MASTER OF SCIENCE IN

FINANCE

MASTERS FINAL WORK

PROJECT

INVESTMENT POLICY STATEMENT:

FRANCISCO FAMILY

MARTIM RIBEIRO

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Abstract

This Investment Policy Statement outlines the strategic financial plan developed for the Francisco family, aiming to grow an initial investment of €615,000 over a 10-year horizon. The primary financial objective is to accumulate a liquid amount of €1,420,000. When adjusted for an expected annual inflation rate of 2.3% and a 28% capital gains tax, the gross target value rises to €2,236,614, which implies a minimum required annual return of 13.78%. This amount is intended to fund their children's university education, build two semi-detached homes, secure a comfortable retirement, and finance a purchase of their dream car.

The portfolio follows a Quality Growth philosophy and is composed exclusively with Exchange Traded Funds, excluding leverage and short-selling and with no immediate liquidity constraints. The strategic asset allocation is based on a central 50/30/20 framework, assigning 50% to equities, 30% to fixed income, and 20% to alternative investments, with additional constraints applied across asset classes and individual securities. Security selection was carried out through a rigorous screening and optimized using Mean-Variance Theory to maximize the Sharpe Ratio. The final portfolio delivers an expected annual return of 15.04%, an annual volatility of 10.51%, and a Sharpe Ratio of 1.18.

Risk was evaluated through multiple Value at Risk models, namely Historical, Parametric and Monte Carlo along with their respective Conditional Value at Risk. Finally, seven key structural risks were identified and assessed, supporting the construction of a risk matrix that evaluates their likelihood and potential impact on the selected portfolio.

JEL classification: C6; G11.
Keywords: Asset Management; Portfolio Theory; IPS; Individual Investors.

Resumo

Esta Declaração de Política de Investimentos descreve o plano financeiro estratégico desenvolvido para a família Francisco, com o objetivo de aumentar um investimento inicial de €615,000 ao longo de um horizonte de 10 anos. O principal objetivo financeiro consiste em acumular um montante líquido de €1,420,000. Quando ajustado a uma taxa de inflação anual esperada de 2.3% e a uma taxa de imposto sobre mais valias de 28%, o valor bruto ascende a €2,236,614, o que implica uma taxa mínima de retorno anual de 13.78%. Este montante destina-se a financiar a educação universitária dos filhos, à construção de duas casas geminadas, a garantir uma reforma tranquila e à compra do carro de sonho do casal.

O portfólio segue uma filosofia de crescimento de qualidade e é composto exclusivamente por Fundos de Investimento Cotados (ETFs), excluindo alavancagem, vendas a descoberto e sem restrições imediatas de liquidez. A alocação estratégica de ativos baseia-se numa estrutura central de 50/30/20, atribuindo 50% a ações, 30% a obrigações e 20% a investimentos alternativos, com restrições adicionais aplicadas entre classes de ativos e ativos individuais. A seleção de ETFs foi realizada através de um processo rigoroso de triagem e otimizada com base na Teoria de Média-Variância, com o objetivo de maximizar o índice de Sharpe. O portfólio final apresenta um retorno anual esperado de 15.04%, uma volatilidade anual de 10.51% e um índice de Sharpe de 1.18.

O risco foi avaliado através de múltiplos modelos de Valor em Risco (VaR), nomeadamente os modelos Histórico, Paramétrico e de Monte Carlo, juntamente com as respetivas extensões de Valor em Risco Condicional (CVaR). Por fim, foram identificados e analisados sete riscos estruturais chave, que sustentaram a construção de uma matriz de risco, avaliando a sua probabilidade e impacto potencial no portfólio selecionado.

Classificação JEL: C6; G11.
Palavras-chave: Gestão de Ativos; Teoria de Carteiras; IPS; Investidores Individuais.

Acknowledgements

Abbreviations

AI: Artificial Intelligence

CFA: Chartered Financial Analyst

CML: Capital Market Line

CvaR: Conditional Value at Risk

ECB: European Central Bank

ESG: Environmental, Social and Governance

ETF: Exchange Traded Funds

GDP: Gross Domestic Product

GIPS: Global Investment Performance Standards

HICP: Harmonized Index of Consumer Prices

IPS: Investment Policy Statement

MPT: Modern Portfolio Theory

MSCI: Morgan Stanley Capital International

MVT: Mean-Variance Theory

NATO: North Atlantic Treaty Organization

NAV: Net Asset Value

OECD: The Organization for Economic Cooperation and Development

REIT: Real Estate Investment Trust

S&P: Standard & Poor's

VAR: Value at Risk

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1 Executive Summary

1.1 Scope and Purpose

This Investment Policy Statement (IPS) defines the guiding principles for managing the client's financial assets over a 10-year horizon, providing a structured framework to ensure that the portfolio remains aligned with the client's long term financial objectives, risk tolerance, and investment constraints. Serving as a reference document, the IPS supports disciplined decision-making, promotes transparency between advisor and client, and establishes a disciplined approach to changes in the client's profile or in market conditions. The advisor ensures a fiduciary duty, complying with the regulations outlined by the CFA (Chartered Financial Analyst) institute and providing impartial guidance.

1.2 Governance

The financial advisor is responsible for creating and maintaining the IPS, delivering quarterly performance reports, and proposing portfolio adjustments when necessary. The client retains final decision-making authority regarding any strategic changes or updates. This governance model promotes transparency, reinforces accountability, and helps ensure that investment decisions remain aligned with the client's long-term objectives and risk tolerance.

1.3 Investment Return and Risk

The IPS aims to achieve a minimum annual return of 13.78%, which is required to grow the initial investment of €615,000 to €1,420,000 over 10 years, while accounting for an expected annual inflation rate of 2.3% and a 28% capital gains tax. The client's risk tolerance is defined as moderately aggressive. A portfolio of 14 ETFs was constructed using Mean-Variance Optimization to maximize the Sharpe Ratio, subject to specific constraints on asset class and ETFs weights. The resulting portfolio has an expected return of 15.04%, a standard deviation of 10.51%, and a Sharpe Ratio of 1.18.

1.4 Risk Management

Risk management is integrated into the investment process through continuous monitoring of portfolio volatility and exposure. Quantitative tools such as Value at Risk (VaR) and Monte Carlo simulations are used to assess potential losses and ensure alignment with the client's profile. The advisor delivers quarterly reports in line with CFA Institute's Global Investment Performance Standards (GIPS). Annual rebalancing is proposed to maintain strategic alignment, with structural changes subject to client's final approval.

2 Investment Policy Statement

2.1 Scope and Purpose

2.1.1 Context and Investor

This Investment Policy Statement represents the formal agreement between the advisor, Martim Ribeiro, and the clients, Mr. Manuel Francisco and Mrs. Margarida Francisco. It provides a structured framework that aligns the couple's long-term financial goals with an investment strategy tailored to their specific objectives, risk tolerance, and constraints.

Mr. and Mrs. Francisco are a married couple of medical doctors, aged 42 and 37 years old respectively, residing in Porto, with well-established professional careers. While they are familiar with fundamental market dynamics and regularly follow financial news, they do not possess the technical knowledge required to construct a diversified portfolio or evaluate complex investment instruments. Consequently, they have chosen to rely on professional advisory services to help them achieve their long-term financial goals.

The couple has eight-year-old twin children, Matilde and Miguel, and their primary motivation for investing is to build a secure and prosperous future for their family. This includes financing the construction of two semi-detached houses, one for each child, and covering the full cost of their university education. In parallel, Mr. and Mrs. Francisco aim to ensure a comfortable retirement and to fulfil a long-standing aspiration of purchasing their dream car.

The total capital available for investment is €615,000. Of this amount, €500,000 was recently inherited by the family, and €115,000 represents savings accumulated over their careers. In addition to this portfolio, they maintain a separate emergency fund of €20,000 to safeguard against unforeseen expenses and ensure financial stability and a long term deposit of €75,000 initiated in 2021.

2.1.2 Structure

As the appointed financial advisor, Martim Ribeiro is responsible for overseeing the investment portfolio of Mr. and Mrs. Francisco, ensuring that all decisions remain consistent with the principles outlined in this IPS. His responsibilities include managing the portfolio, executing the defined investment strategy, and aligning it with the clients' long-term financial objectives.

To ensure that all investment decisions consider the clients' broader financial and legal circumstances, the advisor may consult their tax and legal professionals when appropriate. This collaborative approach supports regulatory compliance and strengthens the alignment between portfolio management and the clients' personal goals.

Martim Ribeiro acts under a fiduciary duty and adheres to the highest standards of ethical conduct, following the CFA Institute Asset Manager Code of Professional Conduct. This includes acting with transparency, impartiality, and unwavering commitment to the clients' best interests, with full disclosure of any potential conflicts of interest.

2.2 Governance

A well-defined governance structure is fundamental to ensuring the effective implementation, monitoring, and ongoing relevance of this IPS. It establishes clear responsibilities for both the financial advisor and the clients, Mr. and Mrs. Francisco, fostering transparency, accountability, and a collaborative approach to long-term portfolio management.

The advisor, Martim Ribeiro, holds primary responsibility for the development, execution, and periodic review of the IPS. He ensures that all investment decisions remain consistent with the clients' objectives, risk profile, and outlined constraints. The advisor is also responsible for identifying any material deviations from the policy and recommending appropriate adjustments when necessary.

With discretionary authority granted by the clients, the advisor is empowered to make investment decisions within the framework defined by this IPS. However, strategic changes, such as significant asset allocation shifts, must be presented to the clients for approval. An annual review of the portfolio's structure will be conducted, taking into account changes in market conditions, macroeconomic forecasts, tax considerations, and the clients' personal circumstances.

Asset allocation decisions are based on the advisor's recommendations and are designed to align with the clients' long-term goals. Full transparency is maintained throughout the process. The advisor discloses expected returns, asset class weightings, historical correlations, inflation expectations, and selected benchmark for comparison. These disclosures cover all asset classes and sub-classes, including equities, fixed income, and alternative investments.

A detailed financial report is provided quarterly, including performance analysis, portfolio composition, key risk metrics, and any significant changes made. These reports serve both as a performance tracking tool and as a basis for reassessing the IPS. If the portfolio's risk exposure diverges from the agreed tolerance levels, the advisor may recommend a review of the clients' risk profile to ensure continued alignment with their evolving financial goals.

2.3 Investment, Return and Risk Objectives

2.3.1 Investment Objectives

The primary investment objective outlined in this Investment Policy Statement is to accumulate a total of €1,420,000 (liquid and before inflation) by the year 2035, through a disciplined, long-term investment strategy with a 10-year horizon. This objective reflects the financial aspirations of Mr. and Mrs. Francisco, structured around key life goals that they intend to fund exclusively through the portfolio.

At the core of these goals is the desire to support their twin children, Matilde and Miguel, by providing them with independent living conditions. For this purpose, the couple intends to build two semi-detached homes, each with an estimated value of €375,000, representing a combined allocation of €750,000. Additionally, they plan to contribute to their children's university education, setting aside €25,000 per child, totaling €50,000. Another central pillar of the investment objective is the couple's retirement. Mr. and Mrs. Francisco seek financial security in their later years and have determined that a capital reserve of €500,000 will allow them to maintain their lifestyle without financial concerns. Furthermore, they wish to fulfil a long-standing aspiration of acquiring their dream car, with an allocated budget of €120,000.

2.3.2 Return, Distribution and Risk Requirements

According to the European Central Bank's March 2025 macroeconomic projections, headline inflation in the euro area was expected to average 2.3% in 2025. However, the updated June 2025 projections revised this figure downward to 2.0%, followed by 1.6% in 2026 and a return to 2.0% in 2027. While the ECB anticipates a gradual convergence toward its 2% medium-term inflation target, this IPS adopts a slightly more conservative approach by assuming a long-term inflation rate of 2.3%. This cautious stance reflects the potential impact of geopolitical tensions, commodity price volatility, and unexpected policy shifts. Incorporating a higher inflation assumption enhances the robustness of return requirement calculations and strengthens the strategy's resilience across diverse economic scenarios.

The €1,420,000 target corresponds to the net amount the clients intend to achieve in today's money. To maintain its real value throughout the 10-year investment period, this figure must be adjusted for the projected average inflation rate of 2.3%, leading to an inflation-adjusted goal of approximately €1,782,562. In addition, as the portfolio's final value must account for a 28% capital gains tax, the required gross nominal value rises to roughly €2,236,614. With an initial investment of €615,000, this implies a necessary compound annual return of 13.78%.

