



Lisbon School
of Economics
& Management
Universidade de Lisboa

MASTER OF SCIENCE IN FINANCE

MASTERS FINAL WORK PROJECT

**INVESTMENT POLICY STATEMENT:
MR. AND MRS. RODRIGUEZ**

CATARINA ALMEIDA

JUNE 2026



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PEDRO RINO VIEIRA

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Abstract

This Investment Policy Statement is prepared for a Portuguese couple, both aged 25, who intend to accumulate €500,000 in real terms over a 25-year horizon through an initial contribution of €20,000 and regular annual savings of €10,000. The goal translates into a required real return of 4.42% per year, equivalent to 6.51% in nominal terms once 2% expected inflation is compounded. With two stable and weakly correlated professional incomes, a fully funded emergency reserve and a long horizon, the investors display an above-average, growth-oriented risk tolerance and minimal liquidity needs, while remaining subject to a long-only, no-leverage mandate restricted to UCITS exchange-traded funds and to a 28% Portuguese capital-gains tax on disposal. The investment philosophy is long-term, passive and globally diversified, implemented through transparent, low-cost listed instruments in a core-satellite structure with a deliberate tilt toward the value factor. Mean-variance optimisation, bounded by the policy's asset-class corridors, yields an allocation of 60% equity, 27% fixed income and 13% real assets, implemented through four low-cost listed instruments: three UCITS ETFs and one physically backed gold ETC. The resulting portfolio carries an expected net return of 11.33% per year against 9.13% volatility, clearing the required-return floor by roughly 4.8 percentage points. Monte Carlo analysis confirms a high probability of meeting the goal, while the constrained optimisation ensures that the adopted portfolio is the best risk-adjusted allocation available within the IPS limits.

JEL classification: C6; G11; G17; D14

Keywords: Asset Management; Portfolio Theory; IPS; Individual Investors; Strategic Asset Allocation; Goal-based Investing; UCITS ETFs

Resumo

Esta Declaração de Política de Investimento é preparada para um casal português, ambos com 25 anos, que pretende acumular €500.000 em termos reais ao longo de um horizonte de 25 anos, através de uma contribuição inicial de €20.000 e de poupanças anuais regulares de €10.000. O objectivo traduz-se numa rendibilidade real exigida de 4,42% ao ano, equivalente a 6,51% em termos nominais depois de capitalizada uma inflação esperada de 2%. Com dois rendimentos profissionais estáveis e pouco correlacionados, um fundo de emergência plenamente constituído e um horizonte longo, os investidores apresentam uma tolerância ao risco acima da média, orientada para o crescimento, e necessidades de liquidez mínimas, mantendo-se sujeitos a um mandato sem alavancagem e sem posições curtas, restrito a fundos de índice cotados UCITS e a uma tributação portuguesa de 28% sobre as mais-valias na alienação. A filosofia de investimento é de longo prazo, passiva e globalmente diversificada, implementada através de instrumentos cotados transparentes e de baixo custo, numa estrutura core-satellite com uma inclinação deliberada para o factor value. A optimização média-variância, limitada pelos corredores por classe de ativos da política, sustenta uma alocação de ativos de 60% em ações, 27% em obrigações e 13% em ativos reais, implementada através de quatro instrumentos cotados de baixo custo: três ETF UCITS e um ETC de ouro fisicamente colateralizado. A carteira resultante apresenta uma rendibilidade líquida esperada de 11,33% ao ano para uma volatilidade de 9,13%, superando o limiar de rendibilidade exigida em cerca de 4,8 pontos percentuais. A análise de Monte Carlo confirma uma probabilidade elevada de atingir o objetivo, enquanto a optimização com restrições garante que a carteira adotada corresponde à melhor alocação ajustada ao risco disponível dentro dos limites definidos pelo IPS.

Classificação JEL: C6; G11; G17; D14

Palavras-Chave: Gestão de Ativos; Teoria da Carteira; IPS; Investidores Individuais;

Alocação Estratégica de Ativos; Investimento Orientado a Objetivos; ETF UCITS

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Abbreviations

CAL	Capital Allocation Line
ECB	European Central Bank
EM	Emerging Markets
EPRA	European Public Real Estate Association
ESG	Environmental, Social and Governance
ETF	Exchange-Traded Fund
EU	European Union
EUR	Euro
FTSE	Financial Times Stock Exchange
GICS	Global Industry Classification Standard
GMV	Global Minimum Variance
HICP	Harmonised Index of Consumer Prices
IG	Investment Grade
IMI	Investable Market Index
IPS	Investment Policy Statement
JEL	Journal of Economic Literature
MiFID II	Markets in Financial Instruments Directive II
MSCI	Morgan Stanley Capital International
MVO	Mean-Variance Optimisation
NAREIT	National Association of Real Estate Investment Trusts
PRIIPs	Packaged Retail and Insurance-based Investment Products
REIT	Real Estate Investment Trust
SAA	Strategic Asset Allocation
SFR	Safety-First Ratio
TER	Total Expense Ratio
UCITS	Undertakings for Collective Investment in Transferable Securities
US	United States
VaR	Value at Risk

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The Advisory Process & IPS Proposal

1. **The Advisory Mandate:** This document presents the final Investment Policy Statement for the Rodriguez household, developed through a structured wealth management advisory process. The mandate was to create a personalised, long-term investment strategy aligned with the clients' circumstances and aspirations. Both clients are 25 years old, one a software engineer and the other a lawyer, with stable human capital, a long horizon, and a single dominant objective: to accumulate €500,000 in real purchasing power over a 25-year horizon ending in 2052, funded by an initial contribution of €20,000 and annual savings of €10,000.
2. **Summary of the Advisory Process:** The process followed a disciplined five-phase approach:
 - a. **Discovery:** Comprehensive data gathering via a client questionnaire and risk profile assessment.
 - b. **Analysis:** Diagnosis of the clients' financial standing, leading to a synthesis of their risk tolerance as high and a moderately aggressive, accumulation-oriented profile.
 - c. **Strategy Formulation:** Development of a goals-based investment strategy targeting a required real return of 4.42% per year, equivalent to 6.51% in nominal terms once expected inflation is incorporated through the Fisher relation.
 - d. **Implementation & Documentation:** This IPS serves as the formal record of the agreed-upon strategy. The security-selection process identifies one suitable listed vehicle for each of the twelve eligible sub-asset classes, while the adopted constrained portfolio ultimately uses four of those vehicles.
 - e. **Monitoring:** Defined procedures for ongoing portfolio oversight and annual IPS reviews.
3. **The IPS Proposal (The Output):** The core of the resulting IPS is an adopted constrained portfolio of 60% equities, 27% fixed income and 13% real assets. The allocation is implemented through four low-cost listed instruments: three UCITS ETFs

and one physically backed gold ETC. The strategy carries an expected gross return of 11.45% per year, 11.33% net of fund costs, against annualised volatility of 9.13%, and is designed to achieve the clients' €500,000 real objective while remaining inside the IPS risk and exposure constraints.

4. **Conclusion:** This IPS is recommended for implementation, as it directly translates the client's profile into a clear, actionable, and disciplined investment plan. The subsequent sections of this document detail the full governance, risk profiling, and investment design.

1 Scope and Purpose

This Investment Policy Statement (IPS) establishes the framework that governs the management of the investment portfolio held by the clients to whom it is addressed. It defines the investment objectives, the return and risk requirements, the constraints, and the governance and monitoring arrangements that together direct how the portfolio is constructed, implemented, and reviewed over its intended life. The document is designed to serve as the single point of reference against which every subsequent investment decision can be assessed for consistency and suitability. The IPS applies to two clients, Mr. and Mrs. Rodriguez, a couple both aged 25 at the inception of the investment and resident in Portugal for tax purposes. Mr. Rodriguez is a software engineer, and Mrs. Rodriguez is a practising lawyer. Both hold stable positions that provide reliable monthly income and a high degree of tenure security, and their earnings derive from professional fields whose fortunes are only weakly correlated with one another, which lends resilience to the household's combined earning capacity. The couple has no children at the outset of the plan and currently resides rent-free with family, so that a substantial share of their disposable income is available for saving and investing. Because their financial circumstances, objectives, and time horizon are fully shared, the clients are treated throughout this document as a single investing unit. The scope of this IPS is limited to the long-term investment portfolio dedicated to the clients' wealth-accumulation goal, namely the attainment of €500,000 in real terms over a 25-year horizon. It does not extend to the clients' other financial resources. In particular, the emergency reserve of three to six months of living expenses, the assets earmarked for intermediate life events such as the purchase of a primary residence, and routine day-to-day banking are all held and managed outside the perimeter of this portfolio and fall outside the remit of this statement. Isolating the long-term portfolio in this way ensures that the strategy set out here is governed solely by the long-horizon objective and is not diluted by shorter-term needs that are funded separately. The purpose of the IPS is threefold. First, it records a clear and shared understanding of the clients' objectives, risk profile, and constraints, so that the strategy rests on an explicit and agreed foundation. Second, it translates that understanding into an implementable investment design, from the strategic asset allocation through to the selection of individual instruments. Third, it provides the standard against which performance and continued suitability are monitored, defining the benchmarks, rebalancing rules, and review cadence that keep the portfolio aligned with its objectives as circumstances evolve. The policy is intended to remain in force throughout the investment horizon and to be reviewed at regular intervals, as well as upon any material change

in the clients' situation, so that it continues to reflect their goals and the prevailing market environment. The analysis throughout this document follows the framework of the CFA Institute and the portfolio-management literature, applied to the couple investing in the portfolio.

2 Governance

This section sets out the governance framework of the investment programme, identifying the parties involved, allocating responsibilities among them, and establishing the procedures through which the policy is approved, implemented, reviewed, and amended. A clear allocation of roles is what allows the strategy defined in the remainder of this document to be executed consistently and to be held accountable to objective standards over the full investment horizon. Two roles are distinguished. The clients, Mr. and Mrs. Rodriguez, are the owners of the assets and the ultimate decision-makers. They are responsible for articulating their objectives, risk profile, and constraints, for reviewing and approving this Investment Policy Statement before it takes effect, and for informing the adviser promptly of any material change in their circumstances. The investment adviser is responsible for translating the clients' profile into an implementable strategy, for proposing the strategic asset allocation, for selecting the instruments that populate each asset class, for executing the agreed strategy, and for monitoring and reporting on the portfolio. The assets themselves are held with a regulated custodian or broker, which settles transactions and produces the independent valuation records on which reporting relies. Because the clients share a single set of objectives and a common horizon, they act jointly and are treated as one investing unit for all governance purposes. Responsibility for the strategic asset allocation rests jointly with the clients and the adviser. The adviser formulates the policy portfolio and its permitted ranges, grounding them in the return and risk requirements established in the risk-profiling chapter, and the clients approve the allocation before implementation. The policy portfolio, rather than short-term market views, is the governing benchmark for the programme. Day-to-day implementation within the approved ranges is delegated to the adviser, who therefore operates under a discretionary mandate bounded by the policy ranges set out in this document. Any change to the policy portfolio itself, as opposed to routine rebalancing back toward it, requires the clients' explicit approval. The portfolio is monitored on a continuous basis and formally reviewed at set intervals. The adviser monitors the allocation each quarter against the adopted target weights and the IPS corridors, rebalancing back toward target when an allocation moves beyond its permitted range. A

comprehensive review of the entire policy is conducted at least once a year, and additionally whenever a material change in the clients' circumstances or in the market environment warrants it. The annual review reassesses the objectives, the risk profile, the constraints, and the continued appropriateness of the strategic asset allocation, and any resulting amendment to this statement is documented and approved by the clients. Reporting follows the same cadence. The adviser provides the clients with a periodic report that states the portfolio's value and composition, its performance measured against the overall benchmark and the benchmarks of the individual asset classes, its realised risk and risk-adjusted return, and its compliance with the policy ranges. The reporting is designed to be transparent and accessible, consistent with the clients' stated preference for instruments and processes they can understand without specialised expertise, so that limited prior investment experience does not hinder informed oversight of the strategy.

