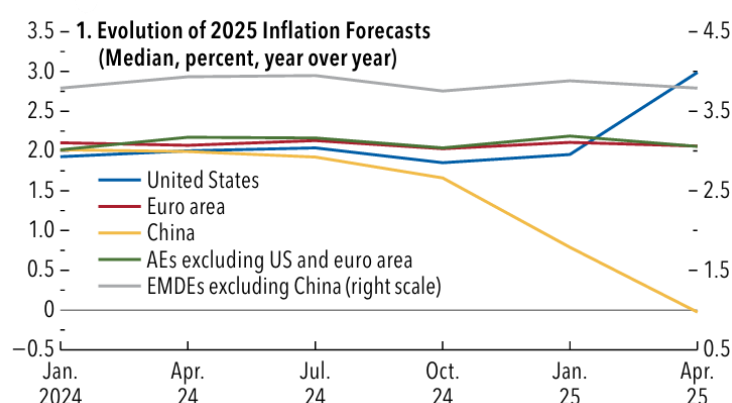
Figure 3 - Evolution of the 2025 Inflation Forecasts Source: IMF WEO April 2025

3.2.1.3 Trumps Tariffs Announcement Influence in the Stock Market

On April 3rd and 4th, the U.S. stock market experienced its most severe two-day decline since the onset of the COVID-19 pandemic in March 2020. This downturn was triggered by investor reaction to a series of newly announced trade tariffs by President Donald Trump, which were positioned as part of a broader "America First" policy initiative. The announcement, labelled "Liberation Day" by the administration, signalled a significant shift in U.S. trade posture, drawing immediate concern from global markets.

Since the inauguration of President Trump, the performance of the U.S. equity markets—particularly the S&P 500 index—has been notably affected. the index has declined by more than 17% from its value on Inauguration Day. Market analysts attribute this downturn to a combination of rising inflation expectations, deteriorating consumer sentiment, and recessionary fears, all of which are viewed as potential consequences of the administration's economic and trade policies.
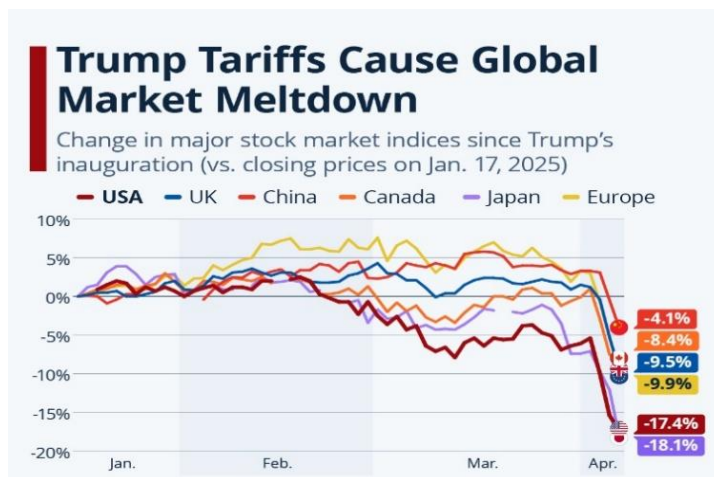
Figure 4 - Change in major stock market indices since Trump's inauguration (vs. closing price on Jan. 17, 2025) Source: Statista

3.2.1.4 Opportunity for Long Term Passive Value Investing

While significant market downturns—such as the one experienced in early April—can initially be perceived as negative events by the broader investor community, they also present strategic opportunities for long-term value-oriented investors. In the short term, stock prices often react to policy uncertainty, macroeconomic shocks, or investor sentiment, resulting in sharp declines that may not accurately reflect the fundamental value of underlying companies. This divergence between price and intrinsic value forms the cornerstone of the value investing philosophy.

Periods of heightened volatility and widespread selloffs, investors often engage in panic-driven or indiscriminate selling, leading to a situation where otherwise fundamentally sound companies experience substantial price reductions. This phenomenon can create an environment in which stocks are temporarily undervalued relative to their long-term earnings potential, cash flows, or asset base.

The concept of mean reversion suggests that over time, market prices tend to converge toward the intrinsic value of the asset. Therefore, acquiring undervalued securities during downturns allows the investor to benefit from future market corrections, as prices gradually adjust to more accurately reflect company fundamentals. In the context of this portfolio strategy, short-term price corrections, though challenging from a volatility and sentiment perspective, are viewed through the lens of opportunity rather than risk. By maintaining a long-term investment horizon,

investors can position themselves to capture the full upside potential of undervalued securities once market equilibrium is restored.

3.2.2 Asset Allocation and Country Allocation

Strategic asset allocation (SAA) refers to a long-term portfolio strategy that involves choosing asset class allocations and rebalancing the allocations periodically. Rebalancing occurs when the asset allocation weights significantly shift away from the originally planned strategic asset allocation, primarily due to unrealized gains or losses in each asset class. The key idea behind SAA is to create a diversified portfolio that aims to achieve the investors' objectives while managing risk. By spreading investments across various asset classes, it helps reduce the impact of market volatility on the overall portfolio.

The SAA followed in this IPS is based on the risk-profiling questionnaire from Vanguard provided to Mr. and Ms. Rodrigues considering factors such as risk tolerance, time horizon and investment return objectives, and the constraints imposed by Mr. and Ms. Rodrigues, mainly the one that shows that Mr and Ms Rodrigues have preferences for securities from large mega cap companies. The objective of Mr. and Ms. Rodrigues is to achieve an investment return of 12%. As a result, TS Investments decided to assign 79.30% of their portfolio to U.S. equities and allocate the remaining 20.70% to US T-Notes/US money market securities.

The decision on investing only in the United States was based on the analysis made in the chapter 3.2.1. The United States is considered the most stable and large economy in the world having one of the biggest GDPs of the world and has one of the highest projected GDP growths among the advanced countries. Another reason is the fact that investing in the United States will help reduce portfolio risk by avoiding currency risk because the investment will be made in the same country that Mr. and Ms. Rodrigues live in. This eliminates potential losses from exchange rate fluctuations. Finally, the United States have more than a third (35.55%) of the large mega cap in the world which also shows the financial stability and the strength and the value of the United States financial market.

The choice on only investing in the United States matches perfectly with the Investment Philosophy proposed for Mr. and Ms. Rodrigues. Historically, value stocks have outperformed growth stocks in the US, often by a striking amount. Data covering nearly a century backs up the notion that value stocks—those with lower relative prices—have higher expected returns. While disappointing periods emerge from time to time, the principle that lower relative prices lead to higher expected returns remains the same. Value premiums have often shown up quickly and in large magnitudes. For example, in years when value outperformed growth, the average premium was nearly 15%. On average, value stocks have outperformed growth stocks by 4.4% annually in the US since 1927.
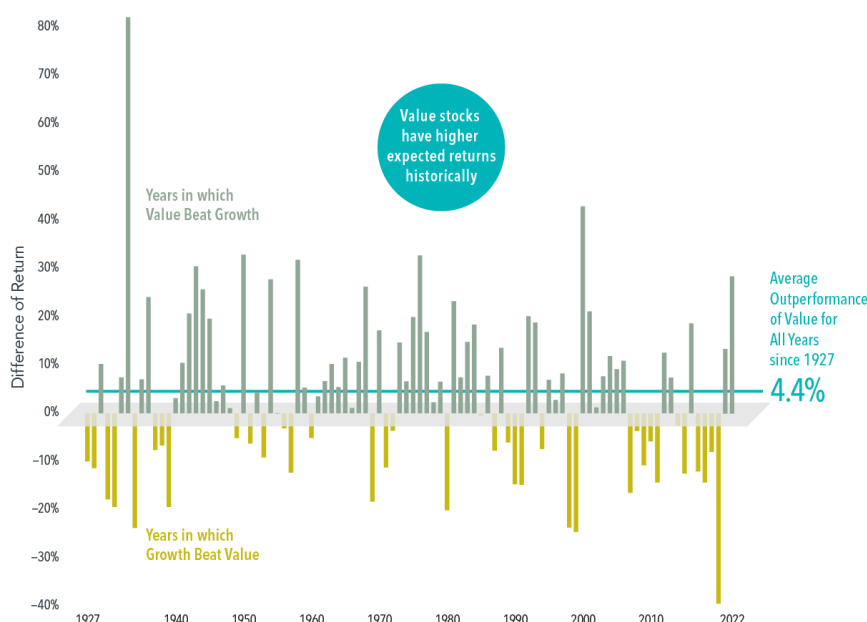
Figure 5 - Value Investing vs Growth Investing since 1927 in the US Source: Dimensional

3.3 Security Selection

The process of security selection involves identifying and determining which financial instruments are appropriate for inclusion in the investment portfolio. Data for this process is sourced from reputable financial databases, specifically Bloomberg and NASDAQ, to ensure reliability and accuracy. The methodology incorporates a series of screening criteria designed to reflect both the investment constraints detailed in Section 2.3.2 and the overarching investment philosophy articulated in this Investment Policy Statement (IPS).

The initial stage of the security selection process involves the consideration of investor-specific constraints, as outlined by the clients, Mr. and Ms. Rodrigues. Notably, the couple has expressed a preference for limiting their investments to large-cap and mega-cap equities and to not invest in any gas and oil companies. Once it is confirmed that the screening parameters align with these client-imposed restrictions, TS Investments applies additional filters to further refine the selection. These filters are intended to identify securities that are consistent with a passive value investing strategy, which prioritizes fundamentally sound companies that are potentially undervalued relative to their intrinsic value.