2.3.3 Portfolio Policy

A structured asset allocation policy will guide the construction and maintenance of the portfolio, ensuring alignment with the defined financial objectives. The allocation process is driven by Modern Portfolio Theory (MPT), aiming to identify the most effective combination of ETFs across asset classes while incorporating the client's risk profile, investment horizon and macroeconomic outlook.

Specific minimum and maximum allocation ranges will be defined for each asset class and for individual ETFs. These ranges are established to provide flexibility while maintaining alignment with the portfolio's strategic objectives, and are detailed in Section 3.2.2 and 3.4.2, respectively. The advisor must ensure adherence to these boundaries, with any rebalancing beyond the set limits requiring prior client approval.

2.3.4 Investor's Risk Tolerance

From an ability to take risk perspective, the investors demonstrate a high capacity to assume financial risk. With a 10-year investment horizon, stable dual professional incomes, and no immediate need for liquidity, they are well-positioned to tolerate short-term fluctuations in pursuit of higher long-term returns. Additionally, the presence of an emergency fund and the absence of significant short-term liabilities further enhance their capacity to absorb potential market volatility. These conditions support the feasibility of a portfolio with higher risk exposure.

Regarding their willingness to take risk, a thoughtful discussion was conducted to ensure alignment between the required return and the clients' psychological comfort with volatility. Although the investment objectives, such as supporting their children's future and planning for retirement, are emotionally meaningful, the clients understand that reaching the final amount of the investment objective entails assuming a higher degree of market risk. Their choice reflects a deliberate and informed commitment to pursuing an aggressive return objective, with awareness of the potential trade-offs in terms of portfolio volatility and interim losses.

The risk assessment (as detailed in Table A2 and Figure A1 in the Appendix) was conducted using the Charles Schwab Risk Profile Questionnaire, which accounts for time horizon and risk preferences. The results indicate a moderately aggressive investor profile, consistent with the portfolio's target return of 13.78% per year. The proposed allocation reflects this risk level while maintaining discipline and diversification across asset classes to manage downside risk appropriately.

In conclusion, the clients demonstrate both a strong ability and a strong willingness to take risk, supporting the adoption of a moderately aggressive investment strategy aligned with their long-term financial objectives.

2.3.5 Specific Portfolio and Relevant Constraints

Liquidity is not expected to be a concern throughout the 10-year investment horizon. The clients benefit from stable dual incomes and maintain an emergency fund sufficient to cover unforeseen short-term expenses. Consequently, there is no anticipated need for premature portfolio liquidation. Nonetheless, all selected instruments must retain sufficient liquidity to allow for full divestment at the end of the investment period, or partial asset sales for rebalancing purposes, in accordance with the predefined allocation strategy.

The portfolio will be constructed exclusively using Exchange Traded Funds, selected for their strong attributes in terms of diversification, transparency, liquidity, and cost-efficiency. These characteristics make ETFs particularly well-suited to a long-term investment strategy that prioritizes disciplined asset allocation and consistent monitoring. In line with the clients' objectives and preferences, all ETFs included will follow an accumulating structure. This choice reflects the clients' lack of need for regular income during the investment period and simplifies the tax implications associated with dividends and interest income distributions. All ETFs will be traded in euros, ensuring consistency with the clients' base currency and avoiding the need for currency conversions. This choice does not compromise international diversification, as global exposure is achieved through euro-denominated ETFs listed on European exchanges.

To manage risk and preserve the integrity of the portfolio, certain investment practices and asset classes are explicitly excluded. The use of short selling and leverage is prohibited, as well as investments in hedge funds and exposure to complex derivative instruments like options and futures. Similarly, non-regulated assets such as cryptocurrencies will not be included, due to their elevated volatility, lack of regulatory oversight, and misalignment with the portfolio's objectives. These exclusions are in place to maintain a transparent and risk-aware investment process.

All capital gains resulting from ETF sales will be taxed at the standard 28% flat rate, applicable to Portuguese tax residents who do not opt for income aggregation (Caixa Geral de Depósitos, 2025). Since the portfolio consists exclusively of accumulating ETFs and the clients do not intend to withdraw funds before the end of the investment horizon, taxation will only occur upon sale. While tax optimisation is not the primary driver of the investment strategy, the use of accumulating ETFs contributes to greater efficiency in tax deferral and calculation.

2.4 Risk Management

The advisor assumes full responsibility for continuously monitoring and evaluating the portfolio's performance and risk profile. Quarterly reports will be issued in accordance with the Global Investment Performance Standards set by the CFA Institute, providing a transparent overview of returns, risk metrics, and any deviations from the target allocation. These reports serve both as a performance assessment and as a tool to identify and respond to shifts in risk exposure. Portfolio rebalancing will be conducted quarterly, ensuring ongoing alignment with the clients' investment objectives.

Risk analysis will be comprehensive and multifaceted. To quantify potential losses, multiple Value at Risk methodologies will be employed, including Historical, Parametric, and Monte Carlo simulations. This layered approach enhances robustness and supports a deeper understanding of downside risks. Risk-adjusted return will be assessed through metrics such as the Sortino Ratio, Information Ratio, and Tracking Error, allowing for an evaluation of performance that accounts for both return and risk consistency relative to the benchmark.

In addition, the portfolio's performance will be compared regularly against a predefined benchmark to assess relative success and efficiency. The construction and rationale of the benchmark will be detailed in Section 3.5. A breakdown of key risk dimensions, including market risk, liquidity risk, inflation risk, regulatory risk, and currency risk, will be conducted and clearly communicated to the clients. The portfolio consists entirely of unhedged ETFs, implying that currency risk is accepted as part of the long-term strategy. This approach avoids the additional costs of hedging while allowing full exposure to international diversification. Currency movements will be monitored regularly, ensuring they remain within acceptable risk limits for the client's profile.

These practices are designed to ensure that the portfolio remains resilient and on track to meet the long-term financial goals of the Francisco family, within their risk tolerance.

3 Investment Design

3.1 Investment Philosophy

An investment philosophy represents a coherent set of principles and assumptions about how financial markets operate, where opportunities may arise, and how to exploit them consistently over time. According to Damodaran, A. (2003), it forms the foundation for rational and disciplined decision-making, helping investors remain consistent even when strategies underperform or market conditions shift. A well-defined philosophy reflects the investor's objectives, risk profile, and time horizon. It helps minimize emotional decision-making and reduces the likelihood of excessive portfolio changes. More than a theoretical stance, it provides the necessary consistency to adapt strategies while staying aligned with long-term goals.

In this IPS, the investment philosophy combines Growth and Quality Investing, focusing exclusively on ETFs with strong fundamentals, long-term potential, and financial resilience. This dual approach offers a balanced method for navigating equity market complexities, with growth capturing innovative firms and quality ensuring stable returns, with the blend providing long-term outperformance (WisdomTree, 2025).

Growth Investing centres on identifying companies with the capacity to expand rapidly, either through gains in market share or significant earnings growth, often fuelled by innovation or disruptive technologies. These businesses are typically positioned in dynamic sectors and are expected to benefit from structural trends that drive long-term performance. While their potential for above-average returns is high, their share prices tend to be more volatile, as they are especially sensitive to investor sentiment and broader market dynamics. This style of investing generally performs well in periods of low or falling interest rates, as lower discount rates increase the present value of projected earnings (Aberdeen, 2024). Additionally, since many of these firms rely on external capital to finance expansion, accommodative monetary conditions tend to support their strategic development as well as low inflation environments.

While value investing has traditionally been favoured during elevated interest rates, inflationary periods or cyclical recoveries, recent evidence underscores the long-term advantages of growth-oriented strategies. Sahani, V. (2025), in a comparative study of the S&P 500 between 2014 and 2024, found that growth stocks consistently delivered higher nominal and inflation-adjusted returns than value stocks. This outperformance of growth stocks relative to value stocks becomes especially evident over the long term, rather than when viewed through the lens of a single year's performance. As such, for long-term investment horizons, growth investing emerges as a more appropriate strategy.

Supporting this view, Albrecht, B. (2025), reports that the U.S. Growth Index outperformed the corresponding Value Index by approximately 10% in 2024, demonstrating sustained strength in growth sectors. Although value stocks outperformed in early 2025 due to a temporary market rotation, growth stocks have maintained a clear edge in long-term performance metrics. This outperformance is attributed to higher earnings growth rates, stronger reinvestment opportunities, and the ability of growth companies to compound returns over extended periods.

Quality Investing is a long-term strategy that focuses on companies with strong and resilient fundamentals. Rather than chasing short-term market trends, this approach selects firms that demonstrate consistent profitability, strong balance sheets, high return on equity, and durable competitive advantage that allow them to maintain the pricing power and the market-leading position. These companies tend to be well-managed, operate with sustainable business models, and are capable of navigating economic cycles with relative stability. Quality stocks often exhibit lower earnings volatility and greater capital efficiency, making them attractive especially during periods of market uncertainty. This same principle applies to fixed income allocation, where investment-grade bonds are preferred for their solid creditworthiness, reliable cash flows, and lower default risk, enhancing portfolio stability without sacrificing long-term returns.

According to Vontobel (2024), combining growth and quality enables investors to identify companies with significant upside potential, while ensuring they possess solid fundamentals, prudent management, and the resilience to navigate different phases of the economic cycle. This integrated approach allows the portfolio to capture upside during favourable market conditions while preserving capital in periods of volatility, ultimately fostering more stable and sustainable performance in the pursuit of long-term wealth accumulation.

3.2 Strategic Asset Allocation

Strategic asset allocation is a disciplined and long-term strategy that involves defining a target mix of asset classes based on the investor's return objectives, risk profile, and investment horizon. Rather than reacting to short-term market fluctuations or economic cycles, this methodology emphasises consistency, diversification, and alignment with clearly established financial goals. By combining different asset classes with distinct risk-return characteristics and low correlations, it seeks to build a resilient portfolio structure that can weather market volatility while optimising long-term performance. Although periodic rebalancing may be required to maintain the intended allocation, the core structure remains stable over time, reflecting the investor's fundamental strategy rather than speculative or emotional impulses.

3.2.1 Macroeconomic Briefing

According to the European Central Bank (2025), economic activity in the euro area is gradually recovering, supported by resilient labour markets, easing inflationary pressures, and stronger-than-expected consumption. The annual average real GDP growth for the euro area is projected at 0.9% for 2025, with a modest acceleration to 1.1% in 2026 and 1.3% in 2027. Globally, the OECD (2025) estimates GDP growth to slow from 3.3% in 2024 to 2.9 % in this year and in 2026 (Figure 1), being Canada, Mexico and United States the main country drivers for this slowdown. US is expecting a GDP growth of 1.6% for the year and 1.5% for 2026, being the high economic policy uncertainty, the tariff rate on imports and retaliations from trading partners some of the primary causes for this values.

Figure 1: GDP Growth Rate
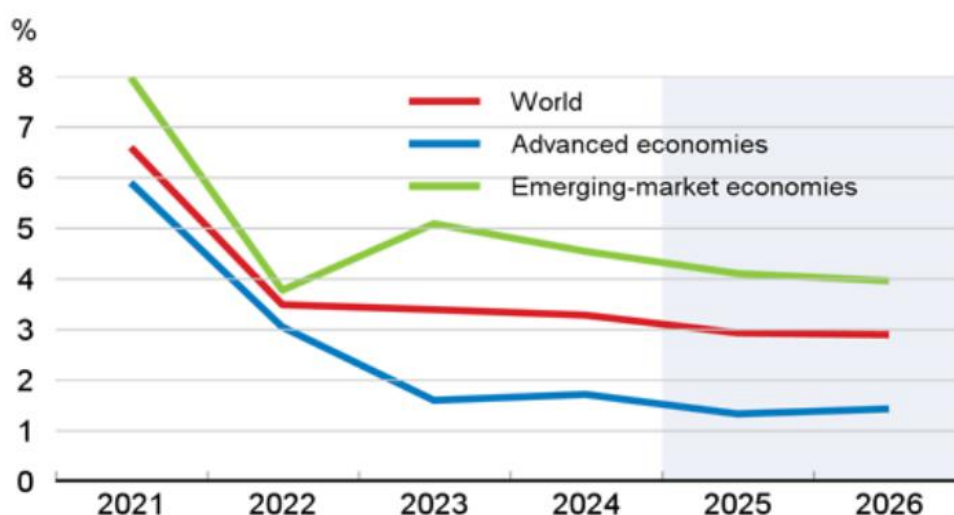
Source: OECD Economic Outlook, June 2025

Inflation, while still above pre-pandemic averages, has declined substantially from its 2022-2023 peaks. According to the European Central Bank's June 2025 macroeconomic projections, headline inflation in the euro area is expected to average 2.0% in 2025, decline to 1.6% in 2026, and return to 2.0% in 2027. It is expected to dip below the 2% target by Q2 2025, reaching a low of around 1.4% in early 2026, before gradually increasing again. This disinflationary trend is broad-based, driven by easing pressures across energy, food, and core inflation, particularly within services. The expected increase in 2027 mainly reflects temporary upward effects from energy prices, linked to climate transition-related fiscal measures, while the medium-term outlook remains aligned with the ECB's 2% target (Figure 2). In the United States, inflation has remained stubbornly above target, with headline inflation expected to reach 3.9% by the end of 2025 before easing gradually in 2026, supported by moderate GDP growth and rising unemployment.

