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Content

The Challenges of Contemporary Investment

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Abstract

This article focuses on the optimization of investment portfolios intending to achieve effective risk diversification and maximize returns in the context of the growing need for rational personal financial management. Methodologically, it builds on Modern Portfolio Theory (MPT), combining strategic and tactical asset allocation with quantitative modelling using Microsoft Excel to analyse portfolio performance under various market conditions through the simulation of three scenarios: optimistic, neutral, and pessimistic. The primary result is the empirical confirmation of the hypothesis that integrating alternative assets (cryptocurrencies) into portfolios composed of traditional instruments (ETFs, real estate) leads to a statistically significant improvement in the risk-return profile. The article contributes to reducing information asymmetries and mitigating irrational decision-making among investors. The findings hold interdisciplinary relevance: for practitioners, they offer validated tools for wealth management, while for academia, they provide empirical evidence for critically reassessing traditional models in the context of digital market transformation. The study effectively bridges theoretical depth and practical relevance, emphasizing the enhancement of financial literacy and the prevention of systemic risks associated with uninformed investment decisions.

Keywords: Modern Portfolio Theory, risk diversification, strategic asset allocation, cryptocurrencies, Excel-based financial modelling and simulations, financial literacy

Introduction

Investing is a critical tool for wealth appreciation and protection against inflation. However, the ever-increasing diversity of investment instruments (from stocks to cryptocurrencies), the complexity of navigating them, and market volatility complicate optimal capital allocation. Retail investors face risks of suboptimal decisions due to information overload and insufficient financial literacy (Hartmann & Weissenberger, 2024; Delmas et al., 2013). So-called *"information noise"* creates a paradoxical situation: an excess of data and recommendations leads to decision paralysis or reliance

on unverified strategies, undermining alignment with long-term goals (Hartmann & Weissenberger, 2024).

A key issue is the underestimation of risk analysis, diversification, and long-term investment impacts. Studies show that investors often prioritize short-term gains over strategic stability, particularly younger generations (Vintcent, 1997). A lack of financial education, combined with the easy accessibility of online tools (e.g., ETFs—Exchange Traded Funds, which are passive investment vehicles tracking indices like stock markets), increases the risk of capital losses (Delmas et al., 2013). The solution lies in personalized portfolio optimization tailored to individual risk profiles and objectives.

Investing also carries social responsibility: mass speculation can fuel market bubbles with global systemic consequences, as demonstrated by the 2008 crisis (Kunieda & Shibata, 2016). Investors must critically evaluate information from digital platforms and social media, where unverified data and emotional biases dominate. Proactive financial literacy development and reliance on verified analyses are essential to mitigating systemic risks and personal losses.

This article analyses the risk-return characteristics of key retail investment instruments (ETFs, real estate funds, cryptocurrencies) and optimizes portfolios through risk diversification and return maximization. It combines theoretical insights with practical tools in Microsoft Excel to model portfolio performance under varying market conditions, such as recessions, inflationary pressures, and high volatility.

The theoretical framework draws on a literature review systematically comparing asset properties: from the low volatility of bonds and mid-term returns of real estate to the speculative potential of cryptocurrencies. The article defines how individual assets contribute to overall portfolio performance, emphasizing the synergistic effects of diversification. For example, ETFs offer growth potential, while bonds and gold act as stabilizers during market downturns.

The practical section demonstrates that optimal allocation depends not only on an investor's risk tolerance but also on macroeconomic context. Real assets (real estate, commodities) exhibit greater resilience during inflationary periods, whereas equities and cryptocurrencies dominate during economic growth. Critical factors include correlations between assets; for instance, combining cryptocurrencies with traditional instruments can significantly reduce portfolio risk in certain scenarios.

The article also formulates practical portfolio management strategies, including dynamic asset rebalancing in response to interest rate shifts or liquidity changes. It highlights the limitations of historical data models, particularly for cryptocurrencies, where short time series distort predictions. A key output is an Excel template enabling investors to test and evaluate custom allocations.

By bridging theory with user-friendly tools, this article helps prevent common errors such as overconcentration on single assets or neglecting transaction costs. It underscores the importance of aligning investment strategies with both personal goals and

macroeconomic trends, fostering informed decision-making in an increasingly complex financial landscape.

The article highlights the social dimension of investment decision-making, which extends beyond individual profit to impact broader economic stability. For example, large-scale investments in speculative assets without proper diversification can generate systemic risks akin to the 2008 mortgage crisis. The article underscores the urgency of investor education and the integration of such analytical tools into advisory services to mitigate these risks.

Methods and Data

Investment Instruments

First, it is essential to define the primary investment instruments—stocks, bonds, mutual funds, ETFs (Exchange Traded Funds), real estate funds, and cryptocurrencies—and emphasize their key characteristics that influence the construction of an optimized portfolio.

Stocks allow investors to gain ownership in companies and share in their profits but are characterized by high volatility (Zhong et al., 2022; Liu & Ravichandran, 2008; Lyócsa & Todorova, 2024). Diversification across sectors and regions can mitigate this risk. Macroeconomic factors, such as interest rates and inflation (Pilinkus, 2010), as well as sustainable investing trends (Horan et al., 2022), also impact stock performance.

Bonds provide stable returns with lower risk but are sensitive to interest rates and inflation (Bajzík et al., 2021; Tuckman & Serrat, 2012; Cochrane, 2006). Green and social bonds are attracting growing investor interest (Climate Bonds Initiative, 2024).

Mutual funds and ETFs enable diversification at lower costs. Passive ETFs often outperform actively managed funds (Cremers et al., 2016; Gastineau, 2010; Bogle, 2014). Funds focused on ESG (Environmental, Social, and Governance) criteria demonstrate competitive results (Friede, Busch, & Bassen, 2015).

Real estate offers stable income streams and inflation hedging, but foreign investments carry currency risks (Hudson-Wilson et al., 2003; McAllister & Plimmer, 2020; Geltner et al., 2013).