The specific screening criteria employed in this phase of the selection process are as follows:
- Company Market Capitalization: >10 billion USD
- Country of Exchange: United States of America
- Currency: USD
- GICS Industry Name (excluding Oil and Gas Industry)
- Price Earnings (P/E) Ratio
- Price to Book (P/B) Ratio
- Price to Sales (P/S) Ratio
- Dividend Yield: Positive Dividend Yield
- Net Margin
- Asset Turnover Ratio
- Positive Average Annual Return in the last 5 years

The inclusion of valuation ratios such as the price-to-book (P/B), price-to-earnings (P/E), and price-to-sales (P/S) ratios play a crucial role in assessing whether a stock is undervalued or overvalued by the market. Damodaran (2012) says that, a core principle of passive value investing is the systematic selection of stocks that exhibit low P/E, P/B, and P/S ratios, as these often-signal undervaluation relative to fundamentals. Supporting this approach, Chan, Hamao, and Lakonishok (1991) found that firms with high book-to-market (B/M) ratios—the inverse of the P/B ratio—tend to outperform those with lower B/M ratios. This excess return has been interpreted within the literature as evidence of both market efficiency and market inefficiency.

Furthermore, Jaffe, Keim, and Westerfield (1989) demonstrated that stocks with high earnings-to-price (E/P) ratios—the inverse of the P/E ratio—also yield superior returns, reinforcing the value of such metrics in long-term investment strategies.

The inclusion of dividend yield as a screening criterion is a valuable tool in identifying potentially undervalued stocks. While the academic literature presents mixed evidence regarding the direct relationship between dividend yield and future stock returns, combining this metric with additional financial indicators can enhance the screening process. Specifically, the use of net profit margin and positive average returns over the past five years, alongside dividend yield, allows for the selection of firms that are not only profitable and financially stable but also demonstrate a track record of performance. The use asset turnover ratio is also helpful in order to understand which companies use their assets efficiently to generate revenue. This multi-criteria approach increases the likelihood of identifying well-established companies that may be mispriced by the market.

The use of the Global Industry Classification Standard (GICS) industry name serves as a strategic tool to promote effective risk diversification across different economic sectors. By categorizing companies according to their primary business activities, this classification framework assists investors in mitigating industry-specific risk. In this context, a screening constraint is applied to ensure that no more than one company per industry is included in the final portfolio selection. This approach reduces the likelihood of overexposure to any single industry or sector, thereby enhancing the portfolio's resilience to sectoral downturns and promoting a more balanced allocation across the market.

After implementing the preceding screens, the advisor's primary objective is to construct a well-diversified portfolio. The literature suggests that increasing the number of stocks in stock portfolios is beneficial, in terms of diversification. The concept of diversification is covered by Graham et al. (2013) where he suggests a range of 10 to 30 stocks for building a well-diversified portfolio. He promotes diversification to lessen the effects of unanticipated events or poor performance of stocks. In Tang (2004)'s review of the literature, the recommendation is between 10 and 40 stocks. This effect can be seen in Figure 10.

Standard Deviation of Portfolio
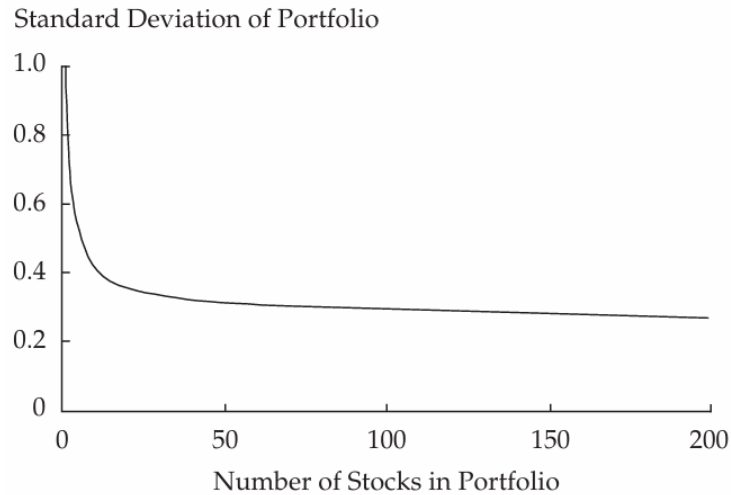
Figure 6 - Decline in standard deviation with increasing diversification. Source: The Diversification Puzzle, Meir Statman (2004)

To guide the selection of companies for the portfolio, key financial ratios and performance metrics were evaluated relative to industry averages provided by Aswath Damodaran. Only those firms demonstrating superior financial indicators - that is, values exceeding their respective industry benchmarks - were considered eligible for inclusion. In cases where multiple companies from the same industry met these criteria, the final selection was based on the highest dividend yield, reflecting a preference for firms offering stronger income potential within their sector. Based on this methodology, a total of 12 securities were selected for the portfolio.

Company Name	Industry
ASSURANT INC	Insurance (General)
DELTA AIR LINES INC	Air Transport
DR HORTON INC	Homebuilding
FEDEX CORP	Transportation
GENERAL DYNAMICS CORP	Aerospace/Defense
ALPHABET INC-CL A	Software (Entertainment)
MERCK & CO. INC.	Drugs (Pharmaceutical)
NORTHERN TRUST CORP	Investments & Asset Management
PACCAR INC	Machinery
STERIS PLC	Healthcare Products
THERMO FISHER SCIENTIFIC INC	Heathcare Information and Technology
TEXAS INSTRUMENTS INC	Semiconductor

Table 2 - Securities by Industry Source: Author

3.4 Portfolio Composition

For the portfolio construction it was utilized the Harry Markowitz's Modern Portfolio Theory (MPT) to establish the optimal allocation of weights for the selected securities. MPT is a mathematical framework designed to construct investment portfolios that maximize expected returns for a given level of risk. Central to the theory is the concept of risk diversification to reduce the overall risk of the portfolio. MPT categorizes risk into two components, the Systematic Risk, a market-wide risk that cannot be eliminated through diversification, as it affects all investments in the market and the Unsystematic Risk the type of risk is specific to individual companies or industries and can be mitigated by increasing the number of securities within a portfolio. While MPT acknowledges that systematic risk is unavoidable, it emphasizes the reduction of unsystematic risk through careful diversification.
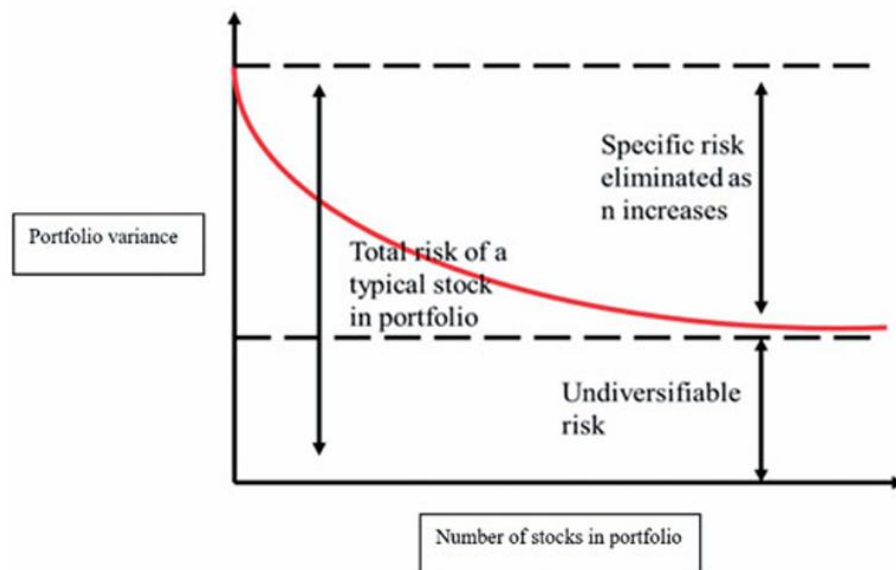
Figure 7 - Effect of Diversification Source: Lou (2019)

Following the completion of the security selection phase, the advisor collects historical securities data from Bloomberg. The data consists of the daily closing price for the past 5 years, covering the period from May 20, 2020, to May 19, 2025.

The subsequent step involves calculating the daily returns during this period, followed by determining the average return for these 5 years. Then, the standard deviation and variance of each of the individual stocks is measured. Following that, the advisor

computes the correlation matrix. The final step is determining the variance-covariance matrix.

The advisor's next priority is establishing the Investment Opportunity Set (IOS), the Minimum-Variance Portfolio (MVP) and the Efficient Frontier (EF). IOS refers to the set of all possible pairs of standard deviations and returns attainable from investing in a collection of assets. EF refers to the subset of the IOS which is efficient meaning that no other portfolio has at least as much expected return and lower standard deviation, or no other portfolio has higher expected return and standard deviation which is smaller or equal. MVP is located at the leftmost point of the EF, representing the portfolio with the lowest possible risk (standard deviation).

However, considering the leverage and short-selling restrictions, the advisor used Excel's Solver instead of the generic approach. In order to include the 12 stocks selected, restrictions were made. No stock should have a weight higher than 10%, since it reduces the likelihood of overexposure to any single industry or sector. And also, no stock should have a weight lower than 2.5% in order to diversify the portfolio since diversification lowers the specific risk of the portfolio.