3 Risk Profiling

3.1 Investment Objectives

Mr. and Mrs. Rodriguez, both aged 25, are a young Portuguese couple at the start of their professional careers and in the early accumulation phase of their financial life. Mr. Rodriguez is a software engineer, and Mrs. Rodriguez is a practising lawyer. Both hold stable positions that provide reliable monthly income and a high degree of tenure security. The couple has no children and currently resides rent-free at a family member's house, which keeps household outflows concentrated on routine living expenses, such as groceries, utilities (water, electricity, and gas), and leisure. The couple therefore leaves a substantial share of their disposable income available for saving and investing. Over the next 5 years the clients intend to purchase their first home, after which mortgage servicing will become a recurring obligation, and within the following decade they also expect to start a family.

Both individuals demonstrate a moderate level of financial literacy but have no prior experience in financial markets. Their motivation to begin investing is grounded in a clear understanding of the time value of money, the recognition that one euro held idle today is worth less, in real terms, than one euro deployed productively over time. They appreciate the importance of broad diversification and are willing to take on a meaningful level of investment risk, acknowledging that their young age and long horizon allow them to absorb interim drawdowns in exchange for the higher expected returns associated with equity-tilted portfolios over a 25-year period.

They have expressed one consistent reservation, namely a measured caution toward the elevated geopolitical and macroeconomic uncertainty currently observed in the global economy.

Their profile fits naturally with a passive, globally diversified investment strategy that provides ample exposure to compensated risk factors, while avoiding the behavioural friction associated with frequent tactical adjustments, leverage, or high-complexity products.

The clients' primary investment objective is the long-term accumulation of investable wealth, with a target terminal portfolio value of approximately €500,000, expressed in today's purchasing power, by the end of a 25-year planning horizon. Inception is funded by a combined initial investment of €20,000 (€10,000 contributed by each partner), and the couple intends to add a further €10,000 to the portfolio in each subsequent year. Meeting this target from this contribution schedule implies a required rate of return, which is derived, expressed in both real and nominal terms, and tested against the proposed allocation in the return and risk requirements section that follows. Reaching the target represents a major milestone in their long-term financial independence. It is intended to provide sufficient accumulated capital to support several interrelated, qualitative goals once the horizon concludes, namely a comfortable transition into a more flexible, semi or fully retired lifestyle, the ability to provide financial support to future children, and the possibility to redeploy capital into other investment opportunities that best fit the household's circumstances at that point. In parallel, and through scheduled servicing out of recurrent income rather than from the portfolio itself, the clients aim to have fully extinguished the mortgage they expect to contract within the next 5 years. The portfolio is therefore conceived not as a single liability-matching exercise, but as a long-horizon wealth-accumulation programme designed to expand the household's range of choices in mid-life.

3.2 Return and risk requirements

To determine the required return, the framework adopted is the future value of an initial lump sum combined with an ordinary annuity, since the clients' goal is not a single deposit, but a €20,000 initial investment followed by 25 annual contributions of €10,000 in real terms. Solving this combined formula for the rate that yields a terminal real wealth of €500,000 over the 25-year horizon produces a required real rate of return of approximately 4.42% per annum. As noted in the objectives, the clients have deliberately chosen not to pre-allocate fixed amounts or percentages to any individual long-term purpose. Their primary goal is to grow the

aggregate capital pool while protecting it against inflation and broader macroeconomic fluctuations, and the allocation across the qualitative goals will be deferred to the end of the planning horizon and made in light of the household's circumstances at that point.

The required return derived above is expressed on an inflation-adjusted, or real, basis. Real framing isolates the productivity of the portfolio from the loss of purchasing power and ensures that the €500,000 target is interpretable in today's euros rather than in nominal future euros, which is essential given the 25-year horizon over which compounded inflation can materially distort the apparent size of the goal.

Over the past two decades, Portuguese inflation, measured by the Harmonised Index of Consumer Prices (HICP) compiled by Statistics Portugal (INE) and published by Eurostat, has averaged approximately 1.9% per annum, with year-on-year readings ranging from short deflationary episodes (around minus 0.9% in 2009 and minus 0.2% in 2014) to the recent post-pandemic, energy-driven spike (8.1% in 2022 and 5.3% in 2023). Across the 2005 to 2019 cycle, the average was below 2%, broadly consistent with the European Central Bank's medium-term price-stability objective. Although the prevailing environment in mid-2026 remains above target, with inflation elevated by recurrent energy shocks, the relevant assumption for a 25-year horizon is the long-run average to which prices are expected to revert. For the purposes of this IPS, an annual inflation assumption of 2.0% per year is therefore adopted, aligned with the ECB target and with the long-run Portuguese average.

Combining this inflation assumption with the 4.42% real required return through the Fisher relation, $(1 + 0.0442)(1 + 0.02) - 1$, gives a nominal required return of approximately 6.51% per annum, which is the floor against which the proposed allocation is judged in the portfolio construction and expected-performance analysis. The required return is stated before investor-level capital-gains taxation. Taxes are modelled separately because they depend on realised gains, rebalancing activity and liquidation timing. The base case assumes that most gains are deferred until the end of the horizon, while the monitoring framework seeks to minimise, but cannot eliminate, interim taxable realisations. The effect of taxation is therefore captured separately in the Monte Carlo analysis, where terminal wealth is also reported after applying the 28% Portuguese capital-gains tax to realised gains.

The clients do not anticipate liquidating any portion of the portfolio before the end of the 25-year horizon. They view this investment as a deliberate, long-term commitment, in line with their current financial reality, and acknowledge that any premature redemption would compromise the compounding dynamic on which the target depends. Liquidity demand against

the portfolio is therefore assessed as low and is met externally by a separate emergency fund covering several months of household expenses.

To monitor portfolio risk on an ongoing basis, three complementary methodologies are applied. Value-at-Risk (VaR), computed both parametrically and from the historical return distribution, provides a quantile-based estimate of potential losses over a defined horizon and confidence level. Monte Carlo simulation generates a forward-looking distribution of terminal wealth by resampling, with replacement, from the portfolio's empirical monthly return distribution rather than from an assumed normal law, so that it does not impose normality and remains genuinely distinct from the parametric VaR. The simulation runs 100,000 paths, incorporates the full schedule of periodic contributions, applies returns net of the 0.12% weighted expense ratio of the underlying ETFs, and yields the probability of reaching the €500,000 target. Historical stress testing evaluates the behaviour of the portfolio under specific past episodes of severe market dislocation. The three lenses are deliberately complementary, combining a parametric quantile measure that assumes normality, a non-parametric simulation drawn from the empirical and non-normal return distribution, and a historical scenario-based view, together providing a perspective on risk that no single metric can deliver in isolation.

3.3 Risk Tolerance

Following the CFA framework, the analysis separates risk capacity from risk tolerance (Maginn et al., 2007). Risk capacity is the objective ability to absorb losses without compromising the plan, while risk tolerance is the subjective willingness to bear volatility in pursuit of higher returns. The two need not coincide, and the policy must be governed by the more binding of them.

Risk tolerance was assessed through the Vanguard Investor Questionnaire. The clients' answers concentrate at the equity-tilted, behaviourally disciplined end of the scale, indicating a strong willingness to remain invested through drawdowns. The only departure from this pattern is self-reported investment knowledge, which sits at the "somewhat inexperienced" level. This single outlier does not lower the overall willingness to take risk, but it does carry an operational implication: the strategy should stay transparent and rules-based, and the monitoring process should keep the clients informed so that limited experience does not translate into poorly timed decisions under stress.

Mapping capacity against tolerance using the capacity-by-tolerance matrix (Cordell, 2001) places the clients in the growth-oriented quadrant, where high tolerance meets high capacity.

The high-capacity reading is supported by a 25-year horizon, two stable salaried incomes in sectors with low mutual correlation, the absence of any dependants or housing costs currently charged against this portfolio, and a correspondingly high implied savings rate. The intermediate life events that the clients anticipate, namely a home purchase and the possible arrival of a child, are funded separately and therefore do not erode the portfolio's capacity to bear risk. Each of these factors lengthens the period over which short-term losses can be recovered and reduces the likelihood that the portfolio is liquidated at an unfavourable moment. The four-dimensional CFA assessment confirms this profile: the clients perceive risk realistically, understanding that equity exposure entails meaningful interim volatility, and they remain willing to accept that volatility in exchange for long-horizon growth.

Finally, the threshold dimension of risk is captured through Roy's (1952) safety-first criterion. The criterion measures the distance between a portfolio's expected return and a minimum acceptable return, scaled by volatility, through the safety-first ratio, $SFR = (E(R_p) - R_L) / \sigma_p$, where $E(R_p)$ is the expected return of the portfolio, σ_p its volatility, and R_L the minimum acceptable return. For these clients, R_L is set at their required return, namely 4.42% in real terms, equivalent to 6.51% in nominal terms. Roy's formulation is preferred over the alternatives of Telser (1955) and Kataoka (1963) because the clients' problem is a fixed-threshold one, concerned with the probability of falling short of a single, well-defined return floor, and the safety-first ratio integrates directly with the mean-variance machinery used elsewhere in the policy. The safety-first ratio is not the objective that selects the portfolio weights. The allocation is determined by maximising the Sharpe ratio within the IPS asset-class corridors, consistent with the mean-variance framework applied throughout, and the safety-first ratio is then computed on the resulting portfolio as a downside-risk diagnostic. Evaluated once the expected return and volatility of the proposed portfolio are established, in the investment design chapter, it confirms that the selected allocation clears the clients' floor with an adequate margin per unit of risk.

Taken together, the Vanguard questionnaire recommendation and the growth-quadrant classification converge on the same conclusion: both risk capacity and risk tolerance are high, and the policy can be built around a growth-oriented, equity-tilted allocation. That allocation is obtained by Sharpe-maximisation under the policy's constraints, and Roy's safety-first ratio then provides the threshold lens through which it is validated against the clients' return floor in the investment design chapter.

3.4 Constraints

Several constraints bound the investment strategy along five canonical dimensions: time horizon, liquidity, taxes, the legal and regulatory environment, and unique preferences and circumstances.

The investment horizon is 25 years, running from the inception of the investment in 2027 to the target terminal date in 2052. This is a single, long-term horizon. Although the clients have articulated intermediate life events, such as the purchase of a primary residence within 5 years and the possible arrival of a child within 10 years, these events are funded outside the perimeter of this portfolio, which is dedicated exclusively to the long-term wealth-accumulation goal of €500,000 in real terms by 2052. Because the intermediate events are financed separately, they do not shorten the portfolio's effective horizon nor create interim claims on its assets.

No material liquidity needs arise from the portfolio. Day-to-day living expenses are fully covered by the clients' salary income, and a separate emergency reserve of three to six months of living expenses is held outside the perimeter of this portfolio, at the clients' discretion, in bank deposits and money-market funds. The portfolio is therefore not required to maintain a buffer for unexpected outflows, which supports a fully invested strategic posture in long-duration assets.