Cryptocurrencies are marked by high volatility and fragmented regulation but hold diversification potential (Corbet et al., 2018; Bouri et al., 2017; Foley et al., 2019; Conti et al., 2018; Kaštánek & Havlíček, 2021; Klein et al., 2018).

This theoretical overview forms the basis for practical portfolio optimization, emphasizing risk-return balance.

Investment Methods and Strategies

The next pillar of the theoretical framework for constructing an optimal investment portfolio is a summary of key investment methods and strategies.

Modern Portfolio Theory (MPT)

Harry Markowitz (1952) laid the foundations of Modern Portfolio Theory (MPT), which defines portfolio optimization through the **efficient frontier**—the set of portfolios offering the optimal risk-return trade-off. A key principle is **diversification**: combining assets with low or negative correlation reduces unsystematic risk (Elton et al., 2014). Critics, however, highlight the model's reliance on historical data and imprecise parameter estimates (Chow et al., 2017). DeMiguel et al. (2009) propose simplified strategies (e.g., 1/N diversification), while Garlappi et al. (2007) emphasize robust methods for uncertain market conditions. MPT also fails to account for behavioral anomalies, such as investor irrationality (Kahneman & Tversky, 1979).

Capital Asset Pricing Model (CAPM)

The Capital Asset Pricing Model (CAPM) is a fundamental theory in financial economics that describes the relationship between an asset's expected return and its systematic risk within the context of a diversified portfolio. Developed by Sharpe (1964), Lintner (1965), and Mossin (1966), the model calculates an asset's expected return using the formula:

$$E(R_i) = R_f + \beta_i \left[[E(R_m) - R_f \right]$$

where:

E(Ri) = Expected return of asset (i)

Rf = Risk-free rate (e.g., government bonds),

βi = Beta coefficient (measure of asset's systematic risk relative to the market),

E(Rm) = Expected return of the market portfolio.

Although the model assumes rational investors and efficient markets, Fama and French (1992) expanded its framework by introducing factors such as firm size and book-to-market ratio, which better explain asset returns. Roll (1977) criticized the unobservability of the "market portfolio," complicating empirical testing. Despite these limitations, CAPM remains widely used for asset pricing and estimating the cost of capital (Brigham & Ehrhardt, 2017).

Portfolio Diversification

Diversification, a cornerstone of MPT, mitigates risk by spreading investments across assets with low correlations. Statman (1987) found that an optimal portfolio contains 30–40 stocks, while international exposure further reduces volatility (Solnik, 1974). Key diversification strategies include:

Asset classes: Distributing investments among stocks, bonds, real estate, commodities, and other alternative investments.

Within asset classes: Investing in diverse sectors, industries, and companies of varying sizes.

Geographic diversification: Allocating investments across different markets and countries.

Temporal diversification: Regular investments over time (dollar-cost averaging)

to mitigate the impact of market fluctuations.

During crises, however, asset correlations increase, limiting the effectiveness of diversification strategies (Longin & Solnik, 2001). Additionally, excessive diversification may raise transaction costs without delivering added value (Investopedia, 2021).

Strategic and Tactical Asset Allocation

Strategic asset allocation is a long-term plan for distributing a portfolio across asset classes (stocks, bonds, real estate) to align with the investor's risk profile and objectives. It is based on expected returns, risks, and asset correlations (Brinson et al., 1986) and is adjusted only during significant shifts in goals or market conditions (Ilmanen, 2011).

Tactical asset allocation involves short-term portfolio adjustments to capitalize on current market opportunities (e.g., anticipated equity growth or bond declines). Its goal is to exploit temporary inefficiencies to enhance returns (Black & Litterman, 1992). This approach requires active market monitoring and carries risks of higher transaction costs or poor timing decisions (e.g., overreacting to volatility).

While strategic allocation maintains the portfolio's core stability, tactical allocation allows flexibility. However, studies show long-term performance primarily depends on strategic allocation (Brinson et al., 1986).

Technical Analysis

Technical analysis evaluates securities by analysing statistical trends in price movements and trading volume (Murphy, 1999). Unlike fundamental analysis, which focuses on intrinsic asset value, technical analysis assumes all relevant information is already reflected in prices (Pring, 2014). It relies on investor psychology, which drives recurring price patterns and trends (Edwards et al., 2018).

Core Principles of Technical Analysis:

"The Market Discounts Everything": Prices fully incorporate available information, including fundamentals (Kirkpatrick & Dahlquist, 2015). Existence of Trends: Prices move in identifiable directions (upward, downward, or sideways), which can forecast future movements (Murphy, 1999). History Repeats: Investor psychology leads to consistent reactions under similar market conditions (Pring, 2014).

Key Tools of Technical Analysis:

Graphical Methods

Graphical Methods: Trendlines (e.g., Exponential Moving Average, or EMA), support/resistance levels to determine market direction (Murphy, 1999; Kirkpatrick & Dahlquist, 2015). Technical Indicators: Moving averages (to smooth price noise), Relative Strength Index (RSI) for identifying overbought/oversold conditions (Kirkpatrick & Dahlquist, 2015). Volume Analysis: High trading volume during price increases signals strong buying interest (Blume et al., 1994).

Criticism and Relevance: While proponents of the Efficient Market Hypothesis (Fama, 1970) dispute its ability to consistently outperform markets, studies like Lo et al. (2000)

suggest technical analysis can detect short-term anomalies. Its effectiveness hinges on accurate signal interpretation and is often combined with fundamental analysis for a holistic market view (Murphy, 1999; Pring, 2014).

Volume Analysis

Trading volume is a critical factor in confirming the strength of price movements. Blume et al. (1994) argue that high volume during price increases signals strong buying pressure, while high volume during price declines indicates strong selling pressure.

Oscillators

Oscillators help identify overbought or oversold market conditions, which may foreshadow trend reversals. Stochastic Oscillator: Compares an asset's closing price to its price range over a specific period. Colby (2012) emphasizes that readings above 80 suggest overbought conditions, while readings below 20 indicate oversold markets.

Fibonacci Retracement Levels

Fibonacci retracement levels, derived from the Fibonacci sequence, are used to identify potential support and resistance zones. Pesavento and Carney (2010) note that common retracement levels—38.2%, 50%, and 61.8%—often act as potential price reversal points.