The formula for Expected Return of the Portfolio is:
$$E(R) = RW_T$$
Where:
R = Annual Return Matrix
W = Weight Matrix ($10\% \geq w_i \geq 2.5\%$, $w_i \in W$)

The formula for the standard deviation of the Portfolio is:
$$\sigma = \sqrt{WVW_T}$$
Where:
V = Variance-Covariance Matrix
W = Weight Matrix ($10\% \geq w_i \geq 2.5\%$, $w_i \in W$)

After computing the hyperbola, the advisor can determine the MV portfolio. TS Investments utilizes Solver with a defined objective of minimizing the standard

deviation of the hyperbola equation. The advisor makes unconstrained variables non-negative since the family opted not to employ leverage or engage in short-selling strategies.

Afterwards, in order to combine the risk-free asset with risky assets, the advisor draws the Capital Allocation Line (CAL). CAL illustrates all the portfolios that optimally combine the risk-free asset and the market portfolio of risky assets. In the process of finding the Tangent Portfolio, Solver is configured to maximize the Sharpe Ratio.

Finally, the last step is to calculate which combination of the risk-free asset and the market portfolio of risky assets provides the return required from Mr. and Ms. Rodrigues. The family's expected return is 12%, hence, the optimal portfolio's expected return is set at 12%. Upon obtaining the return of the optimal portfolio, the advisor finds the standard deviation of the portfolio as follows:

$$\sigma_P = \frac{\bar{R}_p - R_f}{SR_T}$$

Furthermore, the percentage to be invested in risky assets is defined as:

$$W_T = \frac{\sigma_P}{\sigma_T}$$

And the percentage to be invested in the risk-free asset is:

$$W_{R_f} = 1 - \frac{\sigma_P}{\sigma_T}$$

The optimal portfolio proposed for Mr. and Mrs. Rodrigues is designed to achieve an annual return of 12% with a corresponding annual volatility of 15.05%. The Sharpe ratio for this portfolio stands at 0.50. To achieve these results, it is necessary to allocate 79.30% of the portfolio to risky assets, while the remaining 20.70% should be invested in the risk-free asset. The risk-free asset considered is the 10-year United States Government debt security (T-Note, GT10:GOV), yielding 4,45%. This allocation ensures that the portfolio incorporates all 12 stocks identified during the selection process, as they align with the Rodrigues family's investment objectives and constraints. The inclusion of all selected stocks not only achieves the desired return but also supports the diversification necessary to manage risk effectively.

Company Name	Weights
ASSURANT INC	10.00%
DELTA AIR LINES INC	10.00%
DR HORTON INC	10.00%
FEDEX CORP	10.00%
GENERAL DYNAMICS CORP	10.00%
ALPHABET INC-CL A	10.00%
MERCK & CO. INC.	5.00%
NORTHERN TRUST CORP	2.50%
PACCAR INC	10.00%
STERIS PLC	10.00%
THERMO FISHER SCIENTIFIC INC	2.50%
TEXAS INSTRUMENTS INC	10.00%

Table 3 - Tangent Portfolio Composition Source: Author

The figure below illustrates the optimal portfolio designed for Rodrigues Family in the mean-variance space $(\overline{R}, \sigma)$. The optimal portfolio is represented by the golden dot in the graphic and it satisfies all the constraints and requirements of the family.
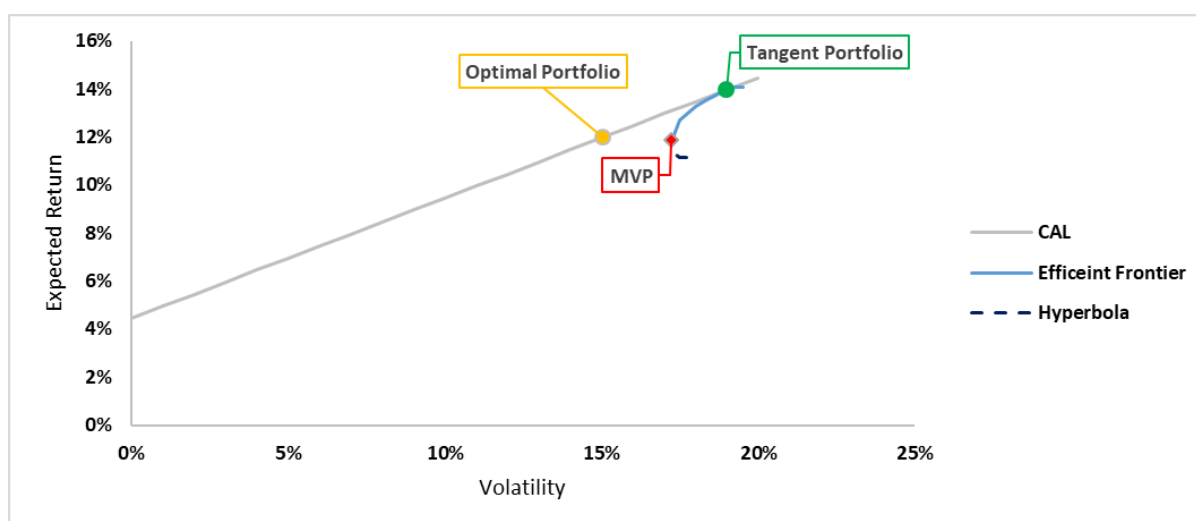
Figure 8 - Investment Opportunity Set (IOS) Source: Author

3.5 Expected Performance

Mr. and Ms. Rodrigues' investment strategy is structured to achieve an annual rate of return of 12% factoring in both inflation and taxes. The portfolio proposed by TS Investments has been carefully designed to align with this objective, ensuring the

financial goals of the family are met within the specified time horizon. A comprehensive summary of the investment plan is detailed in Table 4.

Portfolio	
Expected Return	12%
Volatility (σ)	15.05%
Sharpe Ratio	0.50

Table 4 - Portfolio Annual Expected Return and Volatility Source: Author

When analyzing the historical performance of the portfolio designed for Mr. and Mrs. Rodrigues over the past 5 years, it is evident in figure that their portfolio achieves a similar return to the benchmark (S&P 500 Index).
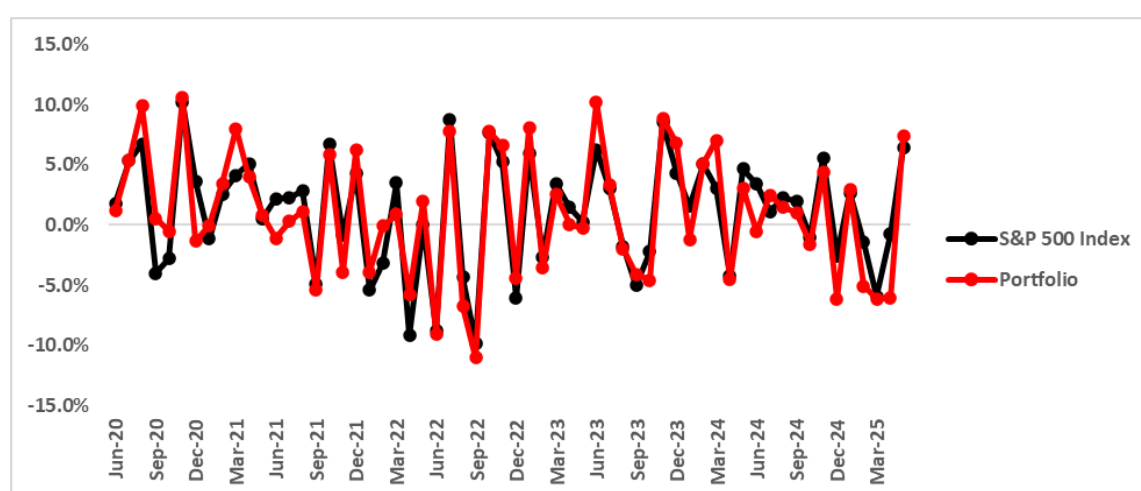
Figure 9 - Comparison between Benchmark Return and Portfolio Return in the last 5 years Source: Author

In addition, to evaluate the range of potential investment outcomes over the client's specified 20-year investment horizon, a Monte Carlo simulation approach was employed. This method enables the projection of expected returns under the assumption of a consistent, long-term investment strategy. Each simulation iteration calculates the terminal portfolio value by generating a sequence of random annual returns, informed by the portfolio's historical expected return, the correlation and covariance structure of the constituent assets, and the aggregate portfolio volatility.
A total of 10,000 simulation paths were generated to statistically model the distribution of possible outcomes. The simulated return paths reflect the combined effects of market uncertainty and asset interactions, allowing for a probabilistic assessment of future performance. The resulting distribution of terminal values provides critical

insight into both the expected growth trajectory and the range of potential deviations from the mean return.

The chart presented below illustrates the simulated portfolio outcomes, offering a visual representation of the estimated return distribution over the 20-year period. These results serve as a robust basis for evaluating long-term investment risk and return characteristics under a probabilistic framework.