The clients are Portuguese tax residents and are therefore subject to Personal Income Tax (IRS) and to the rules applicable to investment income and capital gains under the Portuguese Tax Code. Dividends and interest received by individual investors are generally subject to a flat rate of 28%, applied by withholding, while capital gains realised on the disposal of securities are taxed at the same flat rate of 28% on a self-assessment basis, with specific rules applicable to foreign-source income and to distributing versus accumulating fund structures. The portfolio construction incorporates these constraints by favouring tax-efficient implementations, typically accumulating UCITS ETFs domiciled in Ireland or Luxembourg. Accumulating structures reinvest income internally rather than distributing it, which defers the tax event to the eventual disposal and aligns with the buy-and-hold design, so that taxation is modelled as a single charge on terminal wealth rather than as a recurring annual drag. No active tax-loss harvesting strategy is required at this stage, given the long horizon and the early-cycle position of the clients.

No specific legal restrictions arise beyond those inherent to the Portuguese and EU regulatory environment for retail investors, namely MiFID II suitability, PRIIPs disclosure, and the

UCITS framework. The clients have no fiduciary obligations to third parties, no court-ordered restrictions, and no employment-related concentration constraints.

Two preferences were explicitly stated by the clients during the discovery phase. The first is transparency and simplicity of financial instruments: the clients prefer products whose risk-return characteristics, costs, and underlying exposures can be understood without specialised expertise. This rules out structured products, hedge-fund vehicles, leveraged or inverse instruments, and complex derivatives, and orients the portfolio toward listed, broadly traded, plain-vanilla instruments, index-tracking ETFs and UCITS funds in particular. The second is diversification through global market exposure: the clients explicitly indicated that they value exposure beyond Europe and would prefer the portfolio to reflect global capital markets, an orientation consistent with the academic evidence on the cost of equity home bias (French & Poterba, 1991; Cooper, Sercu & Vanpée, 2018). No ESG, religious, social, or sectoral exclusions were specified.

Together, these five sets of constraints define a coherent and well-aligned framework. The absence of liquidity needs, the long horizon, and the absence of restrictive preferences leave the strategic asset allocation broadly unconstrained on the risk dimension, while the explicit preferences for transparency and global diversification orient the implementation toward simple, listed, and internationally diversified instruments.

4 Investment Design

4.1 Investment Philosophy

The investment philosophy translates the investors' profile into a coherent set of beliefs that governs every subsequent decision in this statement. It rests on three pillars: modern portfolio theory, the behavioural and macroeconomic context in which investment decisions are made, and empirical evidence on what can be expected to add value reliably to a long-horizon portfolio.

The first pillar is grounded in modern portfolio theory. Following Markowitz (1952), risk is assessed at the level of the whole portfolio rather than at the level of each individual security. Diversification across imperfectly correlated assets is therefore the main mechanism through which expected return can be preserved while portfolio risk is reduced. This principle motivates an allocation across global equities, fixed income, and real assets, so that the investors are not

dependent on the performance of any single market, region, or economic regime. The same logic also guides the determination of the strategic weights. The allocation is not chosen solely by judgement. It is derived from a constrained mean-variance optimisation that maximises the portfolio's Sharpe ratio, using estimated asset-class returns, volatilities and correlations as inputs and subject to the long-only and full-investment conditions and the policy constraints defined in this IPS. These estimated returns, risks and correlations feed directly into the strategic allocation, while the investors' required return enters as the floor against which the resulting portfolio is validated.

The second pillar concerns market efficiency and investor behaviour. Markets are viewed as moderately efficient in the sense of Fama (1970): publicly available information is largely incorporated into prices, making persistent security-level mispricing difficult to identify and exploit after costs. This view is reinforced by the evidence reported in the SPIVA scorecards, which show that most active managers fail to outperform their benchmarks net of fees over long horizons. At the same time, investors are not fully rational. Prospect theory, developed by Kahneman and Tversky (1979), shows that loss aversion and other behavioural biases can distort decisions, especially during periods of market stress. A rules-based and low-turnover philosophy therefore protects the investors both from the cost of unnecessary active management and from the behavioural risk of poorly timed discretionary decisions.

The third pillar draws the practical implications from the first two. Since security selection is unlikely to be rewarded reliably and active management can erode returns through fees, turnover, and taxes, the portfolio is implemented mainly through low-cost, physically replicating UCITS ETFs, complemented by one physically backed gold ETC where direct real-asset exposure is required. These vehicles provide broad market exposure, daily liquidity, transparency, and a regulatory structure appropriate for European retail investors. Within this passive core, a moderate factor overlay is permitted, with a measured tilt toward the value premium documented in the asset-pricing literature. The tilt remains deliberately limited, allowing the portfolio to capture a long-run compensated premium without moving materially away from broad market exposure or introducing the timing risk that the philosophy seeks to avoid.

Finally, risk is defined relative to the investors' goal rather than in absolute terms. The relevant question is not volatility in isolation, but the probability that the portfolio falls short of the return required to reach the target. Risk is therefore also evaluated through a safety-first lens in the spirit of Roy (1952), under which the adequacy of the allocation is judged by its ability to exceed the minimum return required by the goal. This goal-relative perspective complements

the optimisation: the portfolio is constructed by Sharpe-maximisation under the policy constraints, and the resulting allocation is then assessed by the margin it provides above the required-return floor, measured by the safety-first ratio.

4.2 Macroeconomic Outlook

The strategic allocation is set against the macroeconomic environment prevailing at the inception of the portfolio in 2027. The purpose of this section is not to forecast short-term market movements, which the investment philosophy explicitly avoids, but to identify the forward-looking macroeconomic conditions that inform the capital market assumptions used in the optimisation. Three variables are especially relevant for that purpose: the path of economic growth, the trajectory of inflation, and the level of interest rates.

At the global level, the International Monetary Fund projects world output growth of 3.1% in 2026 and 3.2% in 2027, a pace that remains below the pre-pandemic historical average and points to a moderate rather than buoyant expansion. Global inflation is expected to gradually moderate over the projection horizon as the lagged effects of earlier monetary tightening continue to pass through the major economies, although geopolitical tensions and energy-market disruptions remain important upside risks. This combination of steady but unspectacular growth and gradually normalising inflation frames an environment in which risk assets can still be expected to earn a positive premium over cash, while the exceptional returns observed in parts of the previous cycle should not be mechanically extrapolated.

For the euro area, which defines the portfolio's base currency, tax environment, and regulatory framework, the European Central Bank's Survey of Professional Forecasters points to a gradual recovery in activity. Real GDP growth is projected at 1.0% in 2026, rising to 1.3% in both 2027 and 2028. Headline inflation is expected to continue converging towards the ECB's medium-term 2% target, with HICP inflation projected at 2.7% in 2026, 2.1% in 2027, and 2.0% in 2028. Interest rates are consistent with this normalisation. The ten-year German Bund yield stood at approximately 2.85% in mid-2026, a level that re-establishes high-quality fixed income as a meaningful source of expected return and diversification after the exceptionally low-yield environment that characterised much of the previous decade.

Taken together, these conditions describe an environment of moderate growth, inflation gradually returning to target, and positive nominal yields. This backdrop supports an allocation that retains substantial exposure to equities as the principal engine of long-run capital appreciation, while assigning a genuine role to fixed income as both a source of yield and a

stabilising component. It also supports the inclusion of real assets, which provide partial protection against upside inflation and geopolitical risk. These macroeconomic anchors are carried forward into the next section, where they inform the forward-looking expected returns used in the optimisation, while volatility and correlation assumptions are calibrated using historical data and long-term capital market estimates.

4.3 Strategic Asset Allocation

The Strategic Asset Allocation is expressed in this IPS as a set of admissible corridors rather than as a fixed portfolio. Its role is to define the range of risk exposures that is consistent with the investors' objectives, risk tolerance, time horizon and constraints. The actual portfolio weights are then selected within those corridors in the portfolio-construction stage, using the constrained maximum-Sharpe portfolio as the relevant risky-asset portfolio.

This distinction is important. The corridors are policy constraints; they are not themselves an investment portfolio. They define the feasible set within which the optimiser may operate, subject to the long-only and full-investment restrictions, the investors' preference for transparent UCITS instruments, and the additional exposure limits described below. The resulting allocation is therefore not chosen by discretion or by a simple 70/20/10 rule, but by the optimisation process under the IPS constraints.

Table 1: Strategic asset-allocation corridors

Component	Strategic corridor
Equity	60% – 75%
Fixed Income	15% – 30%
Real Assets	7% – 13%
Global Value (equity factor tilt)	20% – 30%
Inflation-sensitive allocation	8% – 15%

The starting point for the asset-allocation range is the clients' risk profile. The Vanguard Investor Questionnaire suggests a growth-oriented allocation, with a baseline of 80% equities and 20% fixed income, which is consistent with the high-capacity and high-tolerance classification obtained in the risk-profiling section. However, this recommendation is not adopted mechanically. It is adjusted to reflect the clients' lack of prior investment experience,

their expressed concern about macroeconomic and geopolitical uncertainty, and the need to include inflation-sensitive assets over a 25-year horizon.

The equity corridor is therefore set at 60% to 75% of total portfolio value. This range ensures that equities remain the dominant source of long-term capital appreciation, which is necessary given the clients' required nominal return of 6.51% per year. At the same time, the 75% upper bound prevents the portfolio from becoming excessively dependent on equity-market outcomes, especially given the clients' limited investment experience and the possibility of severe interim drawdowns. The 60% floor ensures that the portfolio does not drift into an overly defensive position that would be inconsistent with the long horizon and the required return.

The fixed-income corridor is set at 15% to 30%. Fixed income is included primarily as a stabilising component, providing duration, credit and currency-hedged sovereign exposure that can cushion equity-market losses and reduce total portfolio volatility. The lower bound ensures that the defensive sleeve remains meaningful, while the upper bound prevents fixed income from diluting the portfolio's expected return to a level that would make the long-term objective harder to reach.

Real assets are allowed to range between 7% and 13% of the portfolio. This sleeve is included for diversification and inflation protection rather than for income generation. The range is deliberately narrower than the equity and fixed-income corridors because real assets are a smaller supporting allocation. A minimum exposure is retained to protect against inflation and regime shifts, while the upper bound avoids excessive concentration in assets such as gold or listed real estate, whose historical performance can be highly sample-dependent.

Within the equity allocation, the IPS permits broad geographical diversification across the United States, Europe, Japan, Pacific ex-Japan and emerging markets. This structure reflects the clients' preference for global exposure and reduces dependence on any single regional economy, monetary-policy regime or currency area. It also mitigates home bias, which is especially relevant for Portuguese investors whose human capital and future liabilities are already strongly linked to the European economy.

The equity allocation also includes an explicit global value factor corridor of 20% to 30% of total portfolio assets. The value premium is treated as a compensated risk factor, but it is bounded because factor returns are unstable across time and may underperform for long periods. The lower bound ensures that the factor tilt is economically meaningful, while the upper bound limits model risk, implementation cost and excessive dependence on a single style premium. Any additional explicit factor exposure, including quality, size or low-volatility

overlays, must remain within the same overall factor discipline; low-volatility exposure, if used tactically, is capped at 5% of total assets.