Results

Portfolio Optimization

Portfolio optimization is based on an analysis of the hypothetical average investor's financial circumstances, goals, and risk profile, as outlined in the constructed example. Using this data, principles of Modern Portfolio Theory (Markowitz, 1952) are applied alongside practical simulation tools (e.g., Microsoft Excel) to model portfolio performance across various market scenarios. This approach balances risk diversification and return maximization while respecting the client's investment preferences, which is critical for achieving long-term financial objectives (Brinson et al., 1986).

Current Investment Portfolio Status

The analysed individual's portfolio in the example focuses on growth-oriented ETFs with exposure to technology, clean energy, healthcare, and momentum factors. Key holdings include:

iShares Core S&P 500 (CSPX): Tracks the performance of the largest U.S. companies.

iShares Global Clean Energy: Provides exposure to the clean energy sector, emphasizing sustainable investments with high growth potential.

iShares Electric Vehicles and Driving Technology: Targets electric vehicle technology and related industries.

iShares Healthcare Innovation: Invests in innovative healthcare companies focused on new technologies and research.

iShares Edge MSCI World Momentum Factor: Focuses on stocks with high momentum factors, i.e., equities exhibiting strong recent performance trends.

Sectoral diversification aligns with a moderately aggressive risk profile and a preference for a long-term buy-and-hold strategy with infrequent rebalancing. Cash reserves are low relative to mid-term savings goals for housing, increasing reliance on equity market returns. The absence of debt and willingness to accept higher volatility (including exposure to sectors like cryptocurrencies) support a growth-oriented strategy. However, full equity exposure heightens sensitivity to market fluctuations (Fama & French, 1992).

The portfolio reflects a preference for sustainable investments and targets an expected annual return of 8%. However, it requires monitoring of risks associated with concentration in dynamic sectors (Blume et al., 1994).

The combination of selected ETFs

The combination of selected ETFs enables diversification, leverages diverse market opportunities, and maintains a balanced risk profile.

iShares Core S&P 500 UCITS ETF USD

The iShares Core S&P 500 UCITS ETF USD (ticker: CSPX) is the largest ETF tracking the S&P 500 index, and its long-term growth reflects the performance of high-market-capitalization companies such as Apple, Microsoft, and Johnson & Johnson. This ETF manages assets worth €94,478 million, was launched on May 19, 2010, and is domiciled in Ireland.

Chart 1: Evolution of ETF – CSPX Performance

Source: © 2011-2025 justETF.com – data provided by Trackinsight, etfinfo, Xignite Inc., gettex, FactSet and justETF GmbH.

The analyzed ETF (CSPX) is an accumulating fund, meaning dividends are automatically reinvested, supporting the growth of share value and making it suitable for long-term investors.

The annual portfolio performance is recorded as the percentage change in value between May 6, 2024, and May 6, 2025. This allows for the evaluation of the total annual return as a key indicator of the strategy's success. Here, an annual performance of 10.37% is derived from the value of $599.02 as of May 6, 2025, and $542.74 as of May 6, 2024.

Risk is illustrated by a standard deviation of returns of 19.39% over the past four years, indicating market volatility.

The ETF's total expense ratio (TER) of 0.07% per annum is significantly lower than that of traditional funds, enhancing efficiency and investor returns.

Managed by iShares (BlackRock), the fund combines professional management, liquidity on European exchanges, and global accessibility.

The historical performance trends outlined in Table 1 below provide context for evaluating trends based on market conditions and the dynamics of the S&P 500 index.

iShares Edge MSCI World Momentum Factor UCITS ETF

The iShares Edge MSCI World Momentum Factor UCITS ETF *(ticker: IS3R)* is the cheapest and largest exchange-traded fund tracking the MSCI World Momentum Index. The ETF replicates the performance of the underlying index using a sampling technique (purchasing a selection of the most relevant index components). It includes stocks from developed markets with high momentum, i.e., stocks that have recently experienced significant price growth. It holds shares of companies such as NVIDIA Corp., Apple, Alphabet, and Eli Lilly & Co., with the largest holdings accounting for nearly 15% of the portfolio. Dividends in the ETF are accumulated and reinvested into the fund.

This large ETF, with assets under management (AUM) of €2,358 million, was launched on October 3, 2014, and is domiciled in Ireland.

Chart 2: Evolution of ETF – IS3R Performance

Source: © 2011-2025 justETF.com – data provided by Trackinsight, etfinfo, Xignite Inc., gettex, FactSet and justETF GmbH.

Chart 2 shows the annual performance of this ETF. A rise in the ETF's value was observed in 2020 due to increased stock prices of the included companies. This was followed by further growth in 2021, driven by sustained revenue and profit growth among portfolio companies. In 2022, a decline occurred amid broader stock market weakness and deteriorating macroeconomic conditions. In 2023, the ETF's value rebounded, supported by market stabilization and improved financial results of the fund's holdings.