Percentile	Final portfolio Value	Expected Return Yield	Portfolio Return
5%	$ 174,389.78	5.37%	185%
25%	$ 328,181.20	8.76%	436%
50%	$ 495,075.56	11.02%	709%
75%	$ 745,821.53	13.31%	1118%
95%	$ 1,349,353.07	16.72%	2104%

Table 5 - Percentiles Source: Author

The results presented in Table 5 provide a comprehensive overview of the investment's return distribution, which exhibits a pronounced positive skewness. This distributional asymmetry indicates that while the majority of outcomes are clustered toward moderate returns, there exists a significant probability of achieving exceptionally high outcomes. Even within the least favourable 5th percentile of the distribution, the investment is projected to almost double in value over a 20-year horizon, corresponding to an annual return of 5.37%, or a 185% total return.

At the median (50th percentile), the investment is expected to grow to more than seven times its original value, reflecting an annual return of 11.02%. At the 75th percentile, the investment grows to over 11 times its initial value, with an associated annual return of 13.31%. The upper tail of the distribution is particularly notable. At the 95th percentile, the projected return reaches an extraordinary 2104%, corresponding to a 16.72% annualized return. This substantial upside highlights the potential for outlier scenarios to significantly enhance portfolio performance.

Overall, the data indicates that over a 20-year investment horizon, the probability of achieving minimal or negative returns is exceedingly low. The return distribution is heavily concentrated in the upper ranges, suggesting a high likelihood of substantial long-term gains. Furthermore, the analysis underscores the opportunity to achieve

returns that significantly exceed the average, especially in favourable market conditions.
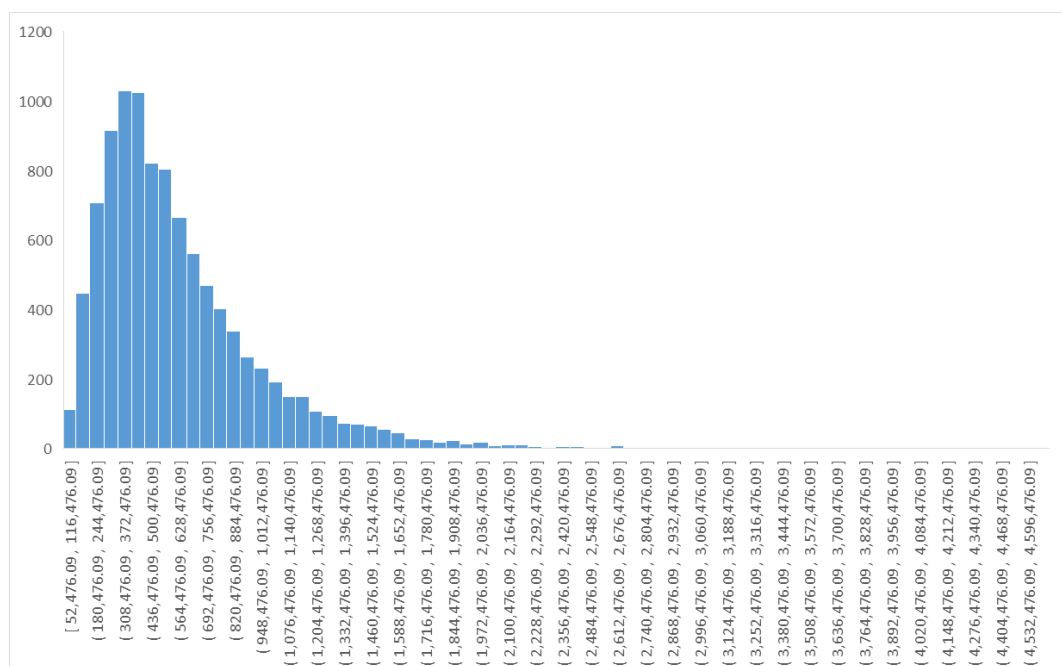
Figure 10 - Monte Carlo 10,000 simulations' distribution over 20 years Source: Author

3.6 Risk Analysis

After evaluating the performance of our portfolios, the subsequent step involves examining risk and volatility. To achieve this, three analyses were conducted to thoroughly assess the associated risks.

3.6.1 Value at Risk - VaR

To ensure accuracy in the risk assessment of the portfolio, three VaR methods are considered: Parametric Method, Historical Method and Monte Carlo Simulation Method.

Parametric VaR represents the maximum expected loss over a specified time horizon at a given confidence level, assuming that asset returns are normally distributed. VaR Historical Method is a commonly used method for estimating VaR relying on the fundamental idea that analysing historical returns can offer valuable insights into potential future outcomes. VaR Monte Carlo Simulation Method uses computational models to run simulations of expected returns across numerous hypothetical

24

scenarios. Subsequently, it calculates VaR by assessing the most adverse outcomes in these simulations. For the Historical Method, the advisor uses daily historical returns of the optimal portfolio covering the period May 20, 2020, to May 19, 2025. For the Monte Carlo Simulation Method, we assume that the portfolio value follows a Geometric Brownian Motion. Which implies that log returns are normally distributed. This allows us to model future portfolio value paths using random samples drawn from a standard normal distribution. The Parametric Method also follows a Geometric Brownian Motion, to support that Parametric VaR returns are normally distributed since GBM leads to normally distributed log returns.

To calculate the future portfolio value, the following formula was used:

$$S_t = S_0 e^{((\mu - 0.5\sigma^2)t + \sigma\sqrt{t}Z)}$$

Where:

S_0 = Initial Value

S_t = Future Value

σ = standard deviation of the portfolio

μ = return of the portfolio

t = time in years

Z= Standard Normal Variable Z~N(0,1)

In order to perform the Monte Carlo Simulation, the Standard Normal Variable Z was random in the 10,000 simulations. The values obtained with all the approaches are illustrated in Table 7.

	Parametric Method	Monte Carlo Simulation Method	Historical Method
Mean	-	0.05%	0.96%
Standard Deviation	-	0.95%	0.95%
Min	-	-4.05%	-5.11%
Max	-	3.97%	8.45%
Value at Risk at 95%	**-1.51%**	**-1.51%**	**-0.49%**

Table 6 - Parametric, Historical and Monte Carlo Simulation VaR Methods Source: Author

As illustrated in Table 7, the historical approach demonstrates a VaR of 0.49% at a 95% confidence interval, which implies that there is 95% confidence that the portfolio will not have a larger loss than 0.49% in one day. In contrast, Monte Carlo's VaR value with 10,000 simulations and the Parametric VaR are equal being 1.51% in both methods.

By seeing the results, the VaR obtained from the Historical Method differs from both Monte Carlo and Parametric VaR. The main explanation for this difference is that both the Parametric and Monte Carlo methods incorporate current implied volatility, allowing them to capture more potential extreme losses through forward-looking simulations. In contrast, the Historical method relies solely on realized past returns, where there were fewer extreme losses in the historical period and more positive returns moving a lower VaR to the 5% percentile.

The figure below illustrates the 10.000 Monte Carlo VaR simulations. The probability distribution of the sample follows a normal distribution, indicating that the values near the mean occur more frequently than the values that are farther away of the mean. The mean being a positive number also indicates that there is a higher probability of the return of the portfolio in one day being positive rather than negative. In the figure the red represents the 5% of simulations where the chance that the actual loss will be greater than the calculated VaR value after 1 day.
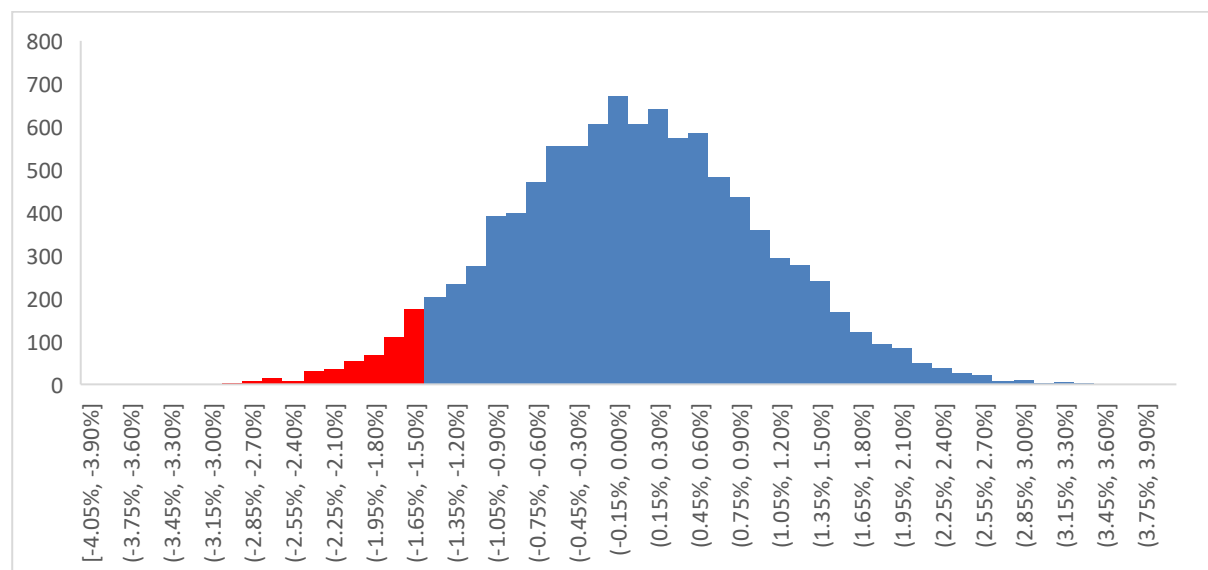
Figure 11 - VaR Monte Carlo 10,000 Simulations Source: Author

3.6.2 Risk Assessment Matrix

A key element of the portfolio's monitoring strategy involves developing a comprehensive understanding of the risk environment associated with the investments. To gain a thorough insight into the risks linked to the portfolio and address them proactively, the advisor utilizes a risk assessment matrix.