Figure 2: Euro area HICP inflation - decomposition into the main components
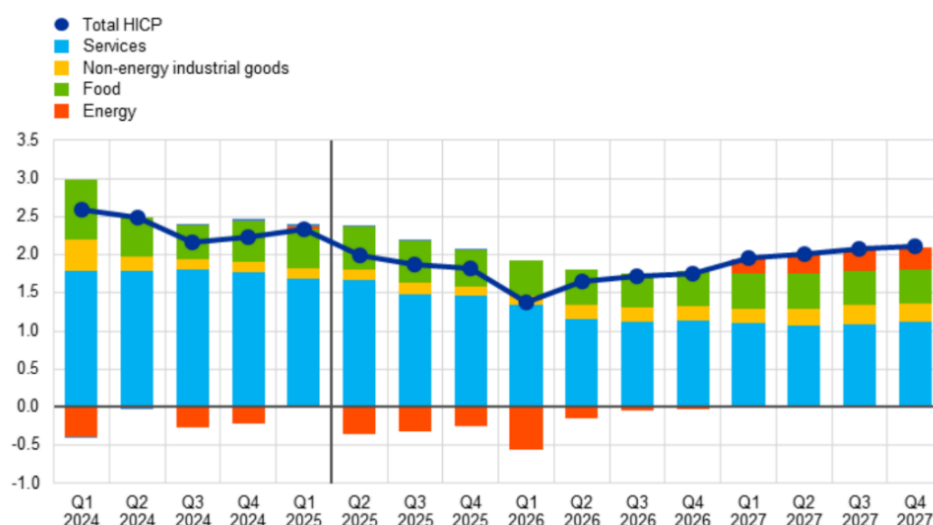
Central banks across many OECD economies are expected to further reduce monetary policy rates in an effort to mitigate the slowdown in economic growth and deteriorating employment conditions. In the United States, however, policy rates are projected to remain unchanged throughout 2025, as persistent upside risks to inflation continue to constrain the Federal Reserve's flexibility. In the euro area, the European Central Bank has taken a more accommodative stance: since mid-2024, it has delivered eight consecutive rate cuts, cumulatively lowering the deposit facility rate from approximately 4.25% to 2.00%. As of 11 June 2025, the interest rates on its main refinancing operations and the marginal lending facility will also be reduced to 2.15% and 2.40%, respectively, reflecting the ECB's commitment to supporting economic recovery while guiding inflation sustainably back to target. Several policymakers, including Slovak central banker Peter Kazimir, have suggested that the ECB is close to pausing, with markets anticipating a potential final cut to 1.75% by the end of the year (Bloomberg, 2025). This environment enhances the risk-adjusted appeal of fixed income, particularly high-quality sovereign and corporate bonds, which play a critical role in diversifying portfolios while generating stable income.

Emerging markets are playing an increasingly important role in the global economy. Countries like China, India, and Brazil have grown rapidly in recent years, moving from mainly agricultural economies to major industrial and service-based economies. This growth has made them more influential in global trade and investment. As investors search for higher returns, many are putting money into these countries, helping local companies grow and making their stock markets stronger. As a result, emerging markets now make up a larger share of global GDP and are home to many fast growing multinational companies.

At the same time, these countries are facing a challenging economic environment. While inflation is easing in many regions, the pace of decline varies. In Asia, where price pressures have moderated, several central banks, such as India's, have begun cutting interest rates to support growth. China has also continued to lower its key rates and reserve requirements amid low inflation. However, in parts of Latin America, persistent inflation and currency volatility have forced a pause or even a reversal of monetary easing. Brazil, for example, has raised interest rates several times since late 2024 to prevent inflation expectations from becoming unanchored.

Export growth remains weak across many commodity exporters, reflecting softer demand from China and the United States. Despite these headwinds, fiscal policy remains broadly neutral, and fiscal balances are expected to improve in the following years. Nonetheless, high public debt and increased interest payments leave emerging markets exposed to global financial volatility, requiring careful policy management to maintain investor confidence.

The widespread adoption of artificial intelligence (AI) is emerging as a key structural driver of productivity and innovation. While the aggregate impact remains uncertain, early signs of efficiency gains are visible, particularly among larger firms leading in AI integration. The overall effect will depend on how broadly AI technologies diffuse across sectors and the balance between augmenting and replacing human labour. Cybersecurity, robotics, and semiconductors are also gaining strategic relevance, with cybersecurity becoming critical against rising digital threats, robotics enhancing automation in manufacturing and healthcare, and semiconductors driving computing and AI applications. In healthcare, digital transformation is improving diagnostics, treatment, and operational models. Meanwhile, the services sector is adapting rapidly to evolving consumer behaviour and technological change. Together, these sectors align strongly with a Quality Growth approach, offering long-term potential supported by innovation, structural tailwinds, and earnings resilience.

3.2.2 Asset Allocation

The portfolio's asset allocation was designed to balance risk and return, while reflecting the macroeconomic outlook and the growing role of alternative investments in portfolio diversification. In line with this perspective, Larry Fink, CEO of BlackRock, argued in his 2025 annual letter to investors that the traditional 60/40 portfolio no longer fully captures the benefits of diversification. Instead, he advocates for a new standard allocation of 50/30/20, giving greater prominence to Alternative Investments, particularly private assets such as real estate (BlackRock, 2025). Alternative Investments are increasingly valued for enhancing diversification, offering inflation protection, and supporting more stable long-term returns through low correlation with traditional assets.

Based on this rationale, the core allocation for this portfolio was set at 50% in Equities, 30% in Fixed Income, and 20% in Alternative Investments. In order to introduce flexibility while ensuring the client's goals are met, allocation ranges (minimums and maximums) were established for each asset class. These ranges allow the optimization process to seek the most efficient allocation in terms of risk and return, while also ensuring that the final portfolio weights do not deviate excessively from the central allocation. To achieve this, a symmetric adjustment was applied to each asset class, allowing for a 25 percent variation around the central allocation. Accordingly, the allocation range was set at 37.5% to 62.5% for Equities, 22.5% to 37.5% for Fixed Income, and 15% to 25% for Alternative Investments.

A detailed explanation of the specific minimum and maximum allocations for each ETF within the portfolio will be provided in section 3.4.2.

It is also important to highlight a key consideration: given the moderately aggressive risk profile of the clients, the high annual return target, and the existence of a stable emergency fund, the advisor opted not to allocate capital to strictly risk-free instruments. This decision is further supported by the fact that the clients already hold a long-term fixed-term deposit, established in 2021, which provides capital preservation and exposure to the risk-free rate. After being fully informed of the associated risks, the clients confirmed their awareness and acceptance of the potential volatility involved. The chosen approach aims to maximize return potential without compromising the portfolio's overall risk balance. Capital will still be allocated to investment-grade Corporate and Government Bond ETFs, which offer relatively stable income while maintaining a low level of volatility.

A summary of the asset class allocations, along with the final optimized portfolio weights, is presented in Table 1.

Table 1: Asset Allocation

Asset Classes	Final Allocation	Minimum Allocation	Central Allocation	Maximum Allocation
Equity	**57.50%**	37.5%	50%	62.5%
Bonds	**22.5%**	22.5%	30%	37.5%
Alternatives	**20%**	15%	20%	25%

Source: Author

3.3 Security Selection

The portfolio is composed exclusively of Exchange Traded Funds in alignment with the investment strategy and principles outlined in this IPS. The decision to rely solely on ETFs reflects the objective of achieving broad diversification, cost-efficiency, transparency, and ease of implementation across different market segments, asset classes, and geographies.

ETFs offer several structural advantages that make them particularly suitable for long term portfolios. First, they are typically more cost-effective than actively managed funds, due to their lower expense ratios and passive investment approach. Second, ETFs provide intraday liquidity, enabling investors to react quickly to market changes and enter or exit positions throughout the trading day. Third, they offer high transparency, often disclosing holdings on a daily basis, which enhances portfolio monitoring and risk management. Furthermore, ETFs grant access to a broad range of asset classes, sectors, and geographies, allowing investors to implement their strategies with flexibility and scale. They are also tax-efficient, due to their unique structure that minimizes capital gains distributions (Schwab, 2019).

Despite these advantages, certain risks are inherent to ETF investing. Tracking error, although generally low in full-replication ETFs, can still lead to slight deviations from the benchmark performance. Market liquidity may vary depending on the underlying assets, especially in niche or thematic ETFs with lower trading volumes. Price deviations from Net Asset Value (NAV) can occur in volatile markets, creating temporary inefficiencies. Additionally, ETFs using synthetic replication or currency hedging can introduce counterparty risk, derivative exposure, and additional costs. In light of these considerations, the screening restrictions applied to the selection process were designed to minimize such risks to the greatest extent possible and ensure the robustness of the final portfolio.

While diversification is essential to reducing risk, an excessive number of ETFs within a portfolio can result in overlapping exposures, increased transaction costs, and diminished overall efficiency. To address these concerns and promote simplicity, clarity, and effectiveness, the number of ETFs was deliberately limited. Recent academic research by Lee, Y., Kim, W. C., & Kim, J. H. (2020) demonstrates that the majority of diversification benefits can be achieved with portfolios containing fewer than 16 assets, especially when these assets are themselves diversified instruments, such as ETFs. Their findings highlight that beyond this range, the marginal gains in risk reduction tend to diminish significantly, while complexity and costs increase. As such, the final selection for the portfolio comprises 14 ETFs, each carefully chosen to ensure broad diversification across different sectors and asset classes.

A rigorous screening process was implemented to ensure that all selected ETFs were consistent with the portfolio's investment philosophy, which combines a focus on long-term growth with quality-oriented fundamentals. Reflecting this dual emphasis, the screening prioritized ETFs with either a growth profile or exposure to high-quality equities and bonds. The following constraints were applied uniformly across all potential ETF candidates:

- **Accumulation Method:** Only ETFs that automatically reinvest dividends were considered, as these are more suitable for long-term capital growth derived by the compounding effect and due to no immediate liquidity needs from the clients.

- **Full Physical Replication Method:** Preference was given to ETFs using full replication rather than synthetic strategies, to eliminate counterparty and liquidity risk.

- **ETF Providers:** To limit concentration risk, reduce dependency on a single ETF issuer and to promote diversification, the portfolio was constructed in a way that ensures no individual provider accounts for more than 50% of the total allocation.

- **Fund Size and Expense Ratio:** Only ETFs with a minimum fund size of €100 million were considered, while simultaneously prioritizing those with the lowest possible expense ratios. Larger funds tend to have better liquidity, tighter bid-ask spreads and greater stability, reducing the risk of closure under financial distress. At the same time, lower expense ratios help maximize net returns by reducing long-term cost drag.

- **Currency:** All ETFs were required to be euro-denominated and listed on European exchanges. Although this does not remove foreign exchange risk arising from underlying non-euro assets, it facilitates operational alignment with the clients' reporting currency and avoids hedged structures.

- **Inception Date:** Only ETFs with at least five years of history were considered, ensuring a consistent performance track record and greater market stability.