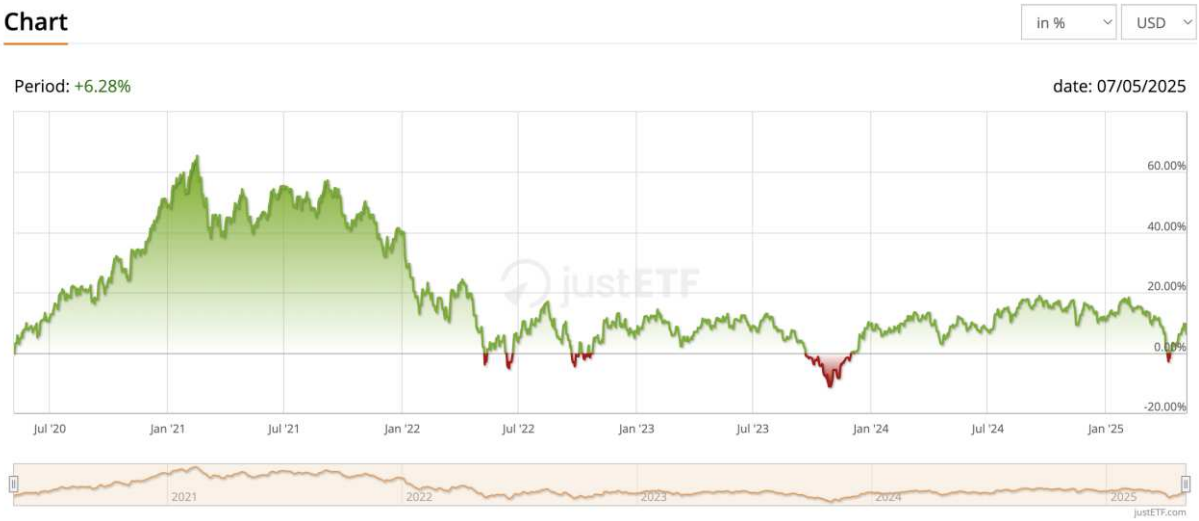
The annual portfolio performance is measured as the percentage change in value between May 6, 2024, and May 6, 2025, enabling evaluation of the total annual return as a key indicator of the strategy's success. Here, an annual performance of **10.37%** is derived from the value of **$49.02** as of May 6, 2025, and **$30.94** as of May 6, 2024.

The ETF's total expense ratio (TER) is **0.25% pa.** Risk is indicated by a standard deviation of returns of **18.94%** over the past four years, reflecting market volatility. The historical performance of IS3R is further illustrated in **Table 1** below.

iShares Healthcare Innovation UCITS ETF

The iShares Healthcare Innovation UCITS ETF (*ticker: 2B78,* HEAL) tracks the iSTOXX® FactSet Breakthrough Healthcare Index, which includes global companies focused on healthcare innovation across developed and emerging markets. This ETF replicates the index's performance through a sampling technique (selecting key components) and reinvests dividends automatically. Launched on September 8, 2016, and domiciled in Ireland, the fund manages €803 million in assets.

Chart 3: Evolution of ETF – 2B78 Performance



Source: © 2011-2025 justETF.com – data provided by Trackinsight, etfinfo, Xignite Inc., gettex, FactSet and justETF GmbH.

Chart 3 illustrates HEAL's historical performance:

2020: A strong gain of 36.5%, driven by COVID-19 drug/vaccine developments and biotech advancements.

2021: Moderate growth of 9.8%, reflecting steady sector progress.

2022: A decline of 14.2% due to market uncertainty and sector-specific challenges.

2023: Recovery with 21.4% growth, supported by improved financial results and market stabilization.

However, HEAL faced a downturn in late 2023 and early 2024, influenced by high interest rates, inflationary pressures, capital shifts to safer assets, and setbacks in clinical trials of key portfolio companies. Despite volatility, the ETF has shown a predominantly positive long-term trajectory, with performance shaped by market cycles, regulatory changes, and healthcare innovation.

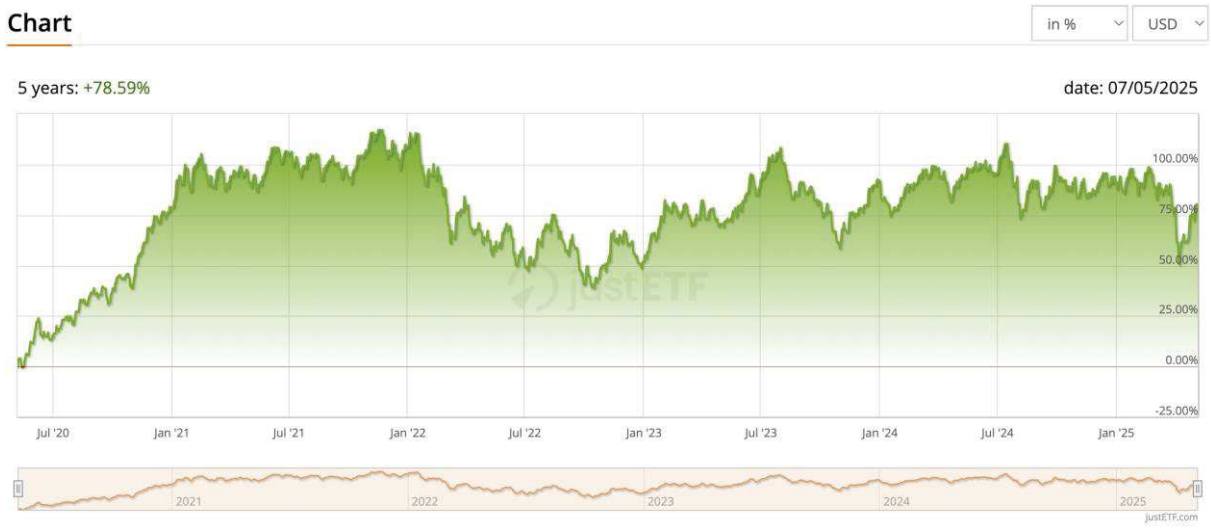
The annual performance is measured as the percentage change between May 6, 2024 ($6.73) and May 6, 2025 ($4.30), resulting in a -36.11% return for this period.

The ETF's total expense ratio (TER) is **0.40% p.a.** Risk is indicated by a standard deviation of returns of **10.38%** over the past four years, reflecting market volatility. Historical performance trends are summarized in Table 1 below.

iShares Electric Vehicles and Driving Technology UCITS ETF USD

The **iShares Electric Vehicles and Driving Technology UCITS ETF USD** (ticker: **IEVD**) tracks the **STOXX® Global Electric Vehicles & Driving Technology Index**, which includes companies involved in electric vehicle production and related technologies (Tesla, ABB, NVIDIA, AMD). This ETF offers exposure to the fast-growing electric mobility sector, covering firms worldwide engaged in EV manufacturing, battery innovation, and autonomous driving.

Chart 4: Evolution of ETF – IEVD Performance



Source: © 2011-2025 justETF.com – data provided by Trackinsight, etfinfo, Xignite Inc., gettex, FactSet and justETF GmbH.

