

Global Market Allocation Report

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Our Investment Philosophy

Global investment has been proven to enhance investors' returns and reduce portfolio risks. In this report, we provide global asset allocation recommendations for equities, bonds, and currencies across short-term (1 year), medium-term (3 years), and long-term (5 years) investment horizons. Our investment strategies consist of Strategic Asset Allocation (SAA) and Tactical Asset Allocation (TAA). Based on this framework, we utilize the Black-Litterman model to integrate SAA and TAA, constructing optimal portfolios that balance long-term goals with short-term adjustments. Detailed information about the portfolio construction process can be found in Appendix 1. In the following sections, we present our core views on the economic conditions of developed and emerging markets, along with our perspectives on equities, fixed income, and currencies. Additionally, we provide an overview of our trading strategies that complement these views.

1. Developed Countries

1.1. USA

Although the US federal budget deficit continues to widen, publicly held debt may exceed 110% of GDP by 2030, raising concerns about the stability of the US dollar and may lead to future challenges. But in 2024, U.S. economy showed strong resilience and steady growth, which created positive effect for the equity market. In the third quarter of 2024, GDP(annualized rate) increased to 2.8%, which is higher than expected 2.0%. Consumer spending rose by 3.7%. The inflation rose to 2.6% in October, 0.2% more than September's rate, but still under control. The unemployment rate was at 4.1%, which showed a solid labor market.

1.2. Japan

After years of stagnation, Japan's economy shows recovery signs in 2024, but challenges persist. The IMF lowered its growth forecast to 0.3%, citing weak exports and slower tourism growth. While domestic demand, especially in services, has improved, Japan remains heavily dependent on exports. Any slowdown in China or the U.S. could pressure its recovery. Inflation above 2% continues to strain costs for consumers and businesses.

1.3. Canada

In 2024, Canada's economy shows moderate growth, with GDP expected to rise by 1.2% for the year. Inflation remains stable at around 2%, aligning

with the Bank of Canada's target, and recent interest rate cuts aim to address slowing growth. However, Canada faces a housing shortage, with the lowest per capita housing supply among G7 nations. The housing deficit is projected to reach 3.5 million units by 2030. Population growth and increased immigration further exacerbate housing demand, posing challenges to the economic recovery process.

1.4. Germany

In 2024, Germany's economy is projected to contract by 0.2%, following a 0.3% decline in 2023, marking two consecutive years of negative growth. Weak global demand has led to a drop in exports, with the trade surplus shrinking from €20.4 billion in June to €16.8 billion in July. Industrial output fell by 2.4% month-on-month, driven by weak performance in the automotive sector. While inflation dropped to 1.9% in August, service sector prices continued to rise. Unemployment remained stable at 6%, but the construction industry saw 17.6% of residential projects canceled due to declining orders. The government plans to address these challenges through tax cuts and efforts to attract skilled workers, but short-term impacts are expected to be limited.

2. Emerging Market

2.1. China

In 2024, China's economy maintained a steady growth, with GDP increasing by 4.6% in the first three quarters. High-tech manufacturing and the service sector performed strongly, and investment grew by 10.6%. With the implementation of coordinated fiscal and monetary policies, total retail sales of consumer goods increased by 3.7%, and export grew by 6.9%. Meanwhile, the Private Economy Promotion Law encouraged private capital to join major project. It also removed restrictions on foreign investment in manufacturing, attracting more capital to high-end industries. Additionally, inflation remained at 0.1%, and the unemployment rate dropped to 5.1%, indicating a healthy labor market.

2.2. India

India's economy is projected to grow at a robust 7.2% in 2024, slightly lower than the previous fiscal year's 8.2%, maintaining its position as the fastest-growing major economy globally. However, inflationary pressures have risen, with the Wholesale Price Index (WPI) inflation reaching 2.36% in October, a four-month high driven by surging food prices. Despite these challenges, India continues

to demonstrate significant resilience and economic potential.

2.3. Brazil

Brazil's economy is projected to grow by 3.2%, up from 2.9% in 2023, driven by strong household consumption and productive investments, supported by a robust labor market and government transfer programs. Inflation is expected to rise slightly to 4.25%, nearing the upper limit of the central bank's target range. Despite inflationary pressures, Brazil demonstrates significant resilience and growth potential, marking a positive trajectory for the year.

2.4. Conclusion

In the short term (1 year), developed market bonds (e.g., U.S. and German government bonds) offer stable yields, with the U.S. 10-year Treasury yield around 4.5%, making them a top choice for low-risk investors. While emerging market bonds provide a 3%-5% premium on average and generally higher returns, they come with significant currency volatility risks, making them more suitable for investors willing to take on higher risks in pursuit of potentially greater returns.

In the medium term, government bonds from developed countries (such as the U.S. and Germany) will continue to attract capital inflows due to their low-risk nature. For instance, as of late 2024, Germany's 10-year bond yield stood at 2.1%, reflecting strong demand for safe-haven assets. Meanwhile, emerging market bonds (such as those from Brazil and South Africa) may offer higher yields. By December 2024, Brazil's 10-year government bond yield was at 9.4%, while South Africa's reached 10.3%, presenting attractive opportunities for investors seeking additional returns.