After establishing the screening restrictions for all ETFs, the next step was to define the main investment themes and sector exposures to be reflected in the portfolio. These were chosen for their relevance to long-term structural trends identified in the macroeconomic analysis and their consistency with the Quality Growth framework. The selection process began on the JustETF platform, with each ETF subsequently validated on Bloomberg to ensure full adherence to the defined criteria. For detailed information about the ETF screens, please refer to Table A3 in the Appendix.

A Quality World ETF was selected as a cornerstone of the portfolio's equity allocation, reflecting the central importance of the quality component in the investment philosophy. It provides diversified access to companies with resilient earnings, strong balance sheets, and high return on equity.

Thematic allocations were introduced to capture disruptive innovation and high-growth potential. Artificial Intelligence, Semiconductors, and Future Mobility were included as strategic allocations, reflecting their growing influence on global productivity, technological innovation, and long-term economic competitiveness. An additional thematic exposure was made to Video Gaming and eSports, a fast growing segment within the digital entertainment industry. According to Precedence Research (2025), the global eSports market was valued at approximately $8.1 billion in 2025 and is projected to grow at a compound annual growth rate of 21.5%, reaching over $48.09 billion by 2034.

To ensure meaningful geographic diversification, allocations were made to Small Cap Equities and Emerging Markets. Small caps provide access to agile, innovation-oriented companies that often operate in niche markets with high growth potential. Emerging Markets were included not only for their long-term growth potential but also for their historically lower correlation with developed markets, which enhances their role as effective diversifier. As highlighted by Mahatani, S. & Morgan, D. (2024), the volatility of emerging market equities has declined significantly over the past decade, converging with that of developed markets and reinforcing their appeal as a more stable and investable asset class.

Healthcare, Financials, and Energy were included as structurally important sectors that collectively offer a blend of resilience, earnings stability, and durable growth. Their historical ability to perform across market cycles reinforces the portfolio's defensive strength while remaining consistent with a quality growth investment philosophy.

To broaden exposure beyond traditional equities, the portfolio includes alternative assets as outlined in the 50/30/20 asset allocation. Gold was added as a hedge against inflation and tail risk, given its low correlation with other asset classes and its historical role as a store of value. Global REITs provide access to real estate markets across different regions, offering income generation, inflation protection, and diversification benefits.

Finally, the fixed income allocation comprises investment-grade Corporate and Government Bonds, which enhance portfolio stability, reduce overall volatility, and provide a reliable income stream, while preserving credit quality.

3.4 Portfolio Composition

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

Modern Portfolio Theory, first introduced by Harry Markowitz in 1952, laid the foundation for contemporary approaches to portfolio construction by formalizing the relationship between risk and return in investment decisions. At its core, MPT argues that investors should not evaluate assets in isolation, but rather in terms of how each contributes to the overall risk and return profile of a diversified portfolio.

A central tenet of MPT is the principle of diversification. When assets within a portfolio exhibit imperfect correlation, the overall volatility of the portfolio can be reduced without necessarily compromising the potential for return. This concept enables investors to construct combinations of assets that offer more efficient risk-return trade-offs than individual investments considered in isolation. The theory assumes that rational investors are inherently risk-averse, meaning they will favour portfolios that provide the highest expected return for a given level of risk, or, conversely, the lowest possible risk for a target return.

To illustrate these optimal allocations, Markowitz introduced the concept of the efficient frontier: a set of optimal portfolios that yield the highest possible expected return for a given level of risk, or alternatively, the lowest level of risk for a given expected return. Portfolios lying beneath this frontier are considered inefficient, as they expose investors to unnecessary risk or offer insufficient reward. In constructing the frontier, the variance and covariance of asset returns are used to calculate portfolio risk, while expected returns are estimated from historical data or forward-looking projections. In this IPS historical data will be used.

The quantitative core of MPT is formalized through Mean-Variance Theory, which models portfolio performance mathematically using two key parameters: the expected return (mean) and the standard deviation (as a proxy for risk). The objective under MVT is to identify the portfolio composition that best balances these two elements, either by maximizing return for a given level of risk or minimizing risk for a desired return. This approach is particularly relevant for equity-dominated portfolios, where return volatility tends to be higher, but where the benefits of diversification can also be more effectively realized.

3.4.2 Methodology

The first step in developing the MPT model involved retrieving daily adjusted closing prices for the 14 ETFs that constitute the portfolio. For this purpose, data was collected using the Bloomberg Terminal, covering the period from April 1, 2020, to April 1, 2025. The use of daily data over the past five years aimed to ensure a reliable statistical foundation by capturing all market movements and thereby enabling the calculation of realistic and representative parameters. Subsequently, all data was exported to Excel, enabling the practical component of the analysis to proceed.

To standardize the time series, lognormal returns were computed for each ETF by calculating the natural logarithm of daily price changes. The average of these daily returns was then determined and annualized using a formula based on the exponential of the mean daily return, converting it into an annualized value.

Following the computation of annual returns, the standard deviation for each ETF was calculated as the square root of the variance over the selected period and then annualized. The next step involved the construction of a variance-covariance matrix to analyse the interdependencies and correlations between the assets.

Within the Solver tool, a set of constraints was implemented to ensure that the optimal portfolio weights complied with the guidelines previously defined in this IPS. Specifically, short selling was prohibited by setting all weights to be non-negative, and the sum of all portfolio weights was constrained to equal one. Furthermore, the asset class allocation ranges outlined in the Asset Allocation section were strictly enforced. All these constraints were applied on solver as follows:

$$37.5\% \leq \sum_{i \in\, Equity\ ETFs} w_i \leq 62.5\%$$

$$22.5\% \leq \sum_{i \in\, Bonds\ ETFs} w_i \leq 37.5\%$$

$$15\% \leq \sum_{i \in\, Alternatives\ ETFs} w_i \leq 25\%$$

$$\sum_i w_i = 1$$

$$w_i > 0$$

In addition to these broad constraints, individual maximum and minimum weights were set for each ETF. This was intended to safeguard portfolio diversification and ensure that each holding remained consistent with the overall investment strategy. A detailed description of the weight ranges applied to each ETF is presented below:

1. **Small Cap and Emerging Markets (3% - 6%):** These categories provide high growth potential and geographic diversification. However, due to their higher volatility, a moderate range was set to ensure meaningful exposure without compromising overall portfolio stability.

2. **Artificial Intelligence, Videogaming and eSports, Semiconductors, and Future Mobility (3% - 6%):** These thematic sectors were individually constrained between 3% and 6% to reflect their importance in capturing disruptive innovation and secular growth trends. Their inclusion is central to the Growth philosophy, however each theme bears idiosyncratic and cyclical risks. The constraints prevent overexposure to any single innovation theme, while ensuring a meaningful combined allocation of around 20% to high-growth segments that drive long-term productivity gains.

3. **Quality World, Energy, Financials, and Healthcare (4% - 7%):** These core sectors align with the Quality Growth approach, combining resilience, strong fundamentals, and consistent earnings. The allocation range ensures they play a central but not dominant role in the equity allocation.

4. **Global REITs (6% - 10%):** Real Estate Investment Trusts offer diversification benefits, income generation, and inflation protection. The 6% minimum ensures sufficient diversification benefits and reflects their role in the alternatives bucket of the 50/30/20 framework, while the 10% cap manages potential risks from interest rate sensitivity and cyclical performance.

5. **Gold (10% - 14%):** Gold acts as a defensive hedge against inflation, currency devaluation, and tail risk. A relatively high weight range was established to reflect its diversification value and historically low correlation with equities and bonds. The 10% minimum ensures the protective buffer remains effective, while the 14% maximum controls the opportunity cost of holding a non-yielding asset in a return-seeking portfolio.

6. **Corporate Bonds (12% - 20%):** As the main component of the fixed income allocation, corporate bonds provide income and moderate risk. The range allows flexibility to optimize return while maintaining investment-grade quality.

7. **Government Bonds (10% - 16%):** Government bonds serve as the most stable component of the portfolio, contributing to capital preservation, liquidity, and downside protection. The 10% minimum prevents underexposure, while the 16% cap avoids excessive weighting in low-growth assets, preserving the portfolio's growth-oriented profile.

Using the Excel Solver add-in, the Minimum Variance Portfolio and the Maximum Sharpe Ratio Portfolio were then determined after all constraints were implemented. The Minimum Variance Portfolio represents the combination of assets with the lowest possible risk, corresponding to the point on the efficient frontier where portfolio variance is minimized. The Sharpe Ratio is a widely adopted metric used to assess the risk-adjusted performance of an investment. It quantifies the excess return an investor receives per unit of risk assumed, comparing the asset's return to the additional risk taken relative to the risk-free rate. In this analysis, the risk-free rate is proxied by the 10-year German Bund. The portfolio weights that maximize the Sharpe Ratio, along with the corresponding return and standard deviation, were determined as follows:

$$Max \ w_i \ \frac{R_p - R_f}{\sigma_p} \qquad (1)$$

$$R_p = \sum_{i=1}^{n} w_i \ r_i \qquad (2)$$

$$\sigma_p = \sqrt{\sum_{i=1}^{n} \sum_{j=1}^{n} w_i \ w_j \sigma_{ij}} \qquad (3)$$

Where R_p is the expected portfolio return, R_f is the risk-free rate, σ_p is the portfolio standard deviation, w_i and w_j are the weights of ETFs i and j, r_i is the expected return of ETF i, and σ_{ij} represents the covariance between assets i and j.

The higher the Sharpe Ratio, the better the trade-off between risk and return. Accordingly, the Maximum Sharpe Ratio Portfolio is the one that maximizes this relationship and is therefore considered the optimal portfolio along the efficient frontier.

To generate the Efficient Frontier, several simulations were run to identify the portfolio that maximized the return for each specific level of risk. This process led to the creation of a set of efficient portfolios, which collectively formed the curve representing the Efficient Frontier.

Subsequently, the Capital Market Line (CML) was drawn. This line represents all possible efficient combinations between the risk-free asset and the risky portfolio. It is tangent to the Efficient Frontier at the point where the Sharpe Ratio is maximized, indicating the optimal risk-return trade-off.

Figure 3: Efficient Frontier and Capital Market Line
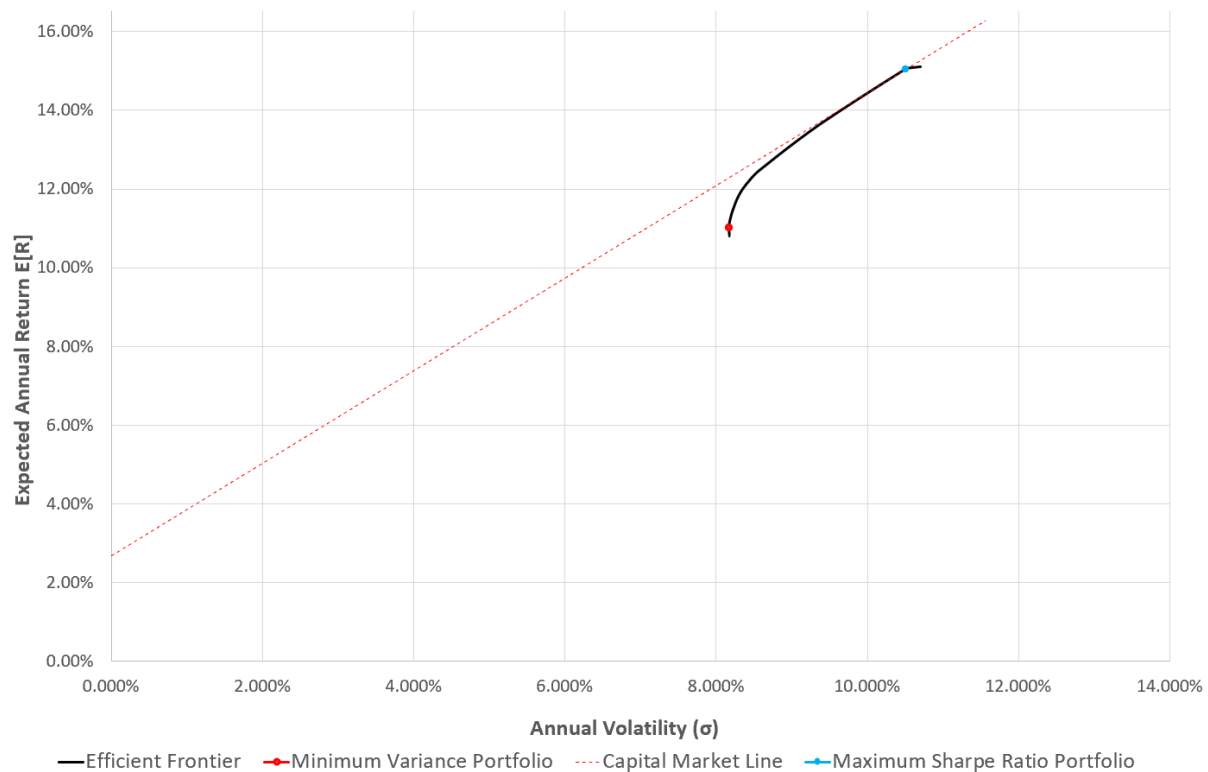
3.4.3 Final Portfolio Composition

As previously discussed in Section 3.2.2, no allocation was made to a strictly risk-free asset, given the existence of a stable term deposit already held by the clients. Accordingly, the advisor recommended full investment in the risky portfolio, resulting in the selection of the combination that maximizes the Sharpe Ratio. This solution achieves an expected annual return of 15.04%, with an annual volatility of 10.51% and a Sharpe Ratio of 1.18. The optimal weights for each ETF and corresponding category are illustrated in Figure 4. For detailed information about the selected ETFs, please refer to Table A4 in the Appendix.