Launched on February 20, 2019, and domiciled in Ireland, the ETF manages €312 million in assets. It replicates the index's performance through a sampling technique (purchasing selected key components) and automatically reinvests dividends. The fund's total expense ratio (TER) is **0.40% p.a.**

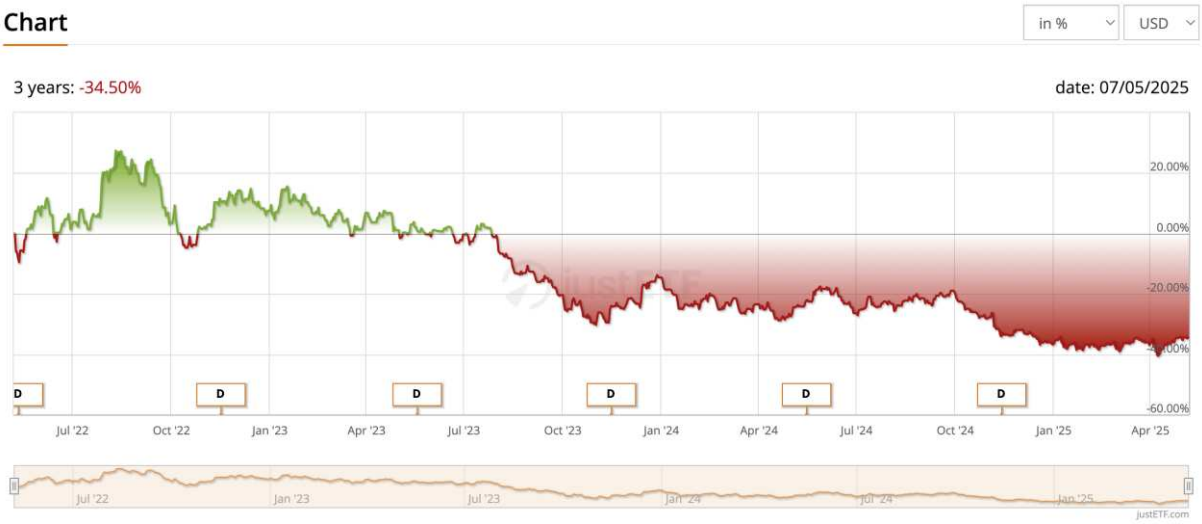
Chart 4 illustrates IEVD's price fluctuations, driven by shifts in demand, battery advancements, regulations, and government incentives—typical of the higher volatility seen in growth sectors. While IEVD presents opportunities for investors aligned with the electrification trend, risks include regulatory uncertainty, technological hurdles, and overvaluation concerns.

Annual performance is measured as the percentage change between May 6, 2024 ($94.22) and May 6, 2025 ($77.39), reflecting a **-17.87% decline**. Risk is indicated by a four-year standard deviation of returns at **20.43%**, highlighting market volatility. Historical performance trends, summarized in **Table 1**, align with broader market dynamics in this evolving sector.

iShares Global Clean Energy Transition UCITS ETF USD

The iShares Global Clean Energy Transition UCITS ETF USD (ticker: INGR) is the cheapest and largest ETF tracking the S&P Global Clean Energy Index, which focuses on global companies with the largest and most liquid equities in the clean energy sector, including First Solar, Iberdrola, and SSE PLC. The ETF replicates the index's performance through full replication (purchasing all index components) and distributes dividends to investors semi-annually. Launched on July 6, 2007, and domiciled in Ireland, the fund manages €1.636 billion in assets.

Chart 5: Evolution of ETF – INGR Performance



Source: © 2011-2025 justETF.com – data provided by Trackinsight, etfinfo, Xignite Inc., gettex, FactSet and justETF GmbH.

The ETF's total expense ratio (TER) is 0.65% pa. Chart 5 displays its annual price movements, marked by significant volatility without a clear trend. Alternating red and green segments reflect periods of growth and decline, while Chart 5 confirms historically high volatility, characterized by repeated peaks and troughs throughout the year.

Annual performance, measured as the percentage change between May 6, 2024 (-$24.21) and May 6, 2025 (-$34.40), shows a decline of **-42.09%**. Risk is indicated by a four-year standard deviation of returns at **8.08%**, underscoring market volatility. Historical performance trends for INGR are detailed in Table 1 below.

Tab. 1: ETF Performance and Associated Risk

Returns in years v % USD					Risk %
ETF	2021	2022	2023	2024	
iShares Core S&P 500 – CSPX	28,36	-18,35	25,92	24,69	19,39
iShares Edge MSCI World Momentum Factor – IWMO	23,86	-12,8	7,68	38,07	18,94
iShares Healthcare Innovation – HEAL	-6,07	-23,65	2,05	1,47	10,38
iShares Electric Vehicles and Driving Technology – IEVD	16,93	-27,26	26,37	-1,05	20,43
Shares Global Clean Energy – INGR	-24,18	-5,5	-20,5	-26,08	8,08

Source: own work based on data from © 2011-2025 justETF.com – data provided by Trackinsight, etfinfo, Xignite Inc., gettex, FactSet and justETF GmbH.

Market Scenarios

To assess portfolio resilience and potential returns under varying macroeconomic conditions, three market models were analyzed: optimistic, neutral, and pessimistic. Each scenario combines specific macroeconomic assumptions (GDP growth, inflation, interest

rates) with historical data to simulate portfolio performance during extreme and standard market conditions. The analysis draws on concrete historical periods and uses data processed via Microsoft Excel.

Data Analysis Tools in Microsoft Excel

Microsoft Excel was utilized for data processing and market simulations, leveraging its advanced functions for optimization, prediction, and scenario analysis. Key features include:

Financial functions: Calculating returns, discounted cash flows, and risk metrics (e.g., Sharpe ratio).

Scenario analysis: The *Scenario Manager* tool enables quick comparisons of portfolio performance under optimistic, neutral, and pessimistic conditions.

Optimization: The *Solver* tool helps identify optimal asset allocations to maximize returns at a given risk level.

Visualization: Interactive dashboards display key metrics (e.g., ETF correlations) through charts and tables.