In the long term, stable inflation and interest rates could further enhance returns in the fixed-income market. According to the International Monetary Fund (IMF), inflation in major global economies is projected to stabilize between 2%-3% by 2025, creating a more favorable environment for fixed-income investments in emerging markets with healthy debt structures, such as India, whose government debt-to-GDP ratio is around 60

This provides diverse options for investors with varying risk appetites, from short-term stable returns to long-term growth potential.

3. Equity, Fixed Income, Currency

3.1. Equity

3.1.1. USA

The equity performed exceptionally well in United States. On December 2, 2024, the price of the S&P

500 ETF(SPY) was \$603.63. Since the beginning of the year, the S&P index has risen by about 26%, setting one of the best annual gains since the late 1990s.

In contrast, the bond market has performed relatively weakly. The price of iShares Aggregate Bond ETF was \$98.9, down 0.31% from the previous day. The comparison between equity and bond markets highlights a preference for investing in the equity market.

Overall, the robust economic growth and proactive fiscal policies provided strong support for the equity market. In the short term, its performance is better than emerging market equity and domestic bond.

3.1.2. China

Recently, China's stock market has surged, driven by targeted government policies such as lowering the reserve requirement ratio, reducing policy interest rates, and encouraging capital inflows. As of December 2, 2024, the Shanghai Composite Index rose to 3,660 points, up 14% year-to-date, while the CSI 300 Index gained 12%. However, sustaining the recovery may require further fiscal measures and reforms.

In contrast, the bond market has struggled, with the China Bond Aggregate Index slipping 0.2%, pressured by increased government bond issuance and tightened liquidity. While equities have shown strong short-term competitiveness, caution is needed due to potential volatility from global uncertainties and domestic policy shifts.

3.2. Fixed Income

In the short term (1 year), developed market bonds, such as U.S. and German government bonds, offer stable yields, with the U.S. 10-year Treasury yield around 4.5%, making them ideal for low-risk investors. Emerging market bonds provide higher average yields (3%-5% premium) but come with significant currency volatility, appealing to higher-risk investors seeking greater returns.

In the medium term (3 years), developed market bonds will continue attracting capital due to their low-risk nature, with Germany's 10-year bond yield at 2.1% as of late 2024. Emerging market bonds, like Brazil's (9.4%) and South Africa's (10.3%), present attractive opportunities for those seeking higher yields.

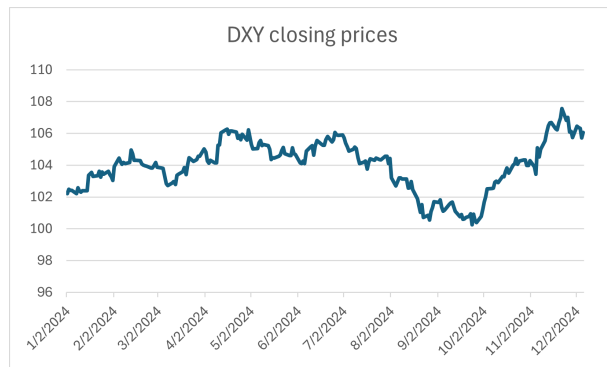
In the long term, stabilized inflation (2%-3% by 2025, per the IMF) and interest rates could enhance fixed-income returns, especially in emerging markets with healthy debt structures, such as India (government debt-to-GDP ratio 60%).

These options cater to varying risk profiles, from short-term stability to long-term growth potential.

3.3. Currency

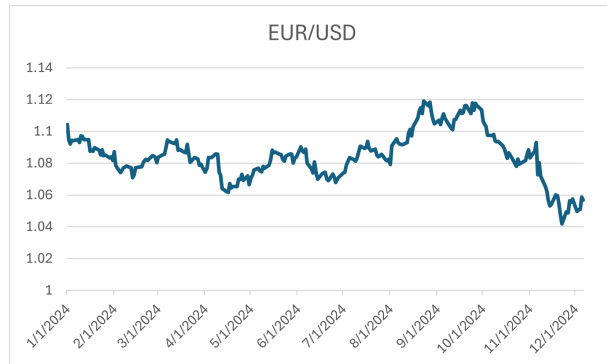
3.3.1. U.S. Dollars

Recently, the U.S. Dollar Index (DXY) has fluctuated around 105, influenced by U.S. economic data and Federal Reserve monetary policy expectations. In the short term (1 year), the dollar is likely to remain stable in a high-interest-rate environment but may lack significant appreciation potential. Over the medium term (3 years), as other countries gradually raise their interest rates, the dollar may weaken. In the long term (5 years), the dollar could gradually depreciate as global economic disparities narrow. Investors should closely monitor global economic and monetary policy changes to adjust their investment strategies accordingly.