Figure 4: Final Portfolio Composition
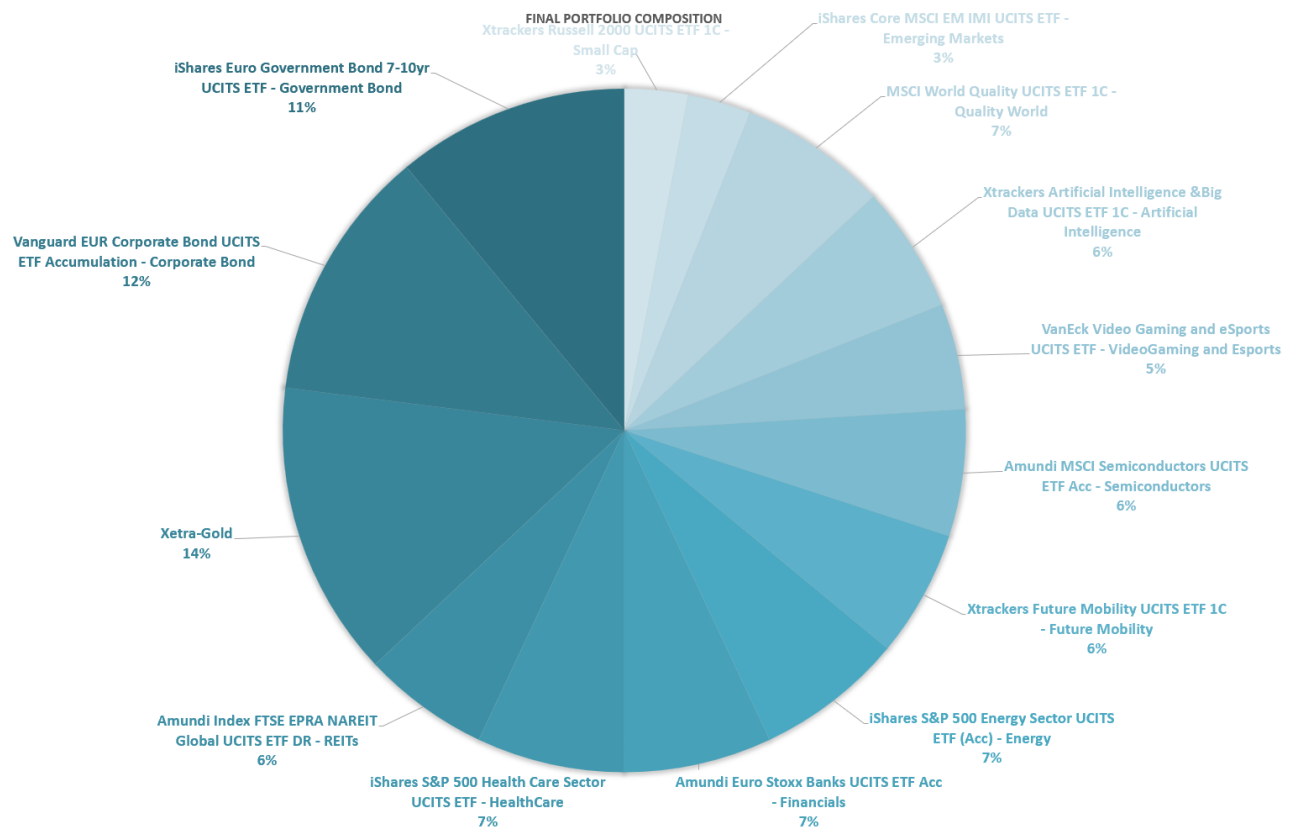
Source: Author

3.5 Expected Performance

The expected performance of the optimal portfolio is summarized in Table 2. This portfolio complies with all the constraints and criteria defined in this Investment Policy Statement, achieving an expected return that exceeds the client's target of 13.78%.

Table 2: Portfolio Characteristics

Portfolio Characteristics	
Expected Annual Return	15.04%
Expected Annual Volatility	10.51%
Sharpe Ratio	1.18

Source: Author

To assess the expected performance of the portfolio over the 10-year investment horizon, a Monte Carlo simulation based on a Geometric Brownian Motion was constructed. This method uses repeated random sampling to estimate the probability distribution of outcomes under uncertainty. By simulating a broad range of potential future scenarios, it enables a more comprehensive understanding of the risks and variability associated with investment returns. The simulation was based on three key parameters: an initial capital of €615,000, an expected annual return of 15.04%, and an annualized volatility of 10.51%. Random returns were generated over a 10-year horizon to reflect the inherent uncertainty of financial markets. This process was repeated 10,000 times, producing a distribution of possible final portfolio values. The statistical summary of the simulation results is presented in Tables 3 and 4.

Table 3: Monte Carlo Percentile Table

Table 4: Monte Carlo Statistics Table

Percentile Table	
5%	€ 1,485,141.17
10%	€1,650,196.12
25%	€1,977,168.59
50%	€2,415,684.53
75%	€2,915,833.73
95%	€3,798,717.75

Statistics Table	
Median	€ 2,415,684.53
Mean	€ 2,498,570.86
Standard Deviation	€ 723,121.78

Based on the simulation outcomes, there is a 5% or lower probability that the portfolio will be worth less than €1,485,141.17. Although this amount would be sufficient to cover the portfolio's primary objectives (namely the construction of the twin houses and the education of the children), it would fall short of fully meeting the couple's broader financial goals when adjusted for inflation and before capital gains tax.

The most probable final value of the portfolio is approximately €2,415,684.53, which corresponds to the median outcome. This estimate reflects the central tendency of the simulation results and is considered the most likely value to be achieved, given the distribution's slight positive skewness. This value exceeds the couple's financial objective by a significant margin, indicating a strong likelihood of outperformance under typical market scenarios. Furthermore, the mean value of €2,498,570.86 highlights the upside potential inherent in the distribution's right tail, suggesting that in a favourable market environment, outcomes significantly above the median are possible. As shown in Figure 5, the histogram of final portfolio values visually confirms this asymmetry and supports the statistical findings.

Figure 5: Monte Carlo Simulation of Portfolio Final Values
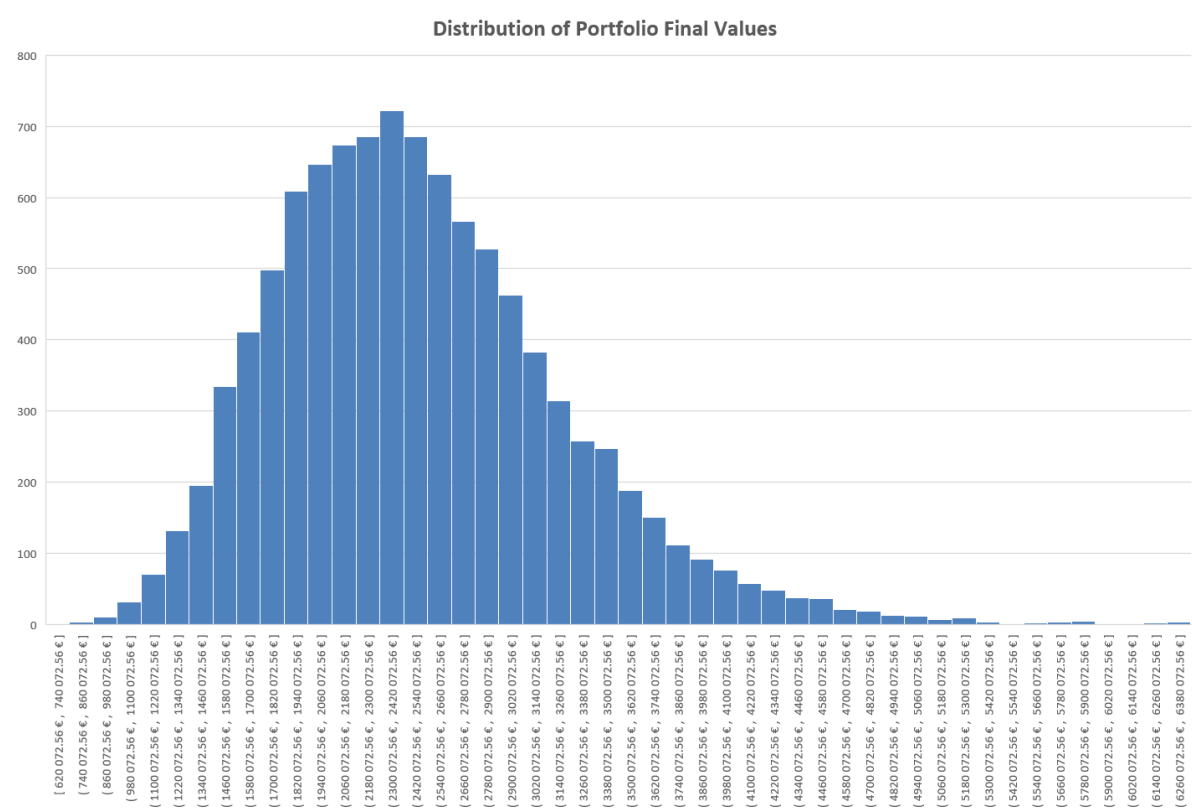
Source: Author

In addition to the Monte Carlo simulation, a benchmark was created to serve as a point of reference for assessing the portfolio's relative performance. This benchmark was built using a weighted average of the historical daily returns of each index tracked by the ETFs in the portfolio, with the respective weights matching those in the final optimal allocation. As shown in Figure 6, an investment of €1 in the benchmark would have grown to €1.81 over the five-year period, while the same investment in the portfolio would have reached €1.94, which clearly illustrates the portfolio's ability to generate superior returns over time.