Inflation-sensitive exposure is also constrained at the portfolio level. Inflation-linked bonds, listed real estate and gold together must represent between 8% and 15% of total assets. This range recognises that inflation is one of the main long-horizon risks to a real wealth target. However, the allocation is capped because these assets do not provide a complete inflation hedge in all environments and may introduce their own sources of volatility, particularly interest-rate sensitivity in REITs and price instability in gold.

The width of each corridor is informed by three considerations: the volatility of the asset class, the role it plays in the portfolio, and the tax and transaction-cost implications of rebalancing. More volatile assets require wider bands to avoid excessive trading caused by ordinary market fluctuations. At the same time, each corridor must remain narrow enough to preserve the intended risk profile of the IPS. The corridors therefore balance discipline with implementation efficiency.

Taxation is particularly relevant for the rebalancing policy. There are two potential taxation moments. First, during the life of the portfolio, a rebalance that requires selling appreciated ETF positions may crystallise taxable capital gains. Second, at the end of the horizon, the investor may face taxation when the remaining portfolio is liquidated and the proceeds are received. The use of accumulating UCITS funds helps defer distributed income, but it does not eliminate taxation. For this reason, rebalancing is designed to rely first on new annual contributions and reinvested cash flows. Sales of existing positions are used only when corridor breaches cannot be corrected through incoming capital. This reduces, but does not remove, the tax cost of interim rebalancing.

The fixed-income sleeve is also subject to a duration constraint. The target modified duration of the fixed-income allocation should remain between 5.0 and 7.5 years. This keeps the bond exposure in an intermediate-duration range, preserving a meaningful defensive role without creating excessive sensitivity to interest-rate shocks. Short-duration bonds may be used to reduce volatility, while longer-duration exposure is limited because it can behave poorly in inflationary or rising-rate environments.

Additional portfolio-level constraints are imposed to control unintended concentrations that may arise from the combination of underlying ETF holdings. No single GICS sector may exceed 30% of equity exposure, with a slightly higher look-through tolerance for technology given its current weight in broad global and US equity indices. Mid- and small-cap exposure is bounded at 4% to 10% of total assets, allowing some exposure to the size premium without

materially increasing portfolio volatility. No single underlying issuer should exceed 5% of total assets on a look-through basis, except where UCITS diversification rules allow higher exposure for qualifying sovereign issuers.

Together, these corridors define the admissible strategic universe of the IPS. They do not determine the final portfolio weights directly. Instead, they translate the clients' objectives and constraints into a disciplined optimisation framework. The portfolio-construction section then identifies the constrained maximum-Sharpe allocation within this framework and tests whether that allocation satisfies the required-return, volatility and safety-first criteria of the mandate.

4.4 Management Structure

The management structure specifies how the policy corridors defined in the Strategic Asset Allocation are translated into an implementable portfolio. It covers the investment vehicles used, the benchmark framework, the management style, the rebalancing process and the allocation of responsibilities between the adviser and the clients. Its purpose is to ensure that the constrained maximum-Sharpe portfolio identified in the portfolio-construction stage can be implemented and monitored in a disciplined way.

The portfolio is implemented through simple, transparent and liquid listed instruments. Each equity, fixed-income and real-estate exposure is implemented through a physically replicating UCITS ETF, selected on total expense ratio, tracking accuracy, fund size, secondary-market liquidity and tax efficiency. Preference is given to accumulating share classes domiciled in Ireland or Luxembourg, since these structures are more suitable for a Portuguese investor in the accumulation phase. The gold exposure is the exception to the UCITS ETF rule: it is implemented through a physically backed gold ETC, because this is the standard listed structure for obtaining direct exposure to allocated bullion.

The target portfolio weights are not fixed in the Strategic Asset Allocation section. That section defines the admissible corridors. The actual weights are obtained in the portfolio-construction stage by selecting the maximum-Sharpe portfolio subject to the IPS constraints, including the long-only restriction, full investment, the equity, fixed-income and real-asset corridors, the global value corridor and the inflation-sensitive allocation corridor. Once adopted, these weights become the operational target portfolio against which implementation, benchmarking and rebalancing are conducted.

The management style is predominantly passive. The adviser does not attempt to forecast short-term market movements or to rotate tactically across regions or asset classes. Instead, the

adviser implements the selected long-term allocation through low-cost index-tracking vehicles and keeps the portfolio within the policy limits. This approach is consistent with the clients' limited investment experience, their preference for understandable instruments and the long-horizon nature of the mandate.

The portfolio may still be described as having a core-satellite structure, but only in functional terms. The core consists of broad, market-capitalisation-weighted equity and fixed-income exposures that provide diversified participation in global capital markets. The satellite consists of intentional non-market-cap exposures, namely the global value factor tilt and the inflation-sensitive allocation, including gold, REITs and inflation-linked bonds. Its role is descriptive rather than decisive: the portfolio is ultimately governed by the constrained optimisation result and by the IPS corridors.

Performance is measured against a composite benchmark constructed from the benchmark indices of the underlying sub-asset classes, using the final target weights obtained in the portfolio-construction section. The benchmark is rebalanced on the same quarterly schedule as the portfolio, so that performance differences reflect implementation choices and market movements rather than benchmark drift. Equity benchmarks are left unhedged, consistent with the long-term nature of the objective, while foreign-currency fixed-income exposures are EUR-hedged to reduce currency noise in the defensive sleeve.

The portfolio is monitored quarterly. This frequency is a compromise between control and implementation efficiency: monthly monitoring would create unnecessary noise and could encourage excessive trading, while annual monitoring would allow allocation drift to accumulate for too long. A rebalance is considered whenever an asset class or portfolio-level exposure breaches its permitted corridor. The objective of rebalancing is not to time the market, but to restore the portfolio to the adopted target weights while remaining inside the IPS constraints.

The rebalancing process follows a contribution-first sequence. Because the clients add €10,000 per year to the portfolio, new contributions are first directed to underweight sleeves before any existing holding is sold. This is particularly important in the Portuguese tax context. A sale of appreciated ETF or ETC positions during rebalancing may crystallise a taxable capital gain at the applicable 28% rate. Therefore, the rebalancing rule reduces unnecessary taxable events but does not eliminate them. A second taxation moment may arise at the end of the investment horizon, when the portfolio is liquidated or gains are otherwise realised. The tax treatment in the performance analysis should therefore distinguish between possible interim tax effects from rebalancing and the final tax charge on realised terminal gains.

The adviser is responsible for selecting the investment vehicles, executing trades, monitoring corridor compliance, reviewing tracking error and fund characteristics, and producing quarterly performance reports against the composite benchmark. The clients retain authority over any change to the Investment Policy Statement itself, including the asset-allocation corridors, the benchmark set, the investment constraints and the management structure. Any change to the IPS requires explicit client approval and should be documented before implementation.

4.5 Security Selection

Whereas the Strategic Asset Allocation defines the admissible exposure ranges, security selection determines which listed instrument is used to represent each sub-asset class in the final portfolio. The purpose of this stage is not to generate the asset allocation itself, but to identify the most suitable implementation vehicle for each exposure that may enter the constrained maximum-Sharpe portfolio.

The portfolio is implemented mainly through physically replicating, UCITS-compliant exchange-traded funds. The only exception is gold, which is implemented through a physically backed exchange-traded commodity, since direct gold exposure in European markets is typically obtained through ETC structures rather than UCITS ETFs. The selection problem is therefore practical rather than tactical: the objective is to choose low-cost, liquid and transparent vehicles that replicate the desired exposure as faithfully as possible.

The selection process follows a two-stage due-diligence framework. The first stage is a qualitative eligibility filter. Starting from the European-listed universe available on Bloomberg, a candidate is retained only if it satisfies the structural requirements of the mandate: physical replication or physical backing, exclusion of synthetic swap-based structures, sufficient fund size, sufficient trading liquidity, an adequate track record, and, where applicable, UCITS compliance. Preference is given to accumulating share classes domiciled in Ireland or Luxembourg, because these are more appropriate for a Portuguese investor in the accumulation phase. This filter reduces the universe to twenty-seven eligible candidates across the twelve sub-asset classes.

The second stage ranks the eligible candidates within each sub-asset class using a transparent composite score. The score is not presented as an optimised or universally valid model. It is a practical fund-selection tool designed for a passive implementation mandate. For that reason, the highest weights are assigned to the criteria most directly linked to passive investor outcomes: total expense ratio and tracking error. Together, these represent 45% of the score,

because costs and replication accuracy are the most persistent drivers of differences between passive funds tracking similar exposures.

The remaining criteria are included to capture implementation quality. Assets under management and secondary-market liquidity receive a combined weight of 25%, as they proxy fund viability, trading depth and expected bid-ask spread. Fund age receives 5%, acting as a minimum track-record check rather than a return-seeking criterion. The remaining 25% is assigned to statistical replication measures: Sharpe ratio, information ratio and market beta. These are not used to reward active outperformance. Instead, they are interpreted as checks on how closely the vehicle behaves relative to its intended exposure. In particular, the information ratio is evaluated by its distance from zero, and beta by its distance from one. The criteria and weights are reported in Table A6.

All realised metrics are computed over the common monthly data window from April 2014 to December 2025, using a 2% annual risk-free rate. Where a candidate's own accumulating share class has insufficient history, a longer-history share-class proxy is used only for measurement, while the accumulating class remains the implemented vehicle when available. This approach is imperfect, but it is preferable to excluding a suitable instrument solely because the exact share class has a short return history.

Applying the eligibility filter and composite score produces one selected vehicle per sub-asset class. The selected instruments are reported in Table 2. They include the iShares Core S&P 500 for US equity, Amundi Stoxx Europe 600 for European equity, iShares Core MSCI Japan IMI and HSBC MSCI Pacific ex Japan for the Asia-Pacific allocation, iShares Core MSCI EM IMI for emerging markets, iShares Edge MSCI World Value for the value sleeve, four fixed-income ETFs, HSBC FTSE EPRA/NAREIT Developed for listed real estate, and Invesco Physical Gold for gold exposure.

Table 2: Security-selection results: one selected ETF per sub-asset class

Sub-asset class	Selected ETF	Ticker	TER	Score	Robustness
US Equity	iShares Core S&P 500	CSPX	0.07%	0.67	Sensitive
Europe	Amundi Stoxx Europe 600	MEUD	0.07%	0.95	Robust
Japan	iShares Core MSCI Japan IMI	SJPA	0.12%	0.80	Robust
Pacific ex-JP	HSBC MSCI Pacific ex Japan	HMXJ	0.15%	0.50	Sensitive
Emerging Mkts	iShares Core MSCI EM IMI	EMIM	0.18%	0.65	Sensitive
Global Value	iShares Edge MSCI World Value	IWVL	0.25%	0.75	Robust
Euro Govt	Xtrackers II Eurozone Govt	XGLE	0.07%	0.80	Robust
Euro IG Corp	iShares Core € Corp Bond	IEAC	0.09%	0.80	Robust
Euro ILB	Xtrackers II Eurozone Infl-Lk	XEIN	0.15%	1.00*	Robust
US Tsy EUR-H	iShares \$ Treasury 7–10y EUR-H	CEMF	0.10%	1.00	Robust
Global REITs	HSBC FTSE EPRA/NAREIT Dev	HPRA	0.24%	0.65	Robust
Gold	Invesco Physical Gold	SGLD	0.12%	0.79	Sensitive

* Single eligible candidate in the sub-asset class; the score is mechanical, and the fund is included by default.