The risk assessment matrix is a visual tool designed to highlight potential risks that could impact the investment strategy. It is based on two key factors: the likelihood of a risk event occurring and the potential impact it may have. Essentially, the matrix provides a visual representation that contrasts the probability of a risk materializing with the severity of its potential consequences.

The following risks were the identified risks that could possibly affect the overall performance of the portfolio.

1- Geopolitical Risk (Medium Probability, High Impact) refers to the potential occurrence of unforeseen and significant events that could materially affect individual companies or financial markets. The ongoing uncertainty surrounding the Ukraine conflict and the political instability affecting key countries pose notable risks. Such developments could have far-reaching implications for the overall stock market, potentially impacting the portfolio's performance over the coming years.

2- Inflation Risk (Medium Probability, Medium Impact) refers to the potential adverse effects of rising prices on the portfolio's performance. Although inflation rate in the United States has been declining in recent months, the announcement of tariffs by Donald Trump, could potentially lead to a resurgence in inflation over the next year. Such an outcome could negatively affect the portfolio's value and returns because rising inflation increases the cost of raw materials, labor, and other inputs essential to business operations. When firms are unable to fully pass these higher costs onto consumers through price adjustments, their profit margins tend to shrink. This compression in profitability can lead to downward revisions in earnings expectations. Consequently, investor confidence may decline, resulting in reduced demand for the

affected stocks. Over time, this dynamic can exert negative pressure on stock valuations across sectors that are particularly sensitive to input cost fluctuations.

3- Interest Rate Risk (Medium Probability, Medium Impact) refers to the potential impact on investments resulting from changes in interest rates. While the Federal Reserve (Fed) is currently cutting the interest rate over the recent months, a significant rise in inflation could prompt the Fed to increase rates again. Such a potential increase in interest rates could negatively affect the stock market by lowering stock prices, which in turn may influence the performance of the portfolio.

4- Default Risk (Low Probability, High Impact) refers to the risk that an entity may fail to meet its financial obligations. Although the stocks selected for the portfolio are from companies that demonstrate better ratios than their industry average and therefore considered to have a low risk of default, the default of any company would still have a negative impact on the portfolio's performance.

5- Economic Recession (Medium Probability, High Impact) A decline in manufacturing production in the wealthiest countries of Europe, coupled with the election of Donald Trump in the United States and the subsequent increase in tariffs on imported products from Europe, could pose significant challenges for the World economy. This combination of factors has the potential to trigger a recession, along with a possible rise in inflation and interest rates. Such developments would likely impact stock prices and, consequently, the overall performance of the portfolio.

The portfolio's risk matrix is illustrated in the figure below, where the probability axis represents the likelihood of each identified risk materializing, and the impact axis indicates the potential consequences should a risk occur.
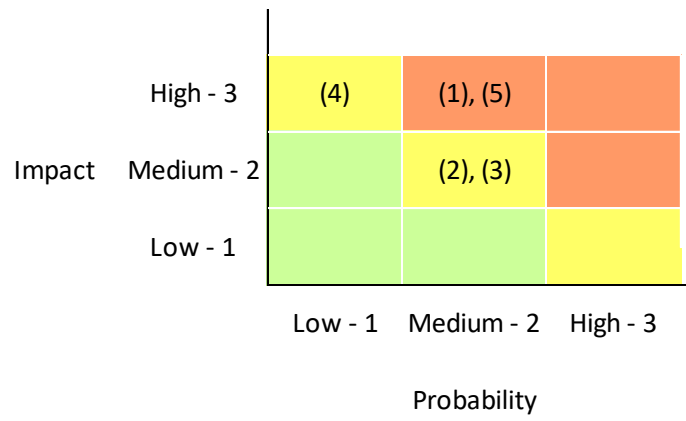
Figure 12 - Risk Assessment Matrix Source: Author

References

Almas, D., & Duque, J. (2008). *Value investing: The book-to-market effect, accounting information, and stock returns* (Advance Working Paper No. 1/2008). Instituto Superior de Economia e Gestão – ADVANCE. Retrieved from https://repositorio.ulisboa.pt/handle/10400.5/2558?locale=en

Benjamin Graham, & Dodd, D. L. (1934). *Security analysis* (6th ed.).

Bloomberg. (2025). *United States Rates & Bonds*. Retrieved from https://www.bloomberg.com/markets/rates-bonds/government-bonds/us

Chan, L. K. C., & Lakonishok, J. (2004). Value and growth investing: Review and update. *Financial Analysts Journal, 60*(1), 71–86. Retrieved from https://www.proquest.com/scholarly-journals/value-growth-investing-review-update/docview/219221511/se-2

Chan, L. K. C., Hamao, Y., & Lakonishok, J. (1991). Fundamentals and stock returns in Japan. *Journal of Finance, 46*, 1739–1789.

CompaniesMarketCap. (n.d.). *Largest companies by market cap*. Retrieved June 15, 2025, from https://companiesmarketcap.com/

Corporate Finance Institute. (n.d.). *Modern Portfolio Theory (MPT)*. Retrieved June 15, 2025, from https://corporatefinanceinstitute.com/resources/career-map/sell-side/capital-markets/modern-portfolio-theory-mpt/

Damodaran, A. (2012). *Investment philosophies: Successful strategies and the investors who made them work* (2nd ed.). Hoboken, NJ: John Wiley & Sons.

Damodaran, A. (2019). *Value at Risk (VaR)*. Retrieved from https://pages.stern.nyu.edu/~adamodar/pdfiles/papers/VAR.pdf

Damodaran, A. (2025). *Capital expenditures by sector (US)*. Retrieved June 19, 2025, from https://pages.stern.nyu.edu/~adamodar/New_Home_Page/datafile/capex.html

Damodaran, A. (2025). *Debt fundamentals by sector (US)*. Retrieved June 19, 2025, from https://pages.stern.nyu.edu/~adamodar/New_Home_Page/datafile/dbtfund.html

Damodaran, A. (2025). *Dividend fundamentals by sector (US)*. Retrieved June 19, 2025, from https://pages.stern.nyu.edu/~adamodar/New_Home_Page/datafile/divfund.html

Damodaran, A. (2025). *Dividends and FCFE by sector (US)*. Retrieved June 19, 2025, from https://pages.stern.nyu.edu/~adamodar/New_Home_Page/datafile/divfcfe.html

Damodaran, A. (2025). *Operating and net margins by sector (US)*. Retrieved June 19, 2025, from https://pages.stern.nyu.edu/~adamodar/New_Home_Page/datafile/margin.html

Damodaran, A. (2025). *Price earnings ratios by sector (US)*. Retrieved June 19, 2025, from https://pages.stern.nyu.edu/~adamodar/New_Home_Page/datafile/pedata.html

Damodaran, A. (2025). *Price to book ratios by sector (US)*. Retrieved June 19, 2025, from https://pages.stern.nyu.edu/~adamodar/New_Home_Page/datafile/pbvdata.html

Damodaran, A. (2025). *Price to sales ratios by sector (US)*. Retrieved June 19, 2025, from https://pages.stern.nyu.edu/~adamodar/New_Home_Page/datafile/psdata.html

Dimensional Fund Advisors. (2023). *When it's value vs. growth, history is on value's side*. Retrieved from https://www.dimensional.com/us-en/insights/when-its-value-versus-growth-history-is-on-values-side

Graham, B., Buffett, W. E., & Zweig, J. (2013). *The intelligent investor: A book of practical counsel*. Harper Collins. (Original work published 1949)

International Monetary Fund. (2025). *World Economic Outlook* (April 2025).

Jaffe, J., Keim, D., & Westerfield, R. (1989). Earnings yields, market values, and stock returns. *Journal of Finance, 44*, 135–148.

Karmelita, P. (2024). *Introduction to Monte Carlo simulation with geometric Brownian motion*. Medium. Retrieved June 19, 2025, from https://medium.com/@pamelakarmelita/introduction-to-monte-carlo-simulation-with-geometric-brownian-motion-c4a5e3f07ad1

Kwag, S.-W., & Lee, S. W. (2006). Value investing and the business cycle. *Journal of Financial Planning, 19*(1), 64–66, 68–71. Retrieved from https://www.proquest.com/trade-journals/value-investing-business-cycle/docview/217545003/se-2

Statista. (n.d.). *Trump tariffs cause global market meltdown* [Chart by Felix Richter]. Retrieved from https://www.statista.com/chart/15468/trump-tariffs-cause-global-market-meltdown/

Statman, M. (2004). The diversification puzzle. *Financial Analysts Journal, 60*(4), 44–53.

Tang, G. Y. N. (2004). How efficient is naive portfolio diversification? An educational note. *Omega, 32*(2), 155–160.