Figure 6: Historical Evolution: Benchmark vs Portfolio

Historical Evolution: Benchmark vs Portfolio
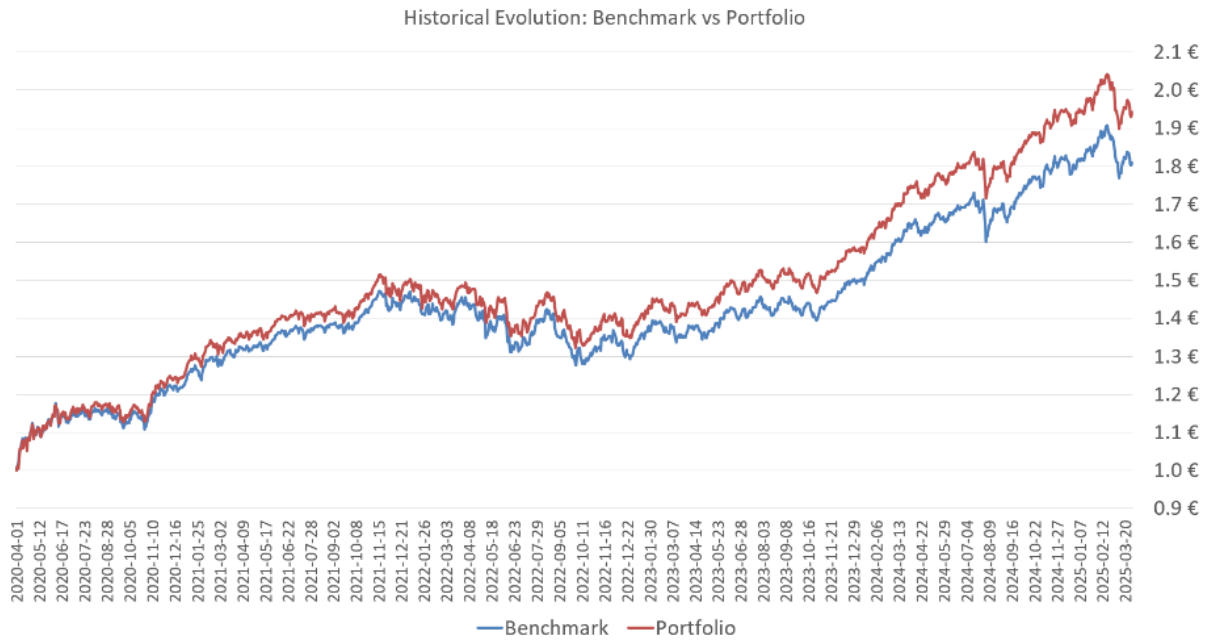
Source: Author

To ensure a comprehensive evaluation and to complement the Benchmark analysis, three key risk-adjusted performance indicators were computed: Tracking Error, Information Ratio, and Sortino Ratio.

$$Tracking\ Error = \sqrt{\frac{\sum_{i=1}^{n}(R_P - R_B)^2}{N - 1}} \qquad (4)$$

$$Information\ Ratio = \frac{R_P - R_B}{Tracking\ Error} \qquad (5)$$

$$Sortino\ Ratio = \frac{R_P - R_f}{Standard\ Deviation\ of\ Negative\ Returns\ (Downside)} \qquad (6)$$

The Tracking Error measures the consistency of the portfolio relative to its benchmark, reflecting the standard deviation of excess returns. A value of 7.15% indicates moderate divergence, suggesting the portfolio moves in line with the benchmark but with some variation.

The Information Ratio evaluates how effectively the portfolio converts active risk into excess return over the benchmark. Calculated by dividing the active return by the Tracking Error, the obtained value of 1.30 indicates strong risk-adjusted performance. Ratios above 1.0 are generally seen as a sign of manager skill and consistent outperformance relative to the benchmark.

The Sortino Ratio differs from the Sharpe Ratio by using downside risk instead of total volatility, focusing only on negative fluctuations. By measuring return relative to downside risk, the Sortino Ratio provides a more accurate view of risk than metrics based on overall volatility. A value of 1.41 suggests strong excess return relative to downside risk, indicating a lower likelihood of undesirable losses.

3.6 Risk Analysis

A comprehensive risk analysis was conducted to assess the potential downside exposure of the portfolio. This analysis plays a critical role in validating whether the portfolio remains aligned with the couple's risk profile and long-term financial objectives under various market conditions. Three Value at Risk methodologies were implemented: Historical VaR, Parametric VaR, and Monte Carlo VaR. Each method provides a distinct statistical perspective on potential losses, contributing to a more robust and multidimensional understanding of portfolio risk. Additionally, Conditional Value at Risk (CVaR) was calculated as a complementary measure to each VaR model, capturing the expected average losses in the worst-case scenarios beyond the chosen confidence threshold. Together, these quantitative tools offer a nuanced view of tail risk exposure. The section concludes with a qualitative analysis of key long-term risks, summarized through a visual Risk Matrix.

3.6.1 Historical VaR

Historical VaR was implemented as a first method to assess the potential downside of the portfolio based on past performance. This is a non-parametric method that calculates the maximum expected loss at a given confidence level by examining the actual distribution of historical returns, without assuming a specific probability distribution. To perform this analysis, a distribution of annual log returns was constructed using the optimal portfolio weights and the corresponding adjusted closing prices of the selected securities. For instance, the first annual return was calculated between April 1st, 2021, and April 1st, 2020. The second return was then computed from April 2nd, 2021, to April 2nd, 2020, and so forth. This approach was applied across all available historical data, generating a robust series of one-year return observations.

Once the distribution was established, percentile-based estimates were computed for multiple confidence levels using the $percentile.EXC$ function in Excel. In addition to Historical VaR, the Conditional VaR was also calculated to assess the average loss in the most adverse outcomes beyond the selected threshold, providing a more comprehensive view of the portfolio's tail risk. The table below summarizes the results for both VaR and CVaR at 99%, 97.5%, 95%, and 90% confidence levels.

Table 5: 1 Year Historical and Conditional VaR

Confidence Level	HistoricalVaR (%)	Historical VaR (€)	Conditional VaR (%)	Conditional VaR (€)
99%	12.10%	€ 74,420.63	12,41%	€ 76,346.30
97.5%	11.27%	€ 69,325.12	11.98%	€ 73,689.38
95%	9.26%	€ 56,934.89	11.16%	€ 68,655.57
90%	5.94%	€ 36,545.09	9.36%	€ 57,552.90

Source: Author

The results presented in Table 5 provide valuable insights into the potential losses the portfolio may incur under different levels of market stress. At a 99% confidence level, the Historical VaR is estimated at 12.10%, corresponding to a potential annual loss of €74,420.63. This figure implies that, in 1% of the worst-case scenarios, the portfolio could experience a loss exceeding this amount. The Conditional VaR at this level, which captures the average loss beyond the 99% threshold, is slightly higher at 12.41%, or €76,346.30, reflecting the expected severity of losses in extreme cases.

At a more moderate confidence level of 95%, the Historical VaR indicates a loss of 9.26%, equivalent to €56,934.89. The Conditional VaR for this level stands at 11.16%, or €68,655.57. This suggests that if a loss worse than the 95% VaR occurs, the average shortfall would be noticeably larger than the initial VaR estimate, highlighting the importance of understanding tail risks.

These findings suggest that the portfolio carries a moderate to high level of downside risk in adverse market conditions. While the probability of such events is relatively low, the Conditional VaR figures emphasize that losses, when they do occur beyond the VaR cut-off, can be materially larger.

3.6.2 Parametric VaR

The Parametric Value at Risk, also known as Variance-Covariance VaR, is a widely used analytical technique that assumes that portfolio returns follow a normal distribution. Unlike Historical VaR, which is based on past return observations, the parametric approach relies on statistical parameters, namely the expected return and standard deviation, to estimate potential losses. The formula used to compute the Parametric VaR is as follows:

$$VCV\ VaR(\alpha) = -\ (\mu - Z\ (1-\alpha) * \sigma) \tag{7}$$

The computation were done assuming an average expected return (μ) equal to 15.04% and a standard deviation (σ) of 10.51%. In addition to the standard VaR, the Conditional VaR was calculated in order to provide a more comprehensive understanding of tail risk under the normality assumption. Table 6 displays the results obtained for different confidence levels.

Table 6: 1 Year Parametric and Conditional VaR

Confidence Level	Z-Stat	Parametric VaR (%)	Parametric VaR (€)	Conditional VaR (%)	Conditional VaR (€)
99%	2.326347874	9.41%	€ 57,858.51	12.97%	€ 79,761.33
97.5%	1.959963985	5.56%	€ 34,177.08	9.53%	€ 58,598.91
95%	1.644853627	2.25%	€ 13,809.75	6.64%	€ 40,818.31
90%	1.281551566	-1.57%	€- 9,672.49	3.40%	€ 20,928.04

Source: Author

At the 99% confidence level, the Parametric VaR indicates a potential loss of 9.41%, corresponding to a decrease of €57,858.51 in portfolio value. This means there is a 1% chance that losses may exceed this threshold under extreme market conditions. The Conditional VaR at the same level points to an even higher potential loss of 12.97%, or €79,761.33, representing the expected average loss in the worst 1% of cases.

At the 95% confidence level, the Parametric VaR drops to 2.25%, which equates to a loss of €13,809.75. Although the probability of exceeding this threshold is higher (5%), the projected loss is significantly smaller. The Conditional VaR for this level stands at 6.64%, translating into a possible average loss of €40,818.31 if the VaR barrier is breached.

Overall, these results confirm the expected behaviour of the parametric approach, showing that as the confidence level increases, the estimated loss also rises. The Conditional VaR values, consistently higher than the parametric VaR figures, reinforce the importance of accounting for tail risk when analysing extreme market movements under the assumption of normally distributed returns.

When compared with the historical method, the parametric approach tends to produce less conservative estimates across all confidence levels. This difference is consistently visible across all confidence intervals, reflecting the historical method's tendency to capture more pronounced downside scenarios. These results highlight the limitations of assuming normality and the relevance of complementing model-based risk estimations with data-driven approaches to ensure a more robust understanding of downside exposure.

3.6.3 Monte Carlo VaR

Monte Carlo Value at Risk is a powerful risk assessment tool that relies on stochastic simulations to estimate the potential downside of a portfolio under uncertain market conditions. This method is particularly valuable when dealing with non-linear return distributions or when aiming to capture a broader range of possible outcomes. Unlike the historical approach, which relies exclusively on past returns, or the parametric approach, which assumes a fixed distribution, the Monte Carlo technique does not depend solely on historical data or on strict distributional assumptions. Instead, it generates a large number of hypothetical future scenarios using random sampling techniques, offering a dynamic and flexible way to assess portfolio risk.

The simulation process, based on a Geometric Brownian Motion, was built using the following formula to compute the potential final value of the portfolio under each scenario, where μ is the expected annual return (15.04%), σ is the annual standard deviation (10.51%), T is the investment horizon in years (1 in this case), and Z is a randomly drawn value from a standard normal distribution:

$$\text{Final Portfolio Value at time } T = \text{Initial Investment.} \, e^{(\mu - \frac{1}{2}\sigma^2)T + Z \cdot \sigma \cdot \sqrt{T}} \tag{8}$$

Based on this formula, 10,000 scenarios were generated, each one providing a different final value for the portfolio at the end of 1 year. The Monte Carlo VaR was computed by applying percentile-based estimations to the simulated portfolio outcomes, capturing the potential loss over a one-year horizon. In addition, the Conditional VaR was also calculated to provide a complementary measure of average losses in extreme scenarios. The results are presented in Table 7.

Table 7: 1 Year Monte Carlo VaR and CvaR

Confidence Level	MC VaR (%)	MC VaR (€)	MC Conditional VaR (%)	MC Conditional VaR (€)
99%	9.17%	€ 56,401.80	12.28%	€ 75,520.22
97.5%	5.29%	€ 32,519.61	9.18%	€ 56,458.86
95%	2.37%	€ 14,588.01	6.46%	€ 39,717.33
90%	-1.64%	€ -10,069.66	3.33%	€ 20,497.86

Source: Author

At the 99% confidence level, the Monte Carlo Value at Risk suggests a potential one-year loss of 9.17%, equivalent to approximately €56,401.80. This indicates that in only 1% of cases, losses may exceed this threshold. The Conditional Monte Carlo VaR, which reflects the average loss in the worst 1% of outcomes, increases to 12.28%, or about €75,520.22, underscoring the magnitude of potential losses in extreme market conditions.

At the 95% confidence level, the one-year Monte Carlo VaR is 2.37%, corresponding to a possible decline of €14,588.01. This means there is a 5% chance that the portfolio could perform worse than this level. The Conditional VaR at this confidence interval rises to 6.46%, or €39,717.33, capturing the average loss among the most adverse 5% of simulated outcomes.

3.6.4 10 Year Horizon Risks

After conducting a quantitative analysis of the portfolio's risk profile using various Value at Risk metrics it is essential to broaden the scope of risk evaluation to include potential structural and macroeconomic threats that may affect the portfolio over the full investment horizon. In this context, a complementary qualitative risk assessment was conducted, focusing on forward-looking scenarios that could materially influence the portfolio's performance throughout the 10-year period. The risks were selected based on the 2025 edition of J.P. Morgan's Long-Term Capital Market Assumptions. Table 8 presents the seven most critical risks identified as relevant for this portfolio, taking into account both the thematic exposures and the geographical allocation embedded in the selected ETFs. For clarity and classification purposes, each risk is assigned a letter and categorized accordingly: risks A, B, and C represent Geopolitical Risks; D corresponds to an Economic Risk; E reflects an Environmental Risk; and F and G are associated with Technology and Structural Risks.