Because the composite score depends on subjective weights, the results are tested through sensitivity analysis. The purpose of this exercise is not to prove that the baseline weights are objectively correct, but to check whether the selected vehicle changes materially when the emphasis is shifted across the main dimensions of ETF selection. The baseline score is therefore compared with four alternative schemes: equal weights across all criteria, a cost-heavy scheme, a replication-fidelity-heavy scheme, and a size-and-liquidity-heavy scheme.

A selected vehicle is classified as robust when it remains the top-ranked candidate under all five schemes. It is classified as sensitive when the winner changes under at least one alternative scheme. This classification is useful because it separates clear decisions from close calls. In the robust cases, the selected fund does not depend materially on the weighting assumptions. In the sensitive cases, the final choice requires judgement based on economic relevance, liquidity and implementation practicality.

Eight of the twelve selections are robust: Europe, Japan, Global Value, Euro Government, Euro Investment-Grade Corporate, Euro Inflation-Linked, US Treasury and REITs. The inflation-linked result should be interpreted with caution, since the sleeve has only one candidate with a usable data series, making its score mechanical rather than informative. The sensitive cases are US equity, Pacific ex-Japan, emerging markets and gold. In each of these cases, the difference between the selected vehicle and the closest alternative is economically small or explained by a trade-off between cost, liquidity and replication quality.

In US equity, the iShares Core S&P 500 is retained despite sensitivity under the cost-heavy scheme, because the competing cheaper fund offers only a marginal fee advantage while the selected fund has materially greater scale, liquidity and track record. In Pacific ex-Japan, the HSBC and iShares candidates are close substitutes; the HSBC vehicle is retained because of its lower cost and stronger trading characteristics. In emerging markets, the iShares Core MSCI EM IMI is retained because its scale and liquidity outweigh the tighter tracking profile of the alternative. In gold, the Invesco and iShares physical products are near substitutes, so the choice has little economic impact on the portfolio.

Three limitations should be acknowledged. First, the Japan and Pacific ex-Japan sleeves are assessed using an Asia-Pacific proxy benchmark where separate index series were not available. This may inflate the measured tracking error, although it affects candidates within the same sleeve symmetrically. Second, the US Treasury sleeve is partly affected by the use of a proxy return series, because the preferred accumulating EUR-hedged share class has a shorter history. Third, the inflation-linked sleeve has only one eligible candidate with sufficient data, so the score does not represent a true ranking. These limitations do not invalidate the selection,

but they mean that the scoring output should be interpreted as structured due diligence rather than mechanical proof of superiority.

4.6 Portfolio Construction

The instruments selected in the previous section are now assembled into a single investable portfolio. Unlike the Strategic Asset Allocation section, which defines admissible corridors, this section determines the actual portfolio weights. The adopted portfolio is the constrained optimum obtained under the IPS restrictions, namely the long-only and full-investment constraints, the asset-class corridors, the global value corridor and the inflation-sensitive allocation corridor.

The optimisation is conducted on the portfolio building blocks rather than directly on individual securities. Expected returns, volatilities and covariances are estimated from monthly total-return index series over the common 2014–2025 window. The building blocks correspond to the eligible sub-asset-class exposures identified in the security-selection stage. The selected ETFs and ETCs are then used as the implementation vehicles for the building blocks that receive positive weights in the final solution.

The objective of the optimisation is to identify the admissible risky-asset portfolio with the strongest risk-adjusted profile under the IPS. Since the clients' problem is defined around a minimum required return, Roy's safety-first criterion is incorporated as the relevant threshold test. The required nominal return of 6.51% is therefore used as the minimum acceptable return against which candidate portfolios are assessed. In the reported results, the adopted constrained optimum is also the maximum-Sharpe portfolio attainable under the IPS restrictions, so it can be interpreted as the constrained tangency portfolio within the feasible set.

Figure 1 shows the efficient frontier under two constraint regimes. The unconstrained frontier imposes only the long-only and full-investment conditions. It is useful as a reference, but it does not represent an implementable policy portfolio because it ignores the IPS corridors and exposure limits. The constrained frontier imposes the relevant IPS restrictions and therefore represents the feasible set available to the clients.

The unconstrained maximum-Sharpe portfolio achieves an expected return of 11.58%, volatility of 7.47%, a Sharpe ratio of 1.28 and a safety-first ratio of 0.68. However, this allocation is not admissible under the IPS because it violates the strategic exposure limits. The relevant solution is therefore the constrained optimum. This portfolio achieves an expected return of 11.45%, volatility of 9.13%, a Sharpe ratio of 1.04 and a safety-first ratio of 0.54. It

is the adopted risky portfolio because it is the best risk-adjusted allocation available once the clients' policy restrictions are imposed.

Figure 1: Efficient Frontier

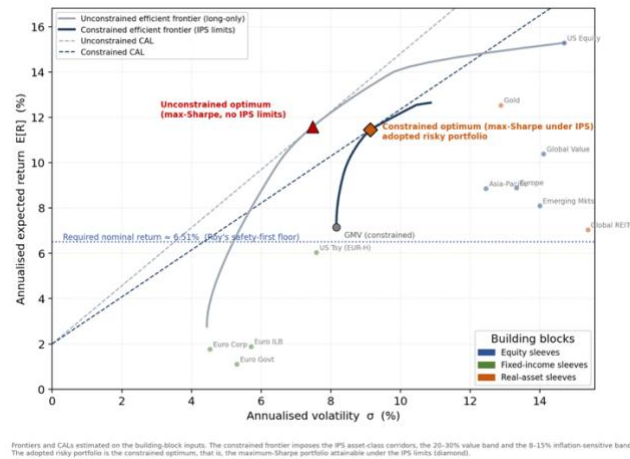
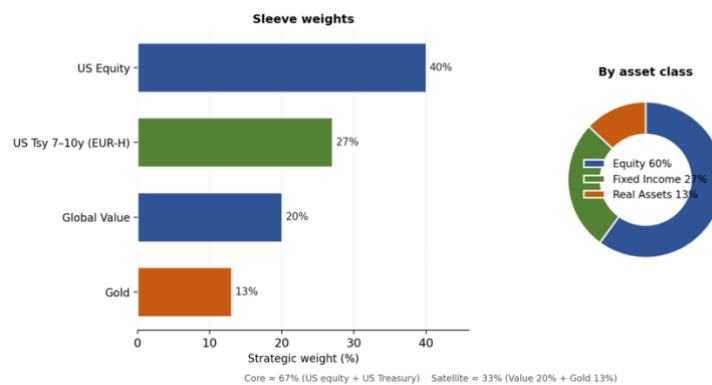


Figure 2: Adopted constrained portfolio weights



This result is economically consistent with the current estimation window. US equity and global value provide the main source of long-term return, while the EUR-hedged US Treasury sleeve improves the portfolio's risk-adjusted profile through diversification and defensive duration exposure. Gold receives the maximum admissible real-asset allocation because, over the 2014–2025 window, it contributes both return and diversification benefits. The remaining eligible sleeves receive zero initial weight, not because they are unsuitable instruments, but because they do not improve the constrained objective relative to the selected combination under the estimated inputs.

The adopted portfolio should be read as the output of a single-period constrained optimisation, not as a relaxation of the policy's diversification intent. Two points reconcile the concentrated solution with the broader strategy. First, the IPS corridors constrain aggregate asset-class, factor and inflation-sensitive exposures; they do not impose positive minimum weights for every region or sub-asset class. The optimiser is therefore allowed to concentrate within the equity and fixed-income blocks when the estimated inputs reward doing so. Over the 2014–2025 estimation window, US equity, global value, EUR-hedged US Treasuries and gold offered the strongest contribution to the constrained risk-adjusted objective, while Europe, Japan, emerging markets, euro bonds, inflation-linked bonds and REITs received zero initial weight. This is a known feature of mean-variance optimisation, which can produce corner solutions that are sensitive to the estimation sample. Second, the governing framework remains the IPS corridors and the diversified eligible universe, not this point estimate alone. The excluded sleeves remain eligible, the policy is reviewed annually, and the allocation may be re-optimised if updated expected returns, volatilities or correlations justify a different mix. The concentration is therefore a starting allocation conditioned on one estimation window, bounded by a policy framework that preserves the option to diversify as forward-looking estimates evolve, rather than a permanent claim that only four instruments should be held.

All figures in this section are gross of Portuguese capital-gains tax. The weighted fund cost of the adopted portfolio is approximately 0.12% per year, so the expected return net of ongoing product costs remains materially above the 6.51% required nominal return. Taxation is not embedded directly in the single-period optimisation because it depends on realised gains, rebalancing trades and the timing of liquidation. Its effect is therefore analysed separately in the expected-performance and Monte Carlo analysis, while the rebalancing policy is designed to minimise unnecessary taxable realisations during the life of the portfolio.

4.7 Monitoring

A portfolio is only as effective as the discipline with which it is maintained. This section sets out how the adopted constrained portfolio is monitored over the 25-year horizon and the rules under which it is brought back into line with its target weights and IPS corridors. The framework is deliberately rules-based rather than discretionary: it is designed to keep the portfolio aligned with the investors' objectives, reduce the temptation to time the market during periods of stress, and limit unnecessary turnover and taxable realisations under the Portuguese capital-gains regime.

The portfolio follows a hybrid calendar-and-corridor rebalancing policy. The allocation is reviewed quarterly, but rebalancing trades are triggered only when an asset class or portfolio-level exposure breaches the admissible corridors defined in the Strategic Asset Allocation. Equity must remain between 60% and 75% of total portfolio value, fixed income between 15% and 30%, and real assets between 7% and 13%. In addition, the global value exposure must remain within its 20%–30% corridor, and the aggregate inflation-sensitive allocation must remain within its 8%–15% range. These corridors define the permitted policy space; the operational target is the adopted constrained portfolio identified in the portfolio-construction section.

Rebalancing is therefore not conducted around a fixed 70/20/10 allocation. The relevant target portfolio is the constrained optimum, with 60% in equity, 27% in fixed income and 13% in real assets. At sleeve level, the target weights are 40% US equity, 20% global value equity, 27% EUR-hedged US Treasury bonds and 13% gold. If market movements push the portfolio outside the permitted ranges, the adviser rebalances toward these adopted target weights, provided that the resulting trades remain consistent with all IPS constraints.

Because the adopted allocation places equity at the lower bound of its corridor and real assets at the upper bound, monitoring must pay particular attention to breaches caused by market

movements. A material fall in equity markets could push equity exposure below 60%, while strong gold performance could push real assets above 13%. These movements do not, by themselves, justify a change in policy. They trigger a disciplined rebalancing process back toward the adopted target allocation.

The first rebalancing tool is cash flow. The clients contribute €10,000 per year in addition to the initial €20,000 investment, and new contributions are directed first to the most underweight sleeve relative to target. Since the selected instruments are mainly accumulating vehicles, regular cash distributions are expected to be limited, but any available cash is treated in the same way. This contribution-first rule is particularly important in the Portuguese tax context because it can correct part of the allocation drift without selling appreciated positions.

Outright sales are used only when corridor breaches cannot be corrected through new contributions or available cash. This reduces, but does not eliminate, tax costs. If a rebalancing sale crystallises a gain, the investor may face Portuguese capital-gains tax at the applicable 28% rate. A second taxation moment may also arise at the end of the horizon, when the portfolio is liquidated or gains are otherwise realised. The monitoring policy therefore aims to minimise avoidable taxable events, not to assume that taxation occurs only at the terminal date. Monitoring operates at three levels. At the portfolio level, realised return, volatility, Sharpe ratio, safety-first ratio and drawdown are tracked quarterly against the expectations established in the portfolio-construction and risk-analysis sections. A persistent divergence from expected behaviour is treated as a reason to review the assumptions behind the allocation, not as a reason for ad hoc tactical trading.