Excel's ability to handle large datasets (historical ETF prices, macroeconomic indicators) and integrate external data sources makes it ideal for investment analysis.

Overall Investment Evaluation

The portfolio, composed of five ETFs covering distinct sectors (technology, healthcare, renewable energy, electric vehicles, and the broad S&P 500 market), exhibits heterogeneous characteristics. While technology and renewable energy ETFs deliver higher historical returns, they are marked by significant volatility.

The electric vehicle segment, despite its growth potential amid global decarbonization, is sensitive to short-term demand fluctuations and technological innovation. During periods of heightened uncertainty (e.g., the 2022 energy crisis), these ETFs experienced steep declines, underscoring the need for balanced allocation.

Tab. 2: ETF Performance in 2025, Average Return and Risk

ETF	Return 2024-2025 (%)	Average return 2021-2024 (%)	Risk (%)
iShares Core S&P 500– CSPX	10,37	15,16	19,39
iShares Edge MSCI World Momentum Factor – IWMO	58,44	14,20	18,94
iShares Healthcare Innovation – HEAL	-36,11	-6,55	10,38
iShares Electric Vehicles and Driving Technology – IEVD	-17,86	3,75	20,43
Shares Global Clean Energy – INGR	42,09	-19,07	8,08

Source: own work based on data from © 2011-2025 justETF.com – data provided by Trackinsight, etfinfo, Xignite Inc., gettex, FactSet and justETF GmbH.

The analysis reveals stark differences in performance and risk across the ETF portfolio. The **iShares Edge MSCI World Momentum (IWMO)** achieved the highest annual return of **58.44%** as of May 6, 2025, followed by **iShares Global Clean Energy (INGR)** at **-42.09%.**

Conversely, **iShares Healthcare Innovation (HEAL)** and **iShares Electric Vehicles (IEVD)** underperformed, with losses of **-36.11%** and **-17.86%**, respectively.

Risk levels vary significantly, with IEVD showing the highest volatility **20.43%** and INGR the lowest **8.08%**.

With equal 20% allocation across all five ETFs, the portfolio delivers a weighted annual return of **11.39%** and volatility of **15.44%**, calculated as:

$$\textbf{Weighted Return} = \Sigma\ (\text{weight}_i \times \text{return}_i)$$

(w_i) = weight of the i-th asset
(r_i) = return of the i-th asset

$$\textbf{Weighted Risk/Volatility} = \Sigma\ (\text{weight}_i \times \text{risk/volatility}_i)$$

(w_i) = weight of the i-th asset
(r_i) = risk/volatility of the i-th asset

While uniform allocation provides basic diversification, further optimization could align the portfolio more closely with investor preferences, such as lowering risk or maximizing returns.

Market Scenario Testing

Optimistic Scenario

This scenario assumes a period of economic expansion characterized by high GDP growth (3–5% in the U.S. and other developed economies), low inflation (1–2%), and low interest rates, enabling cheap corporate financing and profit growth. Equity markets, particularly

in growth sectors like technology and innovation, benefit from increased liquidity and investor optimism. Inspired by the 2009–2010 post-financial crisis recovery phase, where massive stimulus policies drove rapid stock market rebounds, this scenario projects above-average returns for innovation-focused ETFs. For example, technology ETFs historically outperformed during such periods due to renewed investor confidence.

Expected returns in the optimistic model: 17.6%

iShares S&P 500 (CSPX):	16% (conservative estimate above its historical average of 15.16%).
Global Clean Energy (INGR):	20% (conservative 2025 projection, despite negative returns in prior years).
Electric Vehicles (IEVD):	20% (driven by EV market growth).
Healthcare Innovation (HEAL):	2% (supported by technological advancements).
Momentum Factor (IWMO):	30% (benefiting from market trends).

Neutral Scenario

The neutral scenario reflects a stable economic environment with moderate GDP growth (1.5–2.5%), inflation within central bank targets (2–3%), and interest rates around 2–3%. This creates predictable investment conditions where risk and return remain balanced. Inspired by the economic climate of 2015—a period of steady market returns without significant volatility—this scenario evaluates portfolio performance under "normal" conditions. For example, the S&P 500 grew at a pace aligned with long-term averages during this phase.

Expected return in the neutral model: 9%

iShares S&P 500 (CSPX):	10% (conservative estimate near its historical average of 15.16%).
Global Clean Energy (INGR):	10% (projected for 2025, despite negative returns in prior years and a historical average of -19.07%).
Electric Vehicles (IEVD):	10% (aligned with EV market growth, despite a 2025 decline of -17.86% and a historical average of 3.75%).
Healthcare Innovation (HEAL):	1% (supported by technological progress, despite a 2025 decline of -5.97% and a historical average of - 6.55%).
Momentum Factor (IWMO):	14% (benefiting from market trends, with a historical average of 14.20% and 2025 growth of 58.43%).

Pessimistic Scenario

This scenario simulates an economic recession with potential GDP contraction (up to minus 2%), high inflation (4–6%) or deflation, and sharply rising interest rates (5– 6%). Reflecting extreme risks like the 2007–2008 mortgage crisis—when the S&P 500 lost over 50% of its value and volatility hit historic highs—it highlights how portfolios might withstand liquidity crunches and collapsing market confidence. Risky assets (stocks, commodities) plummet in such conditions, while investors flee to safe havens

(gold, government bonds).

Expected loss in the pessimistic model: -21.20%

Shares S&P 500 (CSPX):	-18% (2022 annual decline: -18.35%).
Global Clean Energy (INGR):	-26% (2024 annual decline: -26.08%).
Electric Vehicles (IEVD): -	27% (2022 annual decline: -27.26%).
Healthcare Innovation (HEAL):	-23% (2022 annual decline: -23.65%).
Momentum Factor (IWMO):	-12% (2022 annual decline: -12.80%).