Table 8: 10 Year Key Structural Risks

| Risk	Upside or Downside?	Description	Macro or asset class implication
Regional conflicts extend or spill over, sucking in NATO or China (A)	Downside	The war in Ukraine or new conflicts intensification in the Middle East, potentially involving NATO or China.	Supply chain and energy shocks; positive for USD, bonds and commodities, negative for equities (especially in Europe).
Political polarization worsens in developed nations (B)	Downside	Political fragmentation impairs policymaking and increases market uncertainty.	Higher sovereign risk premiums. Increased volatility across equities and credit markets.
Trade tensions between U.S. and China reignited (C)	Downside	Renewed tariffs and trade barriers arise as tensions escalate between the U.S. and China.	Higher inflation and weaker global trade. Increased pressure on supply chains; negative for industrials.
Debt default by U.S (D)	Downside	U.S. debt ceiling deadlock causes a technical default or loss of market confidence.	Market turmoil and redefinition of risk-free assets; Positive for gold and safe-haven currencies such as CHF and JPY.
Worsening climate or environmental situation (E)	Downside	More frequent and severe climate-related events impact global supply chains and resource availability.	Inflationary pressures on commodities and real assets; negative for fixed income and broad equity markets.
Accelerated adoption of artificial intelligence (F)	Upside	Rapid AI deployment enhances productivity and offsets demographic-driven labor shortages.	Adds to GDP growth with limited inflationary pressure. Positive for equities and credit markets.
European energy independence through renewables investment (G)	Upside	Faster transition towards clean energy aims to reduce dependency on Russian gas.	Mitigates energy-related risks and boosts productivity. Supportive of eurozone equities and the euro.

Source: JP Morgan (2025)

Figure 7 presents a risk matrix that evaluates and ranks the seven key structural risks according to their probability and potential impact on the portfolio. Each risk is classified as Low, Medium, or High, based on the probability of occurring and the potential magnitude of its financial impact on the portfolio. The classification of each risk was based on the specific characteristics of the client's portfolio and further supported by insights from J.P. Morgan (2025) and the World Economic Forum (2025). A detailed description of each risk and its classification follows below:

- **A:** The potential escalation of current regional conflicts, particularly those in Eastern Europe and the Middle East, into broader confrontations involving major powers such as NATO or China represents a serious systemic threat. Such a scenario could destabilize global markets by disrupting energy supply chains, triggering sanctions, and increasing investor risk aversion. The portfolio's exposure to Emerging Markets, Energy, and Real Estate makes it vulnerable to sharp price corrections under such geopolitical stress. While defensive components like Gold and Government Bonds may offer partial cushioning, the widespread and cross-sectoral nature of this risk supports a **high probability** and **high severity** assessment.

- **B:** Deepening political divisions in advanced economies can erode policy consistency, delay fiscal reforms, and foster populist backlash against globalization and innovation. ETFs with exposure to Financials and Health Care could be impacted by regulatory shifts or market confidence erosion. While short-term effects may be contained, long-term implications for capital markets and investor sentiment are non-negligible. The risk carries a **medium probability** and **medium severity** rating.

- **C:** The re-escalation of trade disputes between the U.S. and China could trigger renewed tariffs, export controls, and restrictions on capital flows. ETFs with significant exposure to globally integrated sectors, such as Semiconductors, Artificial Intelligence, and Future Mobility, are particularly sensitive to supply chain disruptions and regulatory barriers. Although the **probability** of renewed tensions is **high** given ongoing geopolitical friction, the portfolio's broad diversification across regions and sectors is expected to buffer some of the impact. As such, the overall **severity** for the portfolio is considered **medium**.

- **D:** Though historically rare and politically improbable, the consequences of a U.S. sovereign default would be catastrophic, with global repercussions for capital markets. Such an event would drive liquidity crises, impair confidence in Treasury-backed ETFs, and lead to a flight from risk assets. While the **probability** remains **low**, the **severity** is extraordinarily **high**, particularly for fixed-income holdings as well as equity ETFs exposed to U.S. markets.

- **E:** The rise in extreme weather events and environmental degradation presents a structural threat to certain sectors in the portfolio. Real Estate and Energy are particularly vulnerable, being exposed to both physical risks such as flooding or heatwaves and transition risks from stricter climate regulation. However, the portfolio's broad sectoral and geographic diversification helps dilute concentrated exposure to these vulnerabilities. While the absence of ESG-specific ETFs slightly limits the natural hedge, the overall impact on long-term performance is expected to be modest. As such, the **probability** of climate-related disruptions remains **medium**, but the **severity** for the portfolio is assessed as **low**.

- **F:** Widespread AI integration is expected to enhance productivity, particularly in developed markets. This aligns well with the portfolio's exposure to growth and innovation through the Artificial Intelligence, Semiconductors ETF and Videogaming & eSports ETF. These positions are expected to benefit from long-term earnings resilience and margin expansion. Given prevailing trends, the **probability** is **high**, while **severity** is **medium**, moderated by diversification.

- **G:** Europe's strategic transition from fossil fuel dependency towards renewables presents long-term structural shifts. This is particularly relevant to the Energy, Future Mobility and Real Estate ETFs, which may experience revaluation as energy policies evolve. The shift could generate opportunities but also bring transitional volatility and stranded asset risk. Over a 10-year horizon, this is assessed as a **medium probability** and **medium severity** scenario for the portfolio.

Figure 7: Risk Matrix
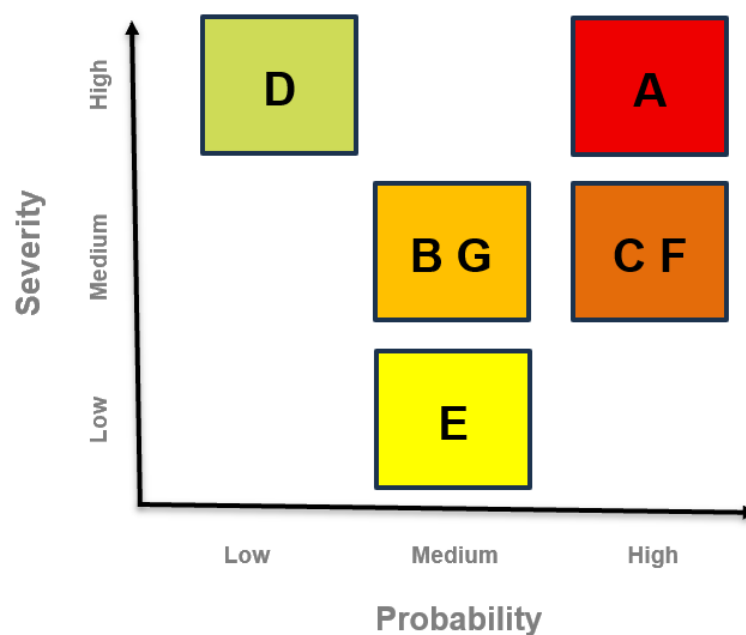
Source: Author

References

Aberdeen (2024). *Decoded: abrdn examines three common investment styles*. Available at: https://www.aberdeenplc.com/en-gb/news-and-insights/decoded-abrdn-examines-three-common-investment-styles

Albrecht, B. (2025). *Value Stocks Lead to Start 2025, but Growth Retains Its Long-Term Advantage*. Morningstar. Available at: https://www.morningstar.com/markets/value-stocks-lead-start-2025-growth-retains-its-long-term-advantage

BlackRock (2025). *Larry Fink's 2025 Annual Chairman's Letter to Investors*. Available at: https://www.blackrock.com/corporate/investor-relations/larry-fink-annual-chairmans-letter

Bloomberg (2025). *ECB to Cut Rates as Trade Mess Weighs on the Economy.* Available at: https://www.bloomberg.com/news/articles/2025-06-05/ecb-to-cut-interest-rates-as-trade-mess-weighs-on-economy?srnd=homepage-asia&embedded-checkout=true

Caixa Geral de Depósitos (2025). *Taxes on investments: how much do I have to pay and how do I declare them?* Available at: https://www.cgd.pt/Site/Saldo-Positivo/leis-e-impostos/Pages/impostos-investimentos.aspx

CFA Institute (2010). *Elements of an Investment Policy Statement for Individual Investors.* Available at: https://rpc.cfainstitute.org/policy/positions/elements-of-an-investment-policy-statement-for-individual-investors

Damodaran, A. (2003). *Investment Philosophies: Successful Strategies and the Investors Who Made Them Work*. John Wiley & Sons.

David, H. (2024). How to Use Monte Carlo Simulation With GBM. Investopedia. Available at: https://www.investopedia.com/articles/07/montecarlo.asp

European Central Bank (2025). *Macroeconomic Projections March 2025*. Available at: https://www.ecb.europa.eu/press/projections/html/ecb.projections202503_ecbstaff~106050a4fa.pt.html#toc7

European Central Bank (2025). *Macroeconomic Projections June 2025*. Available at: https://www.ecb.europa.eu/press/projections/html/ecb.projections202506_eurosystemstaff~16a68fbaf4.en.html

IBOSS. (2025). *Ratio Definitions*. Available at: https://www.ibossam.com/ratio-definitions/

JP Morgan (2025). *2025 Long Term Capital Market Assumptions*. Available at: https://am.jpmorgan.com/content/dam/jpm-am-aem/global/en/insights/ltcma-2025-us-matrix_usd.pdf

JustETF (2025). *ETF Screener*. Available at: https://www.justetf.com/en/search.html?search=ETFS

Lee, Y., Kim, W. C., & Kim, J. H. (2020). Achieving Portfolio Diversification for Individuals with Low Financial Sustainability. *Sustainability*, *12*(17), 7073. Available at: https://doi.org/10.3390/su12177073

Markowitz, H. (1952). Portfolio Selection. *The Journal of Finance,* 7, 77-91. Wiley. https://doi.org/10.1111/j.1540-6261.1952.tb01525.x

Mahatani, S. & Morgan, D. (2024). *Emerging market volatility shifts lower*. Investment Institute. Ninety One Publishing. Available at: https://ninetyone.com/en/insights/emerging-market-volatility-shifts-lower

OECD (2025). *OECD Economic Outlook, Volume 2025 Issue 1*: *Tackling Uncertainty, Reviving Growth.* OECD Publishing. Available at: https://doi.org/10.1787/83363382-en

Precedence Research (2025). *Esports market size, share, and trend 2025 to 2034*. Available at: https://www.precedenceresearch.com/esports-market

Sahani, V. (2025). Comparative Analysis of Growth and Value Stocks in the S&P 500: Impacts of Recent Macroeconomic Events from 2014-2024. In *The British Conference of Undergraduate Research* Available at: https://www.researchgate.net/publication/391552948_Comparative_Analysis_of_Growth_and_Value_Stocks_in_the_SP_500_Impacts_of_Recent_Macroeconomic_Events_from_2014-2024

Schwab (2019). *Benefits and considerations of ETFs*. Available at: https://www.schwab.com/etfs/benefits

Schwab (2025). *Investor Profile Questionnaire*. Available at: https://www.schwab.com/resource/investment-questionnaire

Vontobel (2024). *Quality Growth*. Available at: https://am.vontobel.com/en/quality-growth

WisdomTree (2025). *Quality Growth: High growth exposure, without compromising quality*. Available at: https://www.wisdomtree.eu/en-gb/strategies/quality-growth

World Economic Forum (2025). *The Global Risks Report 2025*. Available at: https://reports.weforum.org/docs/WEF_Global_Risks_Report_2025.pdf

Appendix

Table A1. Client's Profile (detailed)

Names	Mr. Manuel Francisco and Mrs. Margarida Francisco
Age	42 and 37 (respectively)
Children	Eight-year-old twin children, Matilde and Miguel
Occupation	Medical Doctors
Net Annual Income	Mr. Francisco: €36,000 (€3,000 per month)
	Mrs. Francisco: €34,200 (€2,850 per month)
	Total: €70,200
Additional Information	-Long Term Deposit of €75,000
	-Emergency Fund of €20,000
	-Limited Knowledge of Financial Markets
Investment Amount	€615,000
Investment Objective	€1,420,000 (in 10 years: €2,236,614 assuming 2.3% of annual inflation and 28% on Capital Tax Gains)
Time Horizon	10 Years
Investment Constraints	-No Short Selling or Leverage
	-Investment in ETFs
	-No liquidity requirements
	-Only Euro (€) denominated ETFs
Minimum Rate of Return	13.78%
Ability to Bear Risks / Willingness to Take on Risks	High / High
Risk Profile	Moderately Agressive
Expected Average Annual Return (Portfolio)	15.04%
Volatility (Portfolio)	10.51%

Source: Author

Table A2. Profiling Questionnaire

Time Horizon Score: 18 Points

1- I plan to begin withdrawing money from my investments in: Answer: "11 years or more" (10p)	2- Once I begin withdrawing funds from my investments, I plan to spend all of the funds in: Answer: "11 years or more" (8p)

Risk Tolerance Score: 28 Points

| 3- I would describe my knowledge of investments as: Answer: "Limited" (2p)	4- What amount of financial risk are you willing to take when you invest? Answer: "Take average risks, expecting to earn average returns" (4p)
5- Select the investments you currently own or have owned: Answer: "Stocks and/or stock funds" (6p)	6- Consider this scenario: Imagine that in the past three months, the overall stock market lost 25% of its value. An individual stock investment you own also lost 25% of its value. What would you do? Answer: "Buy more shares" (8p)

7- . Review the chart below.