At the risk level, Value-at-Risk, conditional Value-at-Risk, drawdowns and historical stress-scenario losses serve as reference thresholds. A realised loss materially worse than the modelled figures, or a drawdown beyond the historical stress range, triggers a review of the inputs and assumptions used in the optimisation. The purpose is not to abandon the strategy after losses, but to check whether the original risk estimates remain credible.

At the implementation level, each selected ETF or ETC is monitored for the characteristics that justified its inclusion: total expense ratio, tracking error against the relevant benchmark, assets under management, secondary-market liquidity and continued suitability for the intended exposure. A vehicle may be replaced if its costs rise materially, its tracking quality deteriorates, its liquidity falls, or a superior implementation vehicle becomes available. Such a replacement does not constitute a change in the IPS as long as it preserves the same exposure and remains within the approved constraints.

Performance is measured against a composite benchmark built from the benchmark indices of the adopted portfolio sleeves at their target weights: US equity, global value equity, EUR-hedged US Treasury bonds and gold. The benchmark is rebalanced quarterly, matching the portfolio review cycle, so that performance differences reflect implementation quality and market movements rather than benchmark drift. Equity exposures remain unhedged, while the foreign-currency fixed-income exposure is EUR-hedged, consistent with the portfolio-construction assumptions.

Above the quarterly monitoring process sits a full annual IPS review. This review reassesses the clients' objectives, savings capacity, time horizon, risk tolerance, constraints, capital-market assumptions and the continued suitability of the adopted portfolio. A review is also required after a material life event, such as a change in employment stability, the purchase of a home, the arrival of children, a change in tax residence, or a material change in long-term market conditions. Market movements alone are not sufficient grounds to revise the IPS; they are normally handled through the rebalancing rules.

This monitoring framework combines quarterly portfolio control, contribution-first rebalancing, explicit corridor compliance, implementation due diligence and an annual policy review. These elements ensure that the constrained optimum adopted at inception remains an operational investment policy rather than a one-off optimisation result.

4.8 Risk Analysis

Having established that the adopted constrained portfolio satisfies the required-return condition, this section examines the risks the investors must be prepared to tolerate over the 25-year horizon. Four complementary tools are used: parametric and historical Value-at-Risk and conditional Value-at-Risk, drawdown analysis, historical stress-scenario replays, and a Monte Carlo simulation of the full contribution plan. The first three tools describe downside risk over the historical return window, while the Monte Carlo simulation translates the portfolio's risk-return profile into a probability of reaching the €500,000 target.

All risk estimates are computed from the blended monthly return series of the adopted portfolio. The adopted portfolio is the constrained optimum identified in the portfolio-construction section, with 60% in equity, 27% in fixed income and 13% in real assets. Unless otherwise stated, the figures are reported gross of Portuguese capital-gains tax, because they measure the volatility of the investment portfolio itself rather than the investor's final after-tax proceeds.

For the parametric model, monthly returns are assumed to be normally distributed with mean μ and standard deviation σ . For a confidence level c , parametric Value-at-Risk is computed as: $VaR_c = -(\mu + z_{1-c}\sigma)$ where z_{1-c} is the left-tail standard normal quantile. Conditional Value-at-Risk is computed as:

$$CVaR_c = -\left(\mu - \sigma \frac{\phi(z_{1-c})}{1-c}\right)$$

where $\phi(\cdot)$ is the standard normal density function. One-year parametric estimates are obtained by scaling the monthly mean and volatility as $\mu_{12} = 12\mu$ and $\sigma_{12} = \sqrt{12}\sigma$. Historical VaR and CVaR are computed directly from the empirical return distribution, while one-year historical figures are obtained by bootstrapping twelve monthly returns.

Table 4 reports the resulting downside-risk estimates. At the one-month horizon, the portfolio has a parametric 95% VaR of 3.44% and a 99% VaR of 5.20%. The corresponding parametric CVaR figures are 4.52% and 6.08%. The historical estimates are similar but not identical: the 95% historical VaR is 3.95%, the 99% historical VaR is 4.91%, and the corresponding historical CVaR figures are 4.72% and 5.24%. At the one-year horizon, the 95% historical VaR is 5.53% and the 99% historical VaR is 11.35%, with historical CVaR of 9.08% and 14.11%.

Table 4: Value-at-Risk and conditional Value-at-Risk of the policy portfolio

	VaR (param.)	CVaR (param.)	VaR (hist.)	CVaR (hist.)
1-month horizon				
95% confidence	3.44%	4.52%	3.95%	4.72%
99% confidence	5.20%	6.08%	4.91%	5.24%
1-year horizon				
95% confidence	5.13%	8.87%	5.53%	9.08%
99% confidence	11.22%	14.25%	11.35%	14.11%

Expressed as a loss in % of portfolio value. Parametric figures assume normally distributed monthly returns; historical figures use the empirical 2020–2025 return distribution. One-year historical figures are obtained by bootstrapping twelve monthly returns (200,000 draws).

The comparison between the parametric and historical estimates shows that the normal model should be treated as an approximation rather than as a complete description of portfolio risk. The historical estimates are not uniformly higher than the parametric ones: at the 95% monthly level they are more severe, while at the 99% monthly level the parametric VaR is slightly higher. This mixed pattern reflects both non-normality and the limited number of observations

in the sample. The VaR and CVaR figures should therefore be interpreted as reference loss thresholds, not as precise forecasts of maximum losses.

Figure A3 confirms the same point visually. The fitted normal curve does not fully capture the empirical shape of monthly returns, and the left-tail observations around the historical VaR thresholds show why historical and conditional measures are useful complements to the parametric model. In monitoring, historical CVaR is particularly relevant because it focuses on the average loss once the VaR threshold has already been breached.

The drawdown analysis provides a more intuitive view of realised downside risk. Figure A4 shows that the deepest peak-to-trough decline in the available portfolio backtest is -9.9%, reached in December 2022. This is consistent with the portfolio's exposure to the 2022 inflation and interest-rate shock. The result also reflects the composition of the adopted constrained portfolio: the 60% equity allocation leaves the portfolio exposed to equity-market losses, while the EUR-hedged Treasury sleeve and gold allocation provide partial diversification rather than full downside protection.

The historical stress tests in Figure A5 complement the VaR analysis by examining named crisis episodes rather than distributional percentiles. The available historical window includes the COVID-19 crash and the 2022 rate-and-inflation shock. The Global Financial Crisis is not part of the estimation period and is therefore included only as a reconstructed stress scenario based on index-series proxies. This distinction is important: the 2008 scenario is an external robustness check, not an observed return history for the exact implemented portfolio.

The stress results show that the adopted portfolio remains exposed to meaningful losses in severe regimes. The 2022 inflation shock is particularly relevant because the portfolio holds a 27% EUR-hedged US Treasury position, whose defensive role may be weaker when bond yields rise sharply. The reconstructed GFC scenario is the most severe stress test, reflecting the portfolio's 60% allocation to equity risk. Gold helps cushion the loss, but it does not eliminate the portfolio's vulnerability to broad equity-market sell-offs.

The correlation matrix in Figure A1 helps explain the diversification properties of the adopted portfolio. US equity and global value are highly correlated, so the equity sleeve should be treated as a single broad source of growth risk rather than as two independent exposures. By contrast, gold has very low or negative correlations with the main equity blocks, while the EUR-hedged US Treasury sleeve has lower correlations with equities than most equity or REIT exposures. This is why the constrained optimum combines US equity and global value with Treasury and gold exposure rather than relying exclusively on equities.

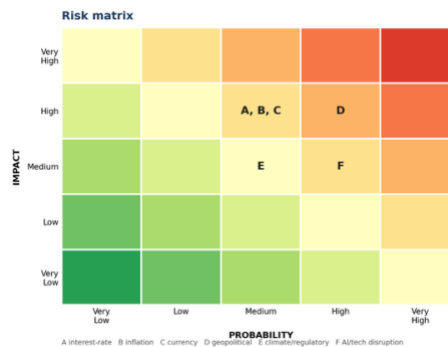
A 25-year horizon also carries structural risks that are not fully captured by historical monthly returns. Table 5 summarises the main long-term risks, their assessed probability and impact, and the portfolio features that partially mitigate them. Geopolitical risk receives the highest combined assessment, because the portfolio has significant exposure to US equity and global value. Interest-rate risk is also material because the fixed-income sleeve consists of a single EUR-hedged US Treasury 7–10 year position. Inflation risk is partly mitigated by the 13% gold allocation, but this hedge is incomplete and may fail in some inflationary regimes.

Table 5: Long-term risk assessment (25-year horizon)

Risk	Probability	Impact	Description and mitigant
(A) Interest-rate risk	3 (medium)	4 (high)	Rising rates depress the value of fixed-income holdings. The fixed-income sleeve is a single EUR-hedged US Treasury 7–10y position, whose intermediate duration limits the drawdown, and maturing coupons are reinvested at higher yields.
(B) Inflation risk	3 (medium)	4 (high)	Sustained inflation in the US or the euro area erodes the real value of the €500,000 target. The 13% gold allocation provides a partial but not complete hedge.
(C) Currency risk	2 (low)	3 (medium)	The equity sleeves are predominantly USD-denominated against a euro-based goal. The US Treasury sleeve is EUR-hedged; equity FX is left unhedged.
(D) Geopolitical risk	4 (high)	4 (high)	Conflicts, trade disputes and political instability can disrupt markets, widen spreads and trigger equity volatility. The concentrated US and global-value equity tilt raises exposure, only partly buffered by gold.
(E) Climate / regulatory risk	3 (medium)	3 (medium)	Long-term environmental and regulatory shifts may affect energy, utilities and broad industry. The non-thematic equity construction limits but does not remove this exposure.
(F) AI / technology disruption	4 (high)	3 (medium)	Accelerating automation reshapes industries, benefiting some sectors and impairing others. Broad US equity exposure captures the upside while carrying sector-level disruption risk.

Figure 3 maps these risks onto a probability-impact matrix. The matrix is qualitative rather than statistical, but it is useful because it highlights risks that may not appear clearly in a short return history. In particular, geopolitical, interest-rate and inflation risks should remain central to the annual IPS review.

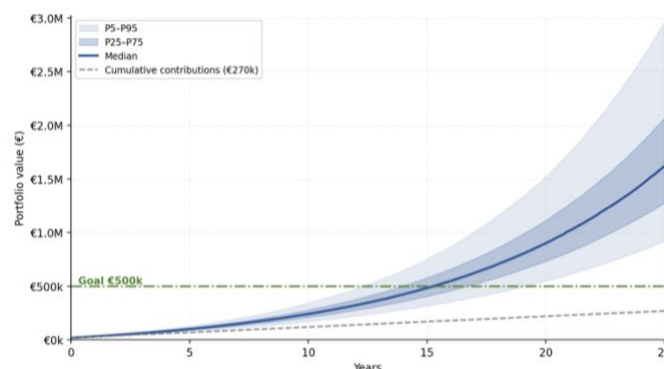
Figure 3: Risk Matrix



The final risk question is whether the adopted portfolio can carry the investors to their €500,000 real wealth target. This is assessed through a Monte Carlo simulation of the actual contribution plan: an initial investment of €20,000 followed by annual contributions of €10,000 over 25 years. The simulation uses the portfolio’s expected return and volatility net of ongoing product costs. The simulation is run with 100,000 paths to reduce simulation noise.