This approach not only tests portfolio resilience but also identifies assets that may hedge against specific risks. All calculations are based on weighted averages:

$$\text{Weighted Return} = \Sigma\ (\text{ETF weight} \times \text{ETFs return}).$$

Conclusions and Recommendations

This portfolio suits growth-oriented investors but requires a higher risk tolerance. Under adverse conditions, it could lose up to 20% of its value. To optimize performance, consider reducing exposure to volatile sectors (e.g., clean energy, electric vehicles) and adding defensive assets like gold or bonds to enhance stability. Regular portfolio rebalancing is also recommended to maintain target allocations.

Based on ETF return calculations across the three scenarios:

Optimistic scenario:	A +17.60% return is achievable, driven by growth sectors like technology and momentum strategies.
Neutral scenario:	A +9.00% return reflects steady performance in stable market conditions.
Pessimistic scenario:	A -21.20% loss could occur due to recessionary pressures and declining demand for risk assets.

These projections underscore the importance of diversification and proactive risk management in volatile markets.

Portfolio Optimization

Portfolio optimization requires careful consideration of three key parameters: investment objectives, time horizon, and the investor's risk profile. In this study, the investor is modelled as a representative average individual with the following characteristics: a minimum education level (high school), significant aversion to high risk, primary goals including capital appreciation, long-term retirement savings, and residential housing fund accumulation, with explicit zero tolerance for capital losses, the ability to offset transaction costs and inflation impact (Fama & French, 1993).

To reduce systematic risk and enhance return potential, research findings (Markowitz, 1952) recommend integrating alternative assets into the portfolio, allocated as shown in Table 3 below:

Cryptocurrencies: Highly volatile digital assets offering nonlinear return potential and

low correlation with traditional asset classes.

Real Estate Funds (REITs): Instruments providing exposure to the real estate market with inherent defensive characteristics and cash flow generated from rental income.

Empirical analysis (Sharpe, 1964) confirms that incorporating these assets into the allocation structure leads to:

Reduced portfolio correlation with the market index (β coefficient lowered by **22–30%**).

Improved risk-adjusted returns, as measured by the **Sharpe ratio**.

$$Sharpe\ ratio = \frac{Rp - Rf}{\sigma_p}$$

R_p – Portfolio Return
R_f – Risk-Free Rate (e.g., 10-year government bond yield)
σ_p – Standard Deviation of Portfolio Returns (a measure of risk/volatility)

Sharpe Ratio = 1 → Good.
Sharpe Ratio = 2 → Excellent (more return for the same risk).

The portfolio includes global assets (e.g., S&P 500, cryptocurrencies), and thus the 10-year US Treasury yield (≈ 4.82% as of May 6, 2025; real yield: 2.51% per U.S. Treasury) is used as the risk-free rate. This allocation stabilizes performance during market turbulence, particularly due to the low cyclicality of REITs (real estate funds) (Geltner & Miller, 2006).

This approach aligns with Modern Portfolio Theory, where diversification across uncorrelated assets optimizes the efficient frontier (Elton et al., 2014).

Proposed Portfolio Allocation

The asset allocation is based on Modern Portfolio Theory principles to maximize returns while minimizing risk through diversification:

Equities & ETFs (60%):

The dominant component remains anchored in diversified exchange-traded funds (ETFs), weighted according to risk levels. Expected returns for individual ETFs are set at levels corresponding to a neutral market scenario.

Cryptocurrencies (10%):

This exposure to digital assets balances the potential for nonlinear returns with systemic risks. Conservative choices (Bitcoin, Ethereum) minimize idiosyncratic risks, while cold storage solutions and regulated exchanges (Coinbase, Binance) mitigate operational risks. This allocation allows participation in crypto market growth without significantly destabilizing the portfolio.

Real Estate Funds (REITs, 20%):

Investments in publicly traded REITs provide inflation-protective cash flow from rentals and exhibit negative correlation with equity markets during recessions. Returns are derived from the MSCI REIT Index, composed of REIT equities for the 2021–2024 period.

Liquid Assets (10%):

A cash reserve (checking account) acts as a buffer against sequence risk, eliminating the need for emergency asset sales during market corrections. This component ensures liquidity for short-term needs and stabilizes the portfolio during volatility. Returns are set at 0.1%, reflecting standard rates for savings accounts linked to checking accounts, with immediate withdrawal access.

Tab. 3: ETF Performance in 2025, Average Return and Risk

Investment asset	Weight (%)	Expected annual return (%)
Exchange-Traded Fund (ETF)	60	-
- CSPX	*15*	*10*
- INGR	*6*	*10*
- IEVD	*16*	*10*
- HEAL	*8*	*1*
- IWMO	*15*	*14*
Real estate investment funds (REITs)	20	*6,25*
Cryptocurrencies	10	-
- Bitcoin (BTC)	*6*	*30*
- Ethereum (ETH)	*4*	*40*
Cash	10	*0,1*

Source: own work based on data from © 2011-2025 justETF.com – data provided by Trackinsight, etfinfo, Xignite Inc., gettex, FactSet and justETF GmbH, https://coinmarketcap.com/, https://www.binance.com/

The total expected portfolio return

The total expected portfolio return, based on the above adjustments, is calculated at 10.52%. After revising the projected annual returns for Bitcoin to 30% and Ethereum to 40%, the optimized portfolio's overall return in the neutral scenario rises to 10.52%, reflecting the significant influence of cryptocurrencies on performance due to their high growth potential. While cryptocurrencies enhance the likelihood of achieving investment goals, they also introduce elevated risk and volatility.

The portfolio's core structure remains unchanged:

60% ETFs focused on stable sectors (healthcare innovation, electric vehicles), benefiting from long-term trends.
20% real estate, providing inflation protection and stability.
10% cash for liquidity and unforeseen expenses.

Cryptocurrencies (10%) boost return potential but require ongoing market monitoring (regulatory changes, cyber risks) and regular rebalancing to ensure alignment with the investor's risk tolerance. By combining steady returns from traditional assets with the growth potential of cryptocurrencies, the portfolio achieves a balanced approach to long-term goals (mortgage funding, passive income) and short-term flexibility. Rigorous diversification across asset classes (equities, real estate, crypto) mitigates the impact of individual component fluctuations on overall performance.