Vanguard Group, Inc. (2025). *Investor questionnaire*. The Vanguard Group, Inc. Retrieved from https://institutional.vanguard.com/content/dam/inst/iig-transformation/offers/vrpa/pdf/participant-education-resources/investor-questionnaire.pdf

Vicente, V. (2023). *What is a risk assessment matrix? And why is it important?* AuditBoard. Retrieved from https://www.auditboard.com/blog/what-is-a-risk-assessment-matrix/#:~:text=A%20risk%20assessment%20matrix%2C%20also

Appendix

Table A1 – Client Profile (Detailed)

Basic Proofile Information	
Full Name	Carlos Rodrigues
	Sofia Rodrigues
Address	Willow Creek Ln 1183, Orlando
Age	Carlos - 38 years old
	Sofia - 36 years old
Citizenship	Both Portuguese
Marital Status	Married
Number of dependents	None
Employment Information	
Eudcational Background	Carlos Rodrigues - Master's Degree in Accountant
	Sofia Rodrigues - Bachelor´s Degree in Applied Mathematics
Occupation	Carlos Rodrigues - Accountant
	Sofia Rodrigues - High School Professor
Net Annual Salary	Carlos - $65,000
	Sofia - $65,000
Household Information	
Household Annual Income	$130,000
Total Liabilities / Debts	None
Capital Gains Tax	15%
Investment Information	
Capital to Invest	$61,229.91
Investment Horizon	20 years
Investment Objective	$450,000
Rate of Return	12%
Investment Constraints	Large and Mega Cap Companies
	No Oil and Gas Companies
	No liquidity
	No short-selling

Figure A1 - Risk-Profiling Questionnaire (Vanguard)

To get your mix, answer these questions

Try to answer them with one goal in mind (many people choose retirement). Remember, there's no right or wrong answer—only your answer. If your results don't feel right, you can always start over.

1. **I plan to begin taking money from my investments in ...**

   ○ A. Less than 1 year
   ○ B. 1 to 2 years
   ○ C. 3 to 5 years
   ○ D. 6 to 10 years
   ○ E. 11 to 15 years
   ⊗ F. More than 15 years

2. **As I withdraw money from these investments, I plan to spend it over a period of ...**

   ○ A. 2 years or less
   ○ B. 3 to 5 years
   ○ C. 6 to 10 years
   ○ D. 11 to 15 years
   ⊗ E. More than 15 years

3. **When making a long-term investment, I plan to keep my money invested for ...**

   ○ A. 1 to 2 years
   ○ B. 3 to 4 years
   ○ C. 5 to 6 years
   ○ D. 7 to 8 years
   ⊗ E. More than 8 years

4. **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 ...**

   ○ A. Sell all of the remaining investment
   ○ B. Sell some of the remaining investment
   ⊗ C. Hold on to the investment and sell nothing
   ○ D. Buy more of that investment

5. **Generally, I prefer an investment with little or no ups or downs in value, and I am willing to accept the lower returns these investments may generate.**

   ○ A. I strongly disagree
   ⊗ B. I disagree
   ○ C. I somewhat agree
   ○ D. I agree
   ○ E. I strongly agree

6. **When the market goes down, I tend to sell some of my riskier investments and put money in safer investments.**

   ○ A. I strongly disagree
   ⊗ B. I disagree
   ○ C. I somewhat agree
   ○ D. I agree
   ○ E. I strongly agree

7. **Based only on a brief conversation with a friend, coworker, or relative, I would invest in a mutual fund.**

   ○ A. I strongly disagree
   ⊗ B. I disagree
   ○ C. I somewhat agree
   ○ D. I agree
   ○ E. I strongly agree

8. From September 2008 through October 2008, bonds lost nearly 4%. If I owned a bond investment that lost almost 4% in two months, I would ...

- ○ A. Sell all of the remaining investment
- ○ B. Sell some of the remaining investment
- ⊗ C. Hold on to the investment and sell nothing
- ○ D. Buy more of that investment

9. The chart below shows the highest one-year loss and the highest one-year gain on three hypothetical investments of $10,000.* Given the potential gain or loss in any one year, I would invest my money in ...

- ○ A. Investment A (gain $593; loss $164)
- ○ B. Investment B (gain $1,921; loss $1,020)
- ⊗ C. Investment C (gain $4,229; loss $3,639)
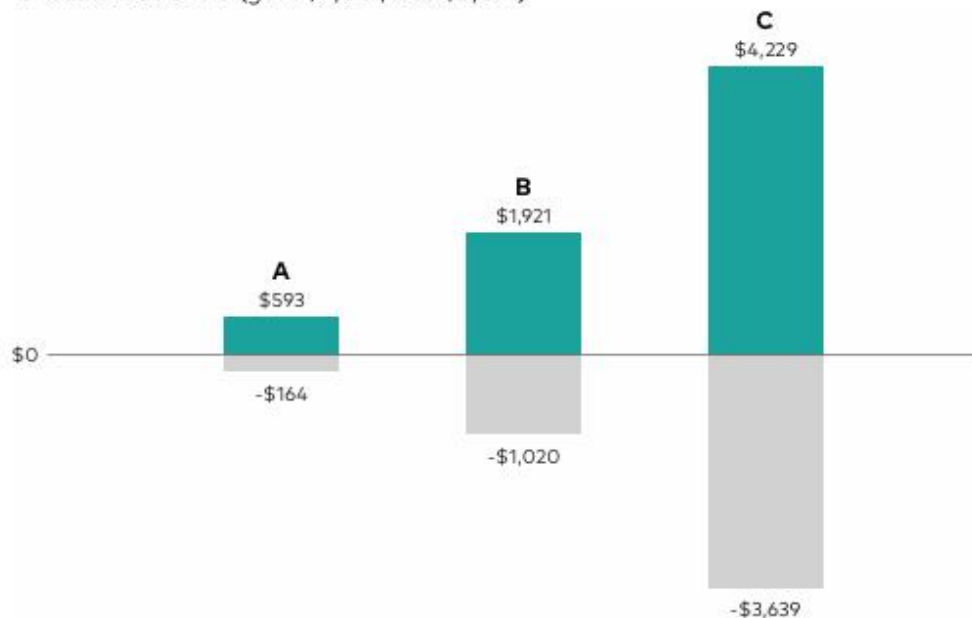
*The maximum gain or loss on an investment is impossible to predict. The ranges shown in the chart are hypothetical and are designed solely to gauge an investor's risk tolerance.

10. My current and future income sources (such as salary, Social Security, pension) are ...

- ○ A. Very unstable
- ○ B. Unstable
- ○ C. Somewhat stable
- ○ D. Stable
- ⊗ E. Very stable

11. When it comes to investing in stock or bond mutual funds (or individual stocks or bonds), I would describe myself as ...

- ○ A. Very inexperienced
- ⊗ B. Somewhat inexperienced
- ○ C. Somewhat experienced
- ○ D. Experienced
- ○ E. Very experienced

Answer key

Use the following answer key to score your questionnaire. For example, if you answered "C" to question 1, give yourself 4 points. Use your score to find your suggested mix on the enclosed insert.

	A	B	C	D	E	F	POINTS
1	0	1	4	7	12	17	17
2	0	1	3	5	8	—	8
3	0	1	3	5	7	—	7
4	1	3	5	6	—	—	5
5	6	5	3	1	0	—	5
6	5	4	3	2	1	—	4
7	5	4	3	2	1	—	4
8	1	3	5	6	—	—	5
9	1	3	5	—	—	—	3
10	1	2	3	4	5	—	5
11	1	2	3	4	5	—	2

Add up your score and enter the total here: 65

Find your suggested investment mix

A suggested investment mix is just an example of a mix that someone with your risk tolerance and investment time horizon may consider. If you do not feel that the suggested mix is right for you, you may decide to use a more conservative or a more aggressive asset mix. A more conservative mix would have a higher percentage of bonds than your suggested mix. A more aggressive mix would have a higher percentage of stocks than your suggested mix.

Income

Bonds 100%	Bonds 80% | Stocks 20%	Bonds 70% | Stocks 30%
7 – 22 pts	23 – 28 pts	29 – 35 pts

Balanced

Bonds 60% | Stocks 40%	Bonds 50% | Stocks 50%	Bonds 40% | Stocks 60%
36 – 41 pts	42 – 48 pts	49 – 54 pts

Growth

Bonds 30% | Stocks 70%	Bonds 20% | Stocks 80%	Stocks 100%
55 – 61 pts	62 – 68 pts	69 – 75 pts