Figure 4 reports the projected wealth path in nominal terms, net of fund fees. Figure A7 then compares three terminal-wealth scenarios: nominal net of fees, after Portuguese capital-gains tax, and real wealth after applying 2% annual inflation. Under the nominal net-of-fees scenario, the median terminal wealth is approximately €1.5 million and the probability of reaching the €500,000 target is 100.0%. After applying a 28% capital-gains tax, the median terminal wealth falls to approximately €1.2 million and the probability of success remains high at 99.8%. In real terms, after adjusting for 2% inflation, the median terminal wealth is approximately €944,000 and the probability of reaching the €500,000 real target is 96.8%.

Figure 4: Monte Carlo projection - 25 years, €20k + €10k/year (nominal, net of fees)



These results should not be interpreted as certainty. Although the simulation avoids imposing normality by resampling from the empirical monthly return distribution, it remains limited by the length and representativeness of the 2020–2025 return window. A longer history or conditional-volatility model such as GARCH could capture additional regimes and volatility

clustering. Given the scope of this IPS, the bootstrap Monte Carlo is retained as a transparent non-parametric baseline.

Taken together, the risk analysis supports the adoption of the constrained optimum, while clarifying the risk the investors must accept. The portfolio is not low-risk: it has meaningful exposure to US equity and global value, material sensitivity to interest-rate conditions through the Treasury sleeve, and only partial protection against inflation through gold. Its suitability depends on the clients' long horizon, high risk capacity, annual contribution discipline and willingness to remain invested through drawdowns.

5 Investment Policy Proposal

This final section consolidates the preceding analysis into the investment policy recommended for Mr. and Mrs. Rodriguez. The proposal is based on the constrained optimum identified in the portfolio-construction section, rather than on a fixed 70/20/10 allocation. The Strategic Asset Allocation defines the admissible corridors; the adopted portfolio is the maximum-Sharpe risky portfolio obtained within those IPS constraints.

The proposal serves two clients, Mr. and Mrs. Rodriguez, both aged 25, with a shared 25-year horizon running to 2052. Their objective is to accumulate €500,000 in real terms, funded by an initial investment of €20,000 and annual contributions of €10,000. This contribution schedule requires a real return of approximately 4.42% per year, equivalent to approximately 6.51% in nominal terms after incorporating the 2% inflation assumption. The clients' long horizon, stable and weakly correlated professional incomes, absence of dependants at inception and limited liquidity needs give them a high capacity to bear risk. Their questionnaire responses also indicate a high willingness to tolerate volatility, provided that the strategy remains transparent and disciplined.

The adopted portfolio allocates 60% to equities, 27% to fixed income and 13% to real assets. At sleeve level, the portfolio is composed of 40% US equity, 20% global value equity, 27% EUR-hedged US Treasury 7–10 year bonds and 13% gold. These weights remain within the strategic corridors defined in the IPS: equity is at the 60% lower bound, fixed income is inside its 15%–30% range, and real assets are at the 13% upper bound. The global value sleeve also remains within its 20%–30% corridor, while the gold allocation provides the inflation-sensitive exposure required by the policy.

On the historical inputs used in the optimisation, the adopted portfolio has an expected gross nominal return of 11.45% per year and annualised volatility of 9.13%. Its gross Sharpe ratio is 1.04 and its safety-first ratio is 0.54, measured against the 6.51% nominal required return. After the weighted ongoing product cost of approximately 0.12% per year, the expected net return is approximately 11.33%, still leaving a substantial margin above the required-return floor. This confirms that the portfolio is not only return-sufficient, but also the best risk-adjusted portfolio available under the IPS constraints.

The risk analysis shows that the portfolio remains exposed to meaningful interim losses. The one-month historical 95% VaR is 3.95%, and the one-year historical 99% VaR is 11.35%. The maximum drawdown in the available backtest is approximately -9.9%, reached during the 2022 inflation and rate shock. These losses are consistent with a growth-oriented mandate and are acceptable only because the clients have a long horizon, no planned withdrawals from this portfolio and an annual contribution schedule that allows them to continue investing during market declines.

The Monte Carlo analysis reinforces the suitability of the proposal. Under the nominal net-of-fees scenario, the median terminal wealth is approximately €1.5 million and the probability of reaching the €500,000 target is 100.0%. After applying the 28% Portuguese capital-gains tax, the median terminal wealth falls to approximately €1.2 million, with a 99.8% probability of success. In real terms, after adjusting for 2% annual inflation, the median terminal wealth is approximately €944,000 and the probability of reaching the €500,000 real target is 96.8%. The real scenario is the most relevant one because the objective is expressed in today's purchasing power.

Implementation is passive and rules-based. The equity and fixed-income exposures are implemented through physically replicating UCITS ETFs, selected for cost, tracking quality, scale and liquidity. The gold exposure is implemented through a physically backed ETC. The portfolio is reviewed quarterly against the adopted target weights and the IPS corridors. Rebalancing follows a contribution-first approach, using the annual €10,000 contribution to correct allocation drift before selling appreciated positions. This reduces avoidable taxable realisations, although it does not eliminate the possibility of capital-gains taxation during rebalancing or at the end of the horizon.

In summary, the proposed IPS recommends the constrained optimum portfolio of 60% equities, 27% fixed income and 13% real assets. The allocation offers an expected gross return of 11.45%, volatility of 9.13%, a Sharpe ratio of 1.04 and a safety-first ratio of 0.54. It clears the required nominal return of 6.51% with a substantial margin and reaches the €500,000 real

objective in 96.8% of simulated paths. The proposal is therefore suitable for the clients, provided that they remain committed to the contribution plan, tolerate interim drawdowns and review the IPS annually as their personal circumstances and market conditions evolve.

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Appendix

Table A1: Client profile (detailed)

Personal details	
Names & age	Mr. & Mrs. Rodriguez, both aged 25 at inception
Status	Unmarried couple, no children at the outset
Occupation	Software engineer and practising lawyer
Residency	Portuguese tax residents
Housing	Residing rent-free with family; first-home purchase planned within 5 years
Income & savings	
Household income	Two stable salaried professional incomes, weakly correlated sectors
Saving capacity	High implied savings rate (low fixed outflows)
Investment capital	€20,000 initial (€10,000 each) plus €10,000 per year
Total contributed	€270,000 over the 25-year horizon
Investment profile	
Horizon	25 years (2027–2052)
Financial knowledge	Moderate; no prior market experience
Risk capacity	High
Risk tolerance	High (growth-oriented quadrant)
Liquidity needs	Low; met by a separate emergency fund
Goals	
Primary goal	€500,000 in real (today's) terms at year 25
Qualitative goals	Early/flexible retirement, support for future children, capital redeployment
Mortgage	Future mortgage serviced from income, not from the portfolio
Return requirements	
Required real return	4.42% per annum
Inflation assumption	2.0% per annum
Required nominal return	6.51% per annum (Fisher)
Capital-gains tax	28%
Constraints	
Style	Passive, globally diversified UCITS ETFs and physically backed gold ETCs
Restrictions	No leverage, no short selling
Preferences	Accumulating share classes; Ireland/Luxembourg domicile; transparent and low-cost
Adopted portfolio	
Adopted allocation	60% equity / 27% fixed income / 13% real assets
Expected return (net)	11.33% per annum
Volatility	9.13% per annum
Sharpe ratio (net)	1.02

Table A2: Vanguard Investor Questionnaire and Responses

Time Horizon													
Question	As I withdraw money from these investments, I plan to spend it over a period of...												
Client's Answer	More than 15 years												
Question	When making a long-term investment, I plan to keep the money invested for...												
Client's Answer	More than 8 years												
Question	I plan to begin taking money from my investments in...												
Client's Answer	More than 15 years												
Risk Capacity													
Question	When it comes to investing in stock or bond mutual funds or ETFs — or individual stocks or bonds — I would describe myself as...												
Client's Answer	Somewhat inexperienced												
Question	My current and future income sources (for example, salary, social security, pensions) are...												
Client's Answer	Stable												
Risk Tolerance													
Question	From September 2008 through October 2008, bonds lost 4%. If I owned a bond investment that lost 4% in two months, I would...												
Client's Answer	Hold onto the investment and sell nothing												
Question	The chart below shows the greatest 1-year loss and the highest 1-year gain on three different hypothetical investments of \$10,000. Given the potential gain or loss in any one year, I would invest my money in...												
Range of 1-year outcomes on a \$10,000 hypothetical investment <table><thead><tr><th>Investment</th><th>Highest 1-year gain (USD)</th><th>Greatest 1-year loss (USD)</th></tr></thead><tbody><tr><td>Investment A</td><td>+\$593</td><td>-\$164</td></tr><tr><td>Investment B</td><td>+\$1,921</td><td>-\$1,020</td></tr><tr><td>Investment C</td><td>+\$4,229</td><td>-\$3,639</td></tr></tbody></table>		Investment	Highest 1-year gain (USD)	Greatest 1-year loss (USD)	Investment A	+\$593	-\$164	Investment B	+\$1,921	-\$1,020	Investment C	+\$4,229	-\$3,639
Investment	Highest 1-year gain (USD)	Greatest 1-year loss (USD)											
Investment A	+\$593	-\$164											
Investment B	+\$1,921	-\$1,020											
Investment C	+\$4,229	-\$3,639											
Client's Answer	Investment C — the one with the most volatility												
Question	During market declines, I tend to sell portions of my riskier assets and invest the money in safer assets.												
Client's Answer	Strongly disagree												
Question	I would invest in a mutual fund or ETF (exchange-traded fund) based solely on a brief conversation with a friend, co-worker, or relative.												
Client's Answer	Strongly disagree												
Question	From September 2008 through November 2008, stocks lost over 31%. If I owned a stock investment that lost about 31% in three months, I would...												
Client's Answer	Hold onto the investment and sell nothing												
Question	Generally, I prefer an investment with little or no ups and downs in value, and I am willing to accept the lower returns these investments may make.												
Client's Answer	Strongly disagree												
Suggested Allocation (Vanguard Output)													
Stocks	80%												
Bonds	20%												
Short-term reserves	0%												

Table A3: Portfolio constraints (detailed)

Asset-class corridors		
Equity		60% – 75%
Fixed income		15% – 30%
Real assets		7% – 13%
Factor & style		
Aggregate explicit factor exposure (value)		20% – 30%
Sector concentration (within equity)		
Any single GICS sector		≤ 30% of equity
Technology sector (look-through)		≤ 36% of equity
Inflation sensitivity		
Inflation-linked bonds, REITs and gold combined		8% – 15%
Duration		
Fixed-income modified duration		5.0 – 7.5 years
Issuer		
Single issuer, look-through (UCITS 5/10/40)		≤ 5%
Structural		
Total portfolio weight		$\Sigma w_i = 100\%$
Short positions		none ($w_i \geq 0$)

Table A4: Composite Benchmark

Sub-class	Benchmark index	Benchmark weight
Equity		60.0%
US Equity	<i>MSCI USA</i>	40.0%
Global Value	<i>MSCI World Enhanced Value</i>	20.0%
Fixed Income		27.0%
US Treasury 7–10y (EUR-H)	<i>ICE US Treasury 7–10 Year (EUR-Hedged)</i>	27.0%
Real Assets		13.0%
Gold	<i>LBMA Gold Price (EUR)</i>	13.0%
TOTAL (composite benchmark)		100.0%

The composite benchmark blends the index of each held sub-class at the adopted portfolio weights (US Equity 40%, Global Value 20%, US Treasury 7–10y EUR-hedged 27%, gold 13%). Sub-classes that receive no allocation in the adopted portfolio do not enter the benchmark.