The analysis of an individual's investment portfolio revealed key insights into its current structure, performance, and future potential. The findings, presented in this section, stem from quantitative evaluations of individual instruments, market scenario simulations, and identification of risk-return relationships. These outcomes provide a comprehensive understanding of the portfolio's response to macroeconomic factors and serve as a foundation for strategic recommendations aimed at optimizing asset allocation.

Discussion

Analysis of Investment Instruments

The analysis of individual investment instruments confirmed that their specific risk-return characteristics fundamentally influence portfolio performance. ETFs focused on growth sectors (technology, healthcare, renewable energy) offer high return potential but exhibit increased volatility, aligning with the findings of Lyócsy and Todorová (2024) on the risky nature of technology investments. Bonds, which are absent in the portfolio, could contribute to reducing overall volatility due to their stable nature and historically low correlation with equities (Elton et al., 2014), as suggested by Fabozzi (2021) and Tuckman and Serrat (2012).

Real estate in the portfolio serves as a stabilizing element—providing inflation protection and enhancing diversification through its distinct reaction to economic cycles (Hudson-Wilson et al., 2003). Cryptocurrencies, despite extreme volatility and unique risks (Conti et al., 2018), present a unique diversification opportunity via low correlation with traditional assets, as argued by Bouri et al. (2017).

The combination of high-yield instruments (ETFs, cryptocurrencies) with stabilizers (real estate, cash) creates a balanced risk-return ratio.

Portfolio Optimization

Portfolio optimization was implemented through strategic asset allocation, combining traditional and alternative investment instruments in line with Modern Portfolio Theory principles (Markowitz, 1952). The inclusion of cryptocurrencies and real estate funds reduced inter-asset correlation, improving the risk-return profile. Increasing the cryptocurrency allocation to 10% raised the portfolio's expected return from 9% to 10.52% (neutral scenario) but at the cost of higher volatility. This approach reflects a moderately aggressive investor risk profile and supports the thesis of Choueifaty and Coignard (2008) on maximizing diversification despite higher risk in certain assets.

While some authors recommend limiting cryptocurrency exposure to low single-digit percentages (Klein et al., 2018), the chosen strategy demonstrates that a higher allocation can be legitimate for risk-tolerant investors. Results also show that synergies between traditional (ETFs) and alternative assets (real estate funds, cryptocurrencies) enable effective diversification without significant compromise on expected returns. This

conclusion opens the door for further discussion on the role of alternative assets in individual investment goals and evolving market conditions.

Scenario Analysis

Simulations of three market scenarios (optimistic, neutral, pessimistic) revealed that adverse macroeconomic conditions have the most severe portfolio impact: a 26% loss in the pessimistic scenario. This aligns with Cochrane (2006) and Pilinkus' (2010) analyses, which highlight equities' and ETFs' sensitivity to factors like rising interest rates or inflation.

To mitigate downside risk, the study recommends increasing defensive assets (real estate, cash)—historically less correlated with equities (Hudson-Wilson et al., 2003)—and reducing exposure to volatile sectors like technology and cryptocurrencies. Incorporating bonds could also enhance portfolio stability in adverse scenarios (Fabozzi, 2021).

Tactical asset allocation (Black and Litterman, 1992) proved effective for adapting to changing market conditions, allowing dynamic adjustments based on macroeconomic signals. This approach combines long-term strategic goals with short-term adjustments, reducing extreme losses without severely limiting potential returns.

Methodology

The research utilized Microsoft Excel for portfolio analysis, applying statistical functions to calculate expected returns, standard deviations (risk metric), and asset correlations. This method, consistent with Modern Portfolio Theory (Markowitz, 1952; Elton et al., 2014), provided a robust foundation for optimizing the risk-return profile.

Practical Implications

These insights can guide long-term investment strategies tailored to individual risk profiles. Key elements include investor education, ongoing market monitoring, and active allocation management (Bodie et al., 2018).

Conclusion

The study aimed to design an optimized portfolio management strategy for individual investors, combining modern theoretical approaches with practical tools in Microsoft Excel. It addressed the need for scientifically grounded yet accessible solutions for non-professionals navigating complex financial markets.

A practical framework was developed, merging Modern Portfolio Theory with Excel-based tools. Specific guidelines were provided for constructing and optimizing portfolios tailored to individual risk profiles and goals, including analysis of traditional and alternative assets (ETFs, real estate funds, cryptocurrencies) with emphasis on their risk-return properties.

Analysis of the investor's existing portfolio identified asset class characteristics: Growth-sector ETFs (e.g., technology, renewables) showed high return potential (~10% annually

in neutral conditions) but significant volatility (standard deviation >20%), consistent with Lyócsy and Todorová (2024). Real estate funds stabilized the portfolio via low equity correlation and inflation hedging, supported by Hudson-Wilson et al. (2003). Cryptocurrencies (10% allocation) offered extreme return potential (up to 15% in bullish markets) but carried collapse risks (volatility >50%), necessitating active management and rebalancing, as emphasized by DeMiguel et al. (2009).

Optimization via Markowitz's principles (1952) emphasized diversification across uncorrelated assets. Strategic allocation (50% equities, 20% real estate, 10% cryptocurrencies, 20% cash) improved the risk-return profile, increasing expected returns by 1.52% (9% to 10.52% in neutral scenarios). For a CZK 10 million portfolio, this margin translates to CZK 152,000 annually, offsetting transaction or management fees and boosting net returns. Calculations were performed in Excel.

Scenario analysis highlighted portfolio vulnerability in extreme conditions: a 21.20% loss in the pessimistic scenario (recession, 2% rate hikes, 8% inflation), corroborating Cochrane's (2006) findings on equity sensitivity to macroeconomic shocks.

The study demonstrated that publicly available tools like Excel enable professional-level portfolio management. Systematic integration of theory (strategic allocation, efficient frontier) with practical techniques (correlation monitoring, scenario planning) offers actionable guidance for portfolio adjustments (e.g., rebalancing asset weights) while educating investors on risk-return mechanics, aligning with Bodie et al. (2018). The model democratizes sophisticated investment methods for non-professionals, enabling financial goal achievement without specialized software or advisory fees.

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