We've outlined the most likely best-case and worst-case annual returns of five hypothetical investment plans. Which range of possible outcomes is most acceptable to you? The figures are hypothetical and do not represent the performance of any particular investment.

Plan	Average annual return	Best-case	Worst-case	Points
A	2.6%	10.8%	-5.1%	0
B	4.1%	19.2%	-10.6%	3
C	5.6%	27.6%	-16.4%	6
D	6.1%	36.0%	-21.7%	8
E	7.2%	42.5%	-25.8%	10

Answer: D (8p)

Source: Author

Figure A1. Charles' Swchab Investor Profile Allocation
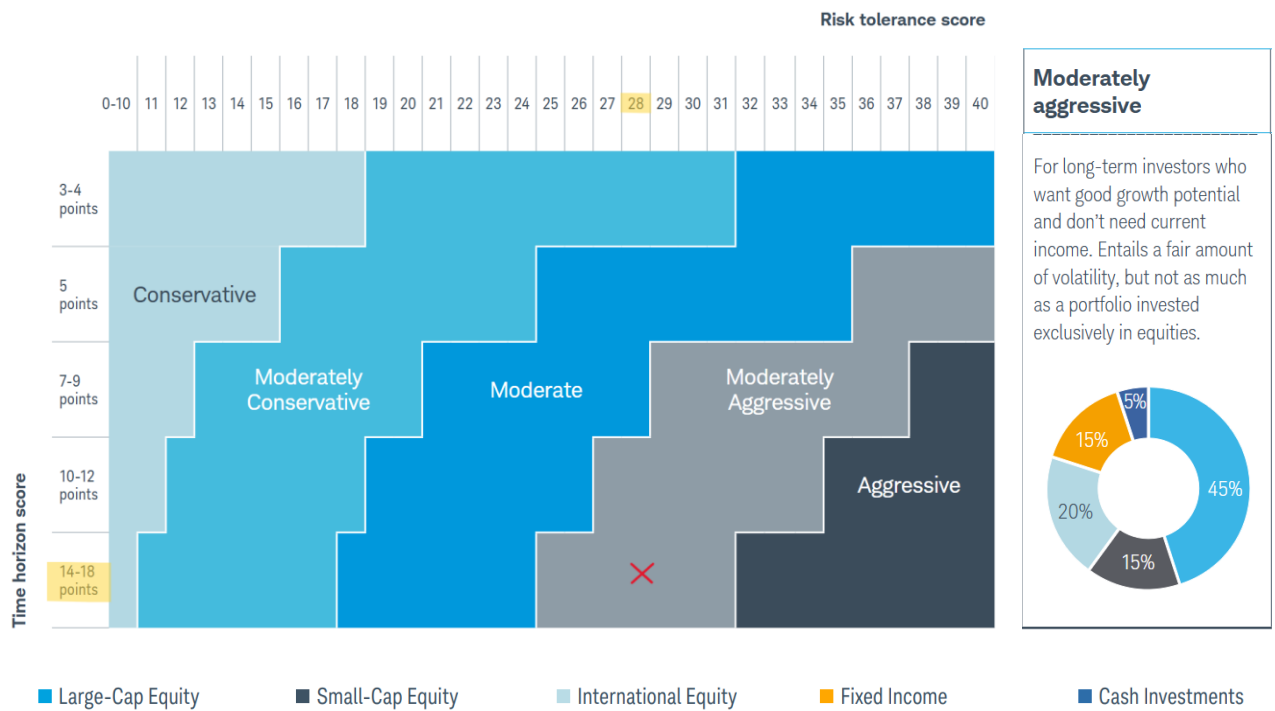
Source: Schwab (2025)

Table A3. ETF Selection Screens

ETFs	Fund Size	Index	Distribution Policy	TER	Replication Method	Traded Currency	ETF Provider	Investment Focus
Xtrackers Russell 2000 UCITS ETF 1C	1366M	Russell 2000	Accumulating	0.3%	Physical	€	Xtrackers	Small Cap
iShares Core MSCI EM IMI UCITS ETF	22061M	MSCI Emerging Markets Investable Market	Accumulating	0.18%	Physical	€	Blackrock	Emerging Markets
Xtrackers MSCI World Quality UCITS ETF 1C	1737M	MSCI World Sector Neutral Quality index	Accumulating	0.25%	Physical	€	Xtrackers	Quality World
Xtrackers Artificial Intelligence &Big Data UCITS ETF 1C	4350M	Nasdaq Global AI and Big Data Index	Accumulating	0.35%	Physical	€	Xtrackers	Artificial Intelligence
VanEck Video Gaming and eSports UCITS ETF	721M	MarketVector Global Video Gaming and eSports ESG index	Accumulating	0.55%	Physical	€	Xetra	Video Gaming and eSports
Amundi MSCI Semiconductors UCITS ETF Acc	645M	MSCI ACWI Semiconductors & Semiconductor Equipment Filtered index	Accumulating	0.35%	Physical	€	Amundi	Semiconductors
Xtrackers Future Mobility UCITS ETF 1C	122M	Nasdaq Global Future Mobility index	Accumulating	0.35%	Physical	€	Xtrackers	Future Mobility
iShares S&P 500 Energy Sector UCITS ETF (Acc)	567M	S&P 500 Capped 35/20 Energy index	Accumulating	0.15%	Physical	€	Blackrock	Energy
Amundi Euro Stoxx Banks UCITS ETF Acc	2508M	EURO STOXX® Banks index	Accumulating	0.3%	Physical	€	Amundi	Financials
iShares S&P 500 Health Care Sector UCITS ETF	1935M	S&P 500 Capped 35/20 Health Care index	Accumulating	0.15%	Physical	€	Blackrock	Health Care
Amundi Index FTSE EPRA NAREIT Global UCITS ETF DR	312M	FTSE EPRA/NAREIT Developed index	Accumulating	0.24%	Physical	€	Amundi	Real Estate
Xetra-Gold	16262M	Gold index	Accumulating	0%	Physical	€	Xetra	Gold
Vanguard EUR Corporate Bond UCITS ETF Accumulation	2914M	Bloomberg Euro Corporate Bond index	Accumulating	0.09%	Physical	€	Vanguard	Corporate Bonds
iShares Euro Government Bond 7-10yr UCITS ETF	879M	Bloomberg Euro Government Bond 7-10 index	Accumulating	0.15%	Physical	€	Blackrock	Government Bonds

Source: JustETF(2025); Author

Table A4. ETFs Detailed Information

ETFs	ISIN	Info
Xtrackers Russell 2000 UCITS ETF 1C	IE00BJZ2DD79	This ETF tracks the Russell 2000 Index, which captures the performance of 2,000 small-cap companies listed in the United States. It follows a full replication methodology, holding all constituents of the index directly. Dividends are accumulated and reinvested. The fund was launched on 6 March 2015.
iShares Core MSCI EM IMI UCITS ETF	IE00BKM4GZ66	This fund replicates the MSCI Emerging Markets Investable Market Index (IMI), covering stocks across emerging economies worldwide. Using full replication, it holds the complete set of index constituents and reinvests all income. It was launched on 30 May 2014.
Xtrackers MSCI World Quality UCITS ETF 1C	IE00BL25JL35	This ETF tracks the MSCI World Sector Neutral Quality Index, which selects stocks from 23 developed countries. The constituents are selected by three main equally weighted indicators of whether a company is demonstrating high quality characteristics: high return on equity, low leverage and stable earnings growth. The fund employs full replication and reinvests dividends. It was launched on 11 September 2014.
Xtrackers Artificial Intelligence &Big Data UCITS ETF 1C	IE00BGV5VN51	This ETF follows the Nasdaq Global Artificial Intelligence and Big Data Index, targeting international companies in the fields of AI, big data, and cybersecurity. The index incorporates ESG filters during stock selection. The fund is fully replicated and accumulates dividends. It was launched on 29 January 2019.
VanEck Video Gaming and eSports UCITS ETF	IE00BYWQWR46	Tracking the MarketVector Global Video Gaming and eSports ESG Index, this ETF includes companies that derive at least 50% of revenues from gaming, eSports, or associated hardware/software. The stocks included are filtered according to ESG criteria. The fund uses full replication and reinvests dividends. It was launched on 24 June 2019.
Amundi MSCI Semiconductors UCITS ETF Acc	LU1900066033	This ETF aims to replicate the MSCI ACWI Semiconductors & Semiconductor Equipment Filtered Index, which tracks large and mid-cap companies across 23 Developed Markets and 24 Emerging Markets that are active in the semiconductor industry. The stocks included are filtered according to ESG criteria. The ETF is fully replicated and reinvests all income. It was launched on 28 March 2007.

Xtrackers Future Mobility UCITS ETF 1C	IE00BGV5VR99	The ETF tracks the Nasdaq Global Future Mobility Index, comprising global companies linked to mobility innovation, including electric vehicles, autonomous driving, and infrastructure. The stocks included are filtered according to ESG criteria. The fund is fully replicated and accumulates dividends. It was launched on 29 January 2019.
iShares S&P 500 Energy Sector UCITS ETF (Acc)	IE00B42NKQ00	This ETF tracks the S&P 500 Capped 35/20 Energy index, which includes U.S. energy sector companies under GICS classification. The weight of the largest company in the index is capped to 35%, the weight of all other companies to 20%. The fund was launched on 20 November 2015.
Amundi Euro Stoxx Banks UCITS ETF Acc	LU1829219390	This ETF follows the EURO STOXX® Banks index, providing targeted exposure to the eurozone banking sector. It uses full replication and accumulates dividends. It was launched on 12 December 2013.
iShares S&P 500 Health Care Sector UCITS ETF	IE00B43HR379	The ETF tracks the S&P 500 Capped 35/20 Health Care index, which captures U.S. companies classified under the Health Care sector (GICS Classification), with weight caps to reduce concentration risk. The dividends in the ETF are accumulated and reinvested.The launch date was 20 November 2015.
Amundi Index FTSE EPRA NAREIT Global UCITS ETF DR	LU1437018838	This ETF replicates the FTSE EPRA/NAREIT Developed index, offering exposure to the largest listed real estate companies from developed markets. It follows a full replication strategy and accumulates dividends. The fund was launched on 17 November 2016.
Xetra-Gold	DE000A0S9GB0	Xetra-Gold tracks the spot price of physical gold in USD with a collateralised debt obligation which is backed by physical holdings of the precious metal. It was launched on 27 November 2007.
Vanguard EUR Corporate Bond UCITS ETF Accumulation	IE00BGYWT403	This ETF tracks the Bloomberg Euro Corporate Bond index The index tracks euro-denominated corporate bonds from industrial, utility and financial issuers publicly issued in the Eurobond and eurozone domestic markets. Rating: Investment Grade. It reinvests income. The fund was launched on 19 February 2019.
iShares Euro Government Bond 7-10yr UCITS ETF	IE00B3VTN290	This ETF follows the Bloomberg Euro Government Bond 10 index, covering euro-denominated sovereign bonds from EMU members with maturities between 7 and 10 years. Rating: Investment Grade. It accumulates interest income. The ETF was launched on 2 June 2009.

Source: JustETF(2025)

Disclosures and Disclaimer

Character count: The main body of this report (from page 1 to page 33) contains 73,380 characters and the remaining sections contain 24,631 characters.

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, outlining purposes and to improve English and grammar. However, all final writing, synthesis, and critical analysis are my own work.

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.

Martim Ribeiro, June 2025