■ Stocks   ■ Bonds
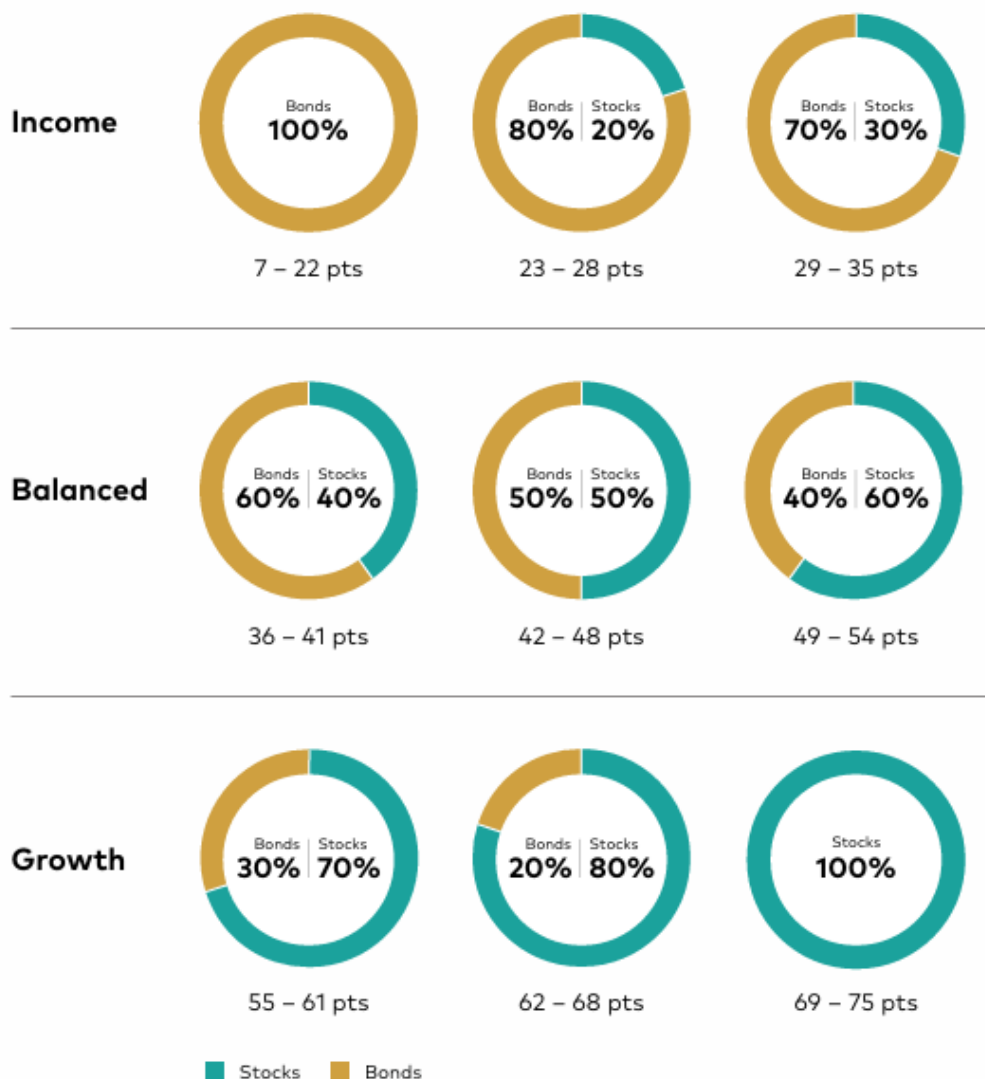
A note about risk

Bond funds are made up of IOUs, primarily from companies or governments. These funds risk losing value if the debt isn't repaid on time. Also, bond prices can drop when interest rates rise or the issuer's reputation suffers. Diversifying means having different types of investments.

Table A2 - Overview of the World Economic Outlook Reference Forecast, % change (detailed) (IMF)

	2024	Projections 2025	Projections 2026	Difference from January 2025 WEO Update[1] 2025	Difference from January 2025 WEO Update[1] 2026	Difference from October 2024 WEO[1] 2025	Difference from October 2024 WEO[1] 2026
World Output	3.3	2.8	3.0	-0.5	-0.3	-0.4	-0.3
Advanced Economies	1.8	1.4	1.5	-0.5	-0.3	-0.4	-0.3
United States	2.8	1.8	1.7	-0.9	-0.4	-0.4	-0.3
Euro Area	0.9	0.8	1.2	-0.2	-0.2	-0.4	-0.3
Germany	-0.2	0.0	0.9	-0.3	-0.2	-0.8	-0.5
France	1.1	0.6	1.0	-0.2	-0.1	-0.5	-0.3
Italy	0.7	0.4	0.8	-0.3	-0.1	-0.4	0.1
Spain	3.2	2.5	1.8	0.2	0.0	0.4	0.0
Japan	0.1	0.6	0.6	-0.5	-0.2	-0.5	-0.2
United Kingdom	1.1	1.1	1.4	-0.5	-0.1	-0.4	-0.1
Canada	1.5	1.4	1.6	-0.6	-0.4	-1.0	-0.4
Other Advanced Economies[2]	2.2	1.8	2.0	-0.3	-0.3	-0.4	-0.3
Emerging Market and Developing Economies	4.3	3.7	3.9	-0.5	-0.4	-0.5	-0.3
Emerging and Developing Asia	5.3	4.5	4.6	-0.6	-0.5	-0.5	-0.3
China	5.0	4.0	4.0	-0.6	-0.5	-0.5	-0.1
India[3]	6.5	6.2	6.3	-0.3	-0.2	-0.3	-0.2
Emerging and Developing Europe	3.4	2.1	2.1	-0.1	-0.3	-0.1	-0.4
Russia	4.1	1.5	0.9	0.1	-0.3	0.2	-0.3
Latin America and the Caribbean	2.4	2.0	2.4	-0.5	-0.3	-0.5	-0.3
Brazil	3.4	2.0	2.0	-0.2	-0.2	-0.2	-0.3
Mexico	1.5	-0.3	1.4	-1.7	-0.6	-1.6	-0.6
Middle East and Central Asia	2.4	3.0	3.5	-0.6	-0.4	-0.9	-0.7
Saudi Arabia	1.3	3.0	3.7	-0.3	-0.4	-1.6	-0.7
Sub-Saharan Africa	4.0	3.8	4.2	-0.4	0.0	-0.4	-0.2
Nigeria	3.4	3.0	2.7	-0.2	-0.3	-0.2	-0.3
South Africa	0.6	1.0	1.3	-0.5	-0.3	-0.5	-0.2
Memorandum							
World Growth Based on Market Exchange Rates	2.8	2.3	2.4	-0.6	-0.4	-0.5	-0.3
European Union	1.1	1.2	1.5	-0.2	-0.2	-0.4	-0.2
ASEAN-5[4]	4.6	4.0	3.9	-0.6	-0.6	-0.5	-0.6
Middle East and North Africa	1.8	2.6	3.4	-0.9	-0.5	-1.4	-0.8
Emerging Market and Middle-Income Economies	4.3	3.7	3.8	-0.5	-0.4	-0.5	-0.3
Low-Income Developing Countries	4.0	4.2	5.2	-0.4	-0.2	-0.5	-0.4
World Trade Volume (goods and services)	3.8	1.7	2.5	-1.5	-0.8	-1.7	-0.9
Imports							
Advanced Economies	2.4	1.9	2.0	-0.3	-0.4	-0.5	-0.5
Emerging Market and Developing Economies	5.8	2.0	3.4	-3.0	-1.1	-2.9	-1.2
Exports							
Advanced Economies	2.1	1.2	2.0	-0.9	-0.6	-1.5	-1.0
Emerging Market and Developing Economies	6.7	1.6	3.0	-3.4	-1.7	-3.0	-1.3
Commodity Prices (US dollars)							
Oil[5]	-1.8	-15.5	-6.8	-3.8	-4.2	-5.1	-3.2
Nonfuel (average based on world commodity import weights)	3.7	4.4	0.2	1.9	0.3	4.6	-0.6
World Consumer Prices[6]	5.7	4.3	3.6	0.1	0.1	0.0	0.0
Advanced Economies[7]	2.6	2.5	2.2	0.4	0.2	0.5	0.2
Emerging Market and Developing Economies[6]	7.7	5.5	4.6	-0.1	0.1	-0.4	-0.1

Source: IMF staff estimates.

Note: See Box A2 of the WEO Statistical Appendix for a list of economies whose projections have been revised based on developments in commodity markets and international trade as of April 4, 2025. Real effective exchange rates are assumed to remain constant at the levels prevailing during March 6, 2025–April 3, 2025. Economies are listed on the basis of economic size. The aggregated quarterly data are seasonally adjusted. WEO = *World Economic Outlook*.

[1] Difference based on rounded figures for the current, January 2025 WEO *Update*, and October 2024 WEO forecasts.

[2] Excludes the Group of Seven (Canada, France, Germany, Italy, Japan, United Kingdom, United States) and euro area countries.

[3] For India, data and forecasts are presented on a fiscal year basis, and GDP from 2011 onward is based on GDP at market prices with fiscal year 2011/12 as a base year.

[4] Indonesia, Malaysia, the Philippines, Singapore, and Thailand.

[5] Simple average of prices of UK Brent, Dubai Fateh, and West Texas Intermediate crude oil. The average price of oil in US dollars a barrel was $79.17 in 2024; the assumed price, based on futures markets, is $66.94 in 2025 and $62.38 in 2026.

[6] Excludes Venezuela. See the country-specific note for Venezuela in the "Country Notes" section of the Statistical Appendix.

[7] The assumed inflation rates for 2025 and 2026, respectively, are as follows: 2.1 percent and 1.9 percent for the euro area, 2.4 percent and 1.7 percent for Japan, and 3.0 percent and 2.5 percent for the United States.