Table A5: Final eligible investment universe (detailed)

Sub-class	ETF	Ticker	ISIN	TER	AUM (€m)	Age	30d vol
US Equity	iShares Core S&P 500 (Acc)	CSPX LN	IE00B5BMR087	0.07%	151,443	15.8	65,507
	iShares MSCI USA (Acc)	CSUS LN	IE00B52SFT06	0.03%	4,759	15.8	5,291
	Vanguard S&P 500 (Acc)	VUAA LN	IE00BFMXXD54	0.07%	84,475	7.1	78,624
Europe	iShares Core MSCI Europe (Acc)	SMEA LN	IE00B4K48X80	0.12%	15,448	16.7	28,286
	Xtrackers MSCI Europe (Acc)	XMEU LN	LU0274209237	0.12%	9,400	18.8	4,689
	Amundi Stoxx Europe 600 (Acc)	MEUD FP	LU0908500753	0.07%	19,568	2.4	34,091
Japan	iShares Core MSCI Japan IMI (Acc)	SJPA LN	IE00B4L5YX21	0.12%	7,977	16.7	20,578
	Xtrackers MSCI Japan (Acc)	XMJP LN	LU0274209740	0.12%	6,470	18.8	6,898
Pacific ex-JP	iShares Core MSCI Pacific ex-Jpn (Acc)	CPXJ LN	IE00B52MJY50	0.20%	3,694	15.8	7,406
	HSBC MSCI Pacific ex Japan (Acc)	HMXJ LN	IE00B5SG8Z57	0.15%	1,307	15.8	28,082
Emerging Mkts	iShares Core MSCI EM IMI (Acc)	EMIM LN	IE00BKM4GZ66	0.18%	44,128	12.0	241,969
	Xtrackers MSCI EM (Acc)	XMME GY	IE00BTJRM35	0.18%	13,366	9.0	94,604
Global Value	iShares Edge MSCI World Value Factor (Acc)	IWVL LN	IE00BP3QZB59	0.25%	7,819	11.7	55,335
	Xtrackers MSCI World Value Factor (Acc)	XDEV LN	IE00BL25JM42	0.25%	5,015	11.7	25,701
Euro Govt	Xtrackers II Eurozone Govt Bond 1C	XGLE LN	LU0290355717	0.07%	3,119	16.7	194
	Amundi Euro Government Bond (Acc)	A4HC GR	LU1437018598	0.09%	1,648	2.2	1,936
Euro IG Corp	Xtrackers II EUR Corporate Bond 1C	XBLC LN	LU0478205379	0.09%	4,443	8.7	106
	iShares Core € Corp Bond (Acc)	IEAC LN	IE00B3F81R35	0.09%	13,796	17.3	23,714
Euro ILB	Xtrackers II Eurozone Infl-Linked 1C	XEIN GY	LU0290358224	0.15%	399	19.0	1,479
	Amundi Euro Govt Infl-Linked (Acc)	MTIX LN	LU1650491282	0.09%	1,462	11.0	447
US Tsy EUR-H	iShares \$ Treasury 7-10y EUR-H (Acc)	CEMF GY	IE000K1V1152	0.10%	7,265	0.9	44,264
	iShares \$ Treasury 7-10y EUR-H (Dist)	IBBI GY	IE00BGPP6697	0.10%	7,265	7.3	503,422
Global REITs	Amundi FTSE EPRA NAREIT Global (Acc)	EPRA FP	LU1437018838	0.24%	789	9.6	2,234
	HSBC FTSE EPRA NAREIT Dev (Acc)	HPRA LN	IE000G6GSP88	0.24%	3,148	3.9	3,833
Gold	iShares Physical Gold ETC	SGLN LN	IE00B4ND3602	0.12%	34,991	15.2	328,693
	Invesco Physical Gold ETC	SGLD LN	IE00B579F325	0.12%	26,845	17.0	27,696
	WisdomTree Physical Gold	PHAU LN	JE00B1VS3770	0.39%	6,910	19.2	9,216

Twenty-seven UCITS ETFs surviving the qualitative eligibility filter, grouped by sub-asset class. TER, assets under management, fund age (to June 2026) and 30-day average volume from Bloomberg. Source: Bloomberg.

Table A6: Security-selection scoring criteria and weights

Criterion	Weight	What it rewards
Cost & replication fidelity	45%	
Total expense ratio	25%	Lower ongoing cost → higher net return
Tracking error vs benchmark	20%	Closer index replication
Viability & tradability	25%	
Assets under management	15%	Fund scale, lower closure risk
Secondary-market liquidity	10%	Tighter spreads, easier execution
Track record	5%	
Fund age	5%	Sufficient history to trust metrics
Statistical replication quality	25%	
Sharpe ratio	10%	Risk-adjusted fidelity to benchmark
Information ratio	10%	Scored $ IR \rightarrow 0$ (passivity, not alpha)
Market beta	5%	Scored $ \beta - 1 \rightarrow 0$ (market exposure ≈ 1)
TOTAL	100%	

Table A7: Robustness of the selection across weighting schemes

Sub-class	Base (IPS)	Equal	Cost-heavy	Fidelity-heavy	Size/Liquidity	Robustness
US Equity	CSPX	CSPX	CSUS	CSPX	CSPX	Sensitive
Europe	MEUD	MEUD	MEUD	MEUD	MEUD	Robust
Japan	SJPA	SJPA	SJPA	SJPA	SJPA	Robust
Pacific ex-Japan	HMXJ	CPXJ	HMXJ	CPXJ	CPXJ	Sensitive
Emerging Markets	EMIM	EMIM	EMIM	XMME	EMIM	Sensitive
Global Value	IWVL	IWVL	IWVL	IWVL	IWVL	Robust
Euro Government	XGLE	XGLE	XGLE	XGLE	XGLE	Robust
Euro IG Corp	IEAC	IEAC	IEAC	IEAC	IEAC	Robust
Euro Infl-Linked	XEIN	XEIN	XEIN	XEIN	XEIN	Robust
US Treasury (H)	CEMF	CEMF	CEMF	CEMF	CEMF	Robust
REITs	HPRA	HPRA	HPRA	HPRA	HPRA	Robust
Gold	SGLD	SGLD	SGLN	SGLD	SGLN	Sensitive

Table A8: Cost and liquidity profile of the selected ETFs, by sleeve

Metric (policy-weighted)	Equities	Fixed income	Real assets	Total
Weighted expense ratio	0.13%	0.10%	0.12%	0.12%
Assets under management (€ m)	103,569	7,265	26,845	67,593
100-day average volume	62,117	44,264	27,696	52,822
Fund age (years)	14.4	0.9	17.0	11.1
Beta vs sub-class benchmark	0.92	0.49	0.98	0.81

Table A9: Final portfolio — ETFs and benchmarks (detailed)

ETF	Fund description	Benchmark index
iShares Core S&P 500 (CSPX)	Ireland-domiciled, accumulating; physically replicates large-cap US equities.	MSCI USA
iShares Edge MSCI World Value (IWVL)	Ireland-domiciled; value-factor tilt across developed markets.	MSCI World Enhanced Value
iShares \$ Treasury 7–10y EUR-Hedged (CEMF)	Ireland-domiciled; US Treasuries 7–10y with the currency hedged to euro.	ICE US Treasury 7–10 Year (EUR-Hedged)
Invesco Physical Gold (SGLD)	Physically backed gold ETC; each share backed by allocated bullion.	LBMA Gold Price (EUR)

Table A10: Mean-variance inputs — expected return and volatility

Building block	Index	Monthly ret.	Monthly vol.	Annual ret.	Annual vol.
US	MXUS	1.27%	4.24%	15.28%	14.70%
Europe	MXEU	0.74%	3.85%	8.89%	13.33%
Asia-Pacific	MXPC	0.74%	3.59%	8.85%	12.45%
Emerging	MXEF	0.67%	4.04%	8.10%	14.00%
Value	MXWOEV	0.87%	4.07%	10.39%	14.11%
Euro Govt	LEATTREU	0.09%	1.53%	1.11%	5.30%
Euro IG	LECP TREU	0.15%	1.31%	1.77%	4.53%
Euro ILB	BEIGIT	0.16%	1.65%	1.89%	5.71%
US Tsy	H30773US	0.50%	2.19%	6.04%	7.59%
REITs	ENGL	0.59%	4.44%	7.04%	15.38%
Gold	XAUEUR	1.04%	3.72%	12.54%	12.88%

Historical estimates from monthly total-return index series over the common window April 2014 to December 2025. Equity indices unhedged; the US Treasury sleeve is implemented EUR-hedged.

Figure A1: Correlation matrix of the building blocks



Figure A2: Annualised covariance matrix of the building blocks

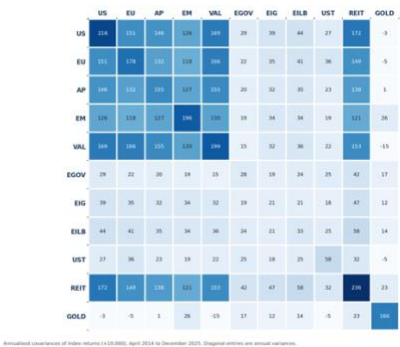


Figure A3: Distribution of monthly returns with Value-at-Risk thresholds

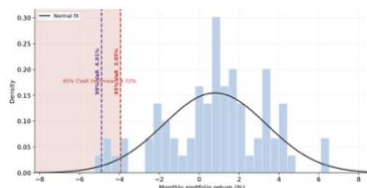


Figure A4: Portfolio Drawdowns, 2020-2026

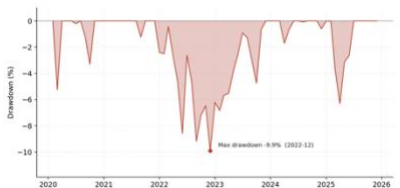


Figure A5: Historical stress-scenario replays

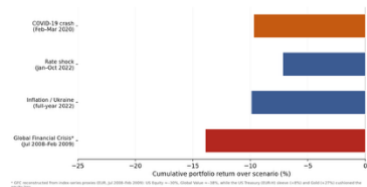


Figure A6: Historical backtest of the policy portfolio, 2020-2026

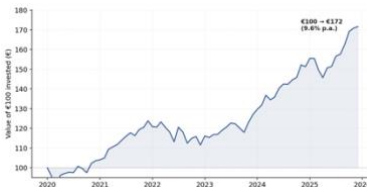
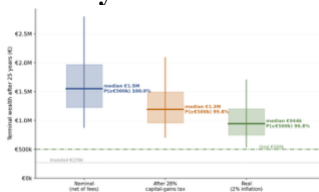


Figure A7: Projected terminal wealth by scenario



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Artificial intelligence tools were used during the preparation of this Master's Final Work. Their use included support in brainstorming, structuring ideas, improving the clarity and fluency of the English writing, reformulating selected passages based on my prompts, assisting with the organization of arguments, and generating or reviewing Python code used for quantitative calculations and charts.

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