Table A3 - Percentage of Large-Cap and Mega-Cap Companies per Country (Companies Market Cap)

Countries	Nº of Large Mega Cap Companies	% of Large Mega Cap Companies	Countries	Nº of Large Mega Cap Companies	% of Large Mega Cap Companies
Argentina	2	0.11%	Luxembourg	3	0.17%
Australia	33	1.86%	Malaysia	6	0.34%
Austria	3	0.17%	Mexico	13	0.73%
Belgium	7	0.39%	Netherlands	26	1.46%
Bermuda	7	0.39%	New Zealand	2	0.11%
Brazil	21	1.18%	Norway	9	0.51%
Canada	65	3.66%	Philippines	6	0.34%
Chile	5	0.28%	Poland	7	0.39%
China	159	8.96%	Portugal	4	0.23%
Colombia	2	0.11%	Qatar	4	0.23%
Czech Republic	1	0.06%	Romania	1	0.06%
Denmark	13	0.73%	Russia	11	0.62%
Finland	11	0.62%	Saudi Arabia	18	1.01%
France	42	2.37%	Singapore	14	0.79%
Germany	52	2.93%	South Africa	9	0.51%
Greece	2	0.11%	South Korea	33	1.86%
Hong Kong	31	1.75%	Spain	21	1.18%
Hungary	1	0.06%	Sweden	24	1.35%
India	112	6.31%	Switzerland	43	2.42%
Indonesia	8	0.45%	Taiwan	30	1.69%
Ireland	22	1.24%	Thailand	10	0.56%
Israel	11	0.62%	Turkey	3	0.17%
Italy	23	1.30%	United Arab Emirates	24	1.35%
Japan	123	6.93%	United Kingdom	60	3.38%
Jersey	1	0.06%	United States	631	35.55%
Kazakhstan	2	0.11%	Vietnam	2	0.11%
Kuwait	2	0.11%	**Grand Total**	**1775**	**100%**

Table A4- Screening Methodology (detailed)

Ticker	Name	Market Cap	Curncy	GICS Ind Name	Industry by Damoradan	P/E	P/S
AIZ US Equity	ASSURANT INC	10,052,749,779.48	USD	Insurance	Insurance (General)	14.46	0.87
DAL US Equity	DELTA AIR LINES INC	30,897,739,225.08	USD	Passenger Airlines	Air Transport	8.86	0.53
DHI US Equity	DR HORTON INC	36,837,180,776.48	USD	Household Durables	Homebuilding	9.30	1.14
FDX US Equity	FEDEX CORP	53,317,947,445.07	USD	Air Freight & Logistics	Transportation	11.87	0.63
GD US Equity	GENERAL DYNAMICS CORP	75,499,840,651.90	USD	Aerospace & Defense	Aerospace/Defense	19.51	1.56
GOOGL US Equity	ALPHABET INC-CL A	2,142,688,610,000.00	USD	Interactive Media & Services	Software (Entertainment)	20.11	5.68
MRK US Equity	MERCK & CO. INC.	196,563,526,484.84	USD	Pharmaceuticals	Drugs (Pharmaceutical)	10.69	3.06
NTRS US Equity	NORTHERN TRUST CORP	21,327,263,977.25	USD	Capital Markets	Investments & Asset Management	9.23	1.36
PCAR US Equity	PACCAR INC	47,823,803,617.50	USD	Machinery	Machinery	14.70	1.58
STE US Equity	STERIS PLC	23,321,791,701.32	USD	Health Care Equipment & Supplies	Healthcare Products	35.43	4.56
TMO US Equity	THERMO FISHER SCIENTIFIC INC	147,320,774,097.12	USD	Life Sciences Tools & Services	Heathcare Information and Technology	23.32	3.68
TXN US Equity	TEXAS INSTRUMENTS INC	179,595,845,297.51	USD	Semiconductors & Semiconductor Equipment	Semiconductor	37.03	10.70

Ticker	Name	P/B	Dividend Yield	Profit Margin	Average 5 Years Return	Asset Turnover
AIZ US Equity	ASSURANT INC	1.98	1.61%	6.40%	15.1%	34.60%
DAL US Equity	DELTA AIR LINES INC	2.16	1.27%	5.61%	17.7%	82.73%
DHI US Equity	DR HORTON INC	1.58	1.33%	12.92%	19.1%	107.16%
FDX US Equity	FEDEX CORP	2.03	2.61%	4.94%	14.1%	100.71%
GD US Equity	GENERAL DYNAMICS CORP	3.40	2.13%	7.93%	15.5%	86.22%
GOOGL US Equity	ALPHABET INC-CL A	5.86	0.48%	28.60%	18.9%	82.10%
MRK US Equity	MERCK & CO. INC.	4.02	4.14%	26.68%	0.8%	57.35%
NTRS US Equity	NORTHERN TRUST CORP	1.63	2.74%	24.50%	7.7%	10.37%
PCAR US Equity	PACCAR INC	2.83	1.45%	12.36%	16.2%	79.92%
STE US Equity	STERIS PLC	3.76	0.96%	11.26%	9.9%	51.48%
TMO US Equity	THERMO FISHER SCIENTIFIC INC	3.16	0.44%	14.77%	4.0%	43.74%
TXN US Equity	TEXAS INSTRUMENTS INC	10.44	2.75%	30.68%	9.9%	46.10%

Figure A2 - Portfolio Representation in Mean-Variance Space
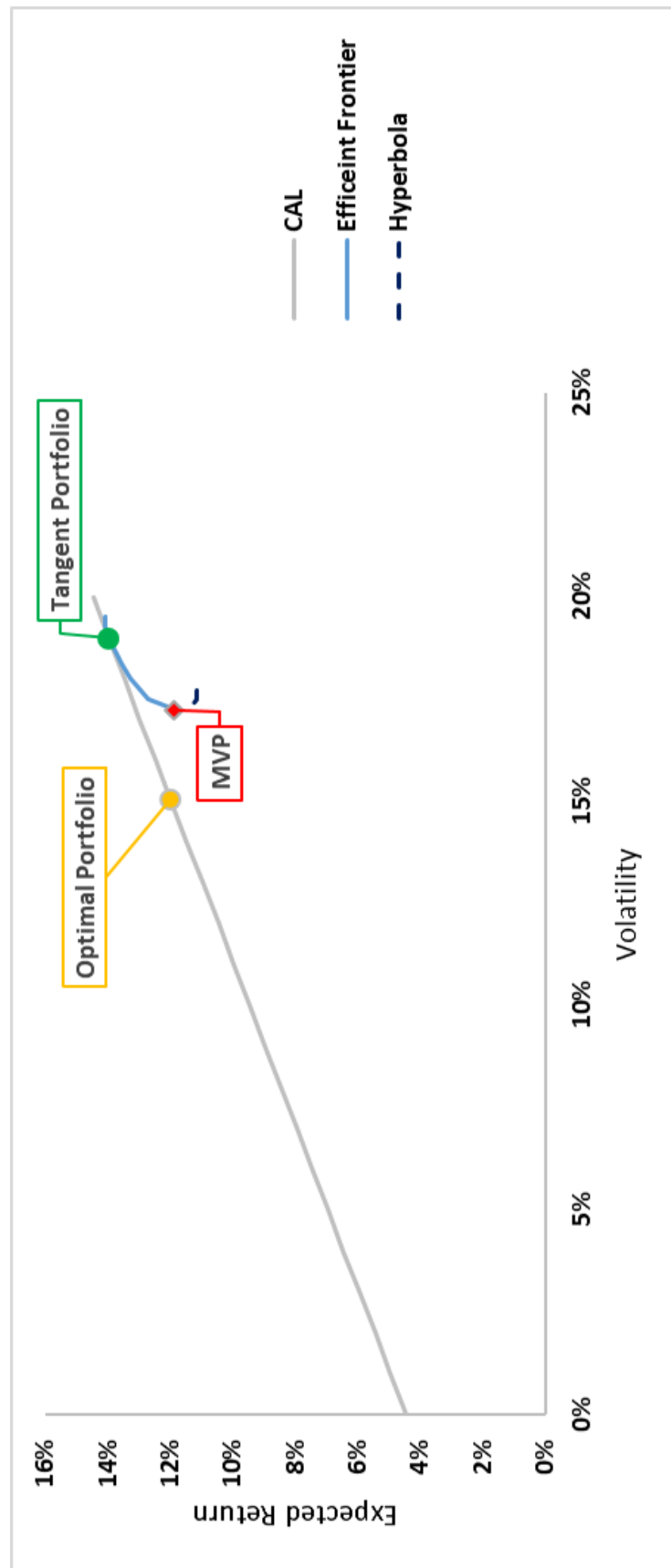
Disclosures and AI Disclaimer

The main body of this report contains 40,542 characters excluding spaces, and the preliminary and supplementary sections of the report such as the cover page, table of contents, bibliography, and appendices contains 12,428 characters.

This report is published for educational purposes by Master students and does not constitute a real Investment Policy Statement, although it follows the CFA Institute guidelines. The client, either individual or institutional, is fictional.

This report was prepared by a Master's student in Finance at ISEG – Lisbon School of Economics and Management, exclusively for the Master's Final Work. The opinions expressed and estimates contained herein reflect the personal views of the author about the subject company, for which he/she is sole responsible. Neither ISEG, nor its faculty accepts responsibility whatsoever for the content of this report or any consequences of its use. The report was revised by the supervisor.

The information set forth herein has been obtained or derived from sources generally available to the public and believed by the author to be reliable, but the author does not make any representation or warranty, express or implied, as to its accuracy or completeness. The information is not intended to be used as the basis of any investment decisions by any person or entity.

In the interest of transparency, I provide the following disclosure regarding the use of artificial intelligence (AI) tools in the creation of this project:

 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.

Nonetheless, I have ensured that the use of AI tools did not compromise the originality and integrity of my work. All sources of information, whether traditional or AI-assisted, have been appropriately cited in accordance with academic standards. The ethical use

of AI in research and writing has been a guiding principle throughout the preparation of this thesis.

I understand the importance of maintaining academic integrity and take full responsibility for the content and originality of this work.

Tiago Pedro dos Santos, 19 June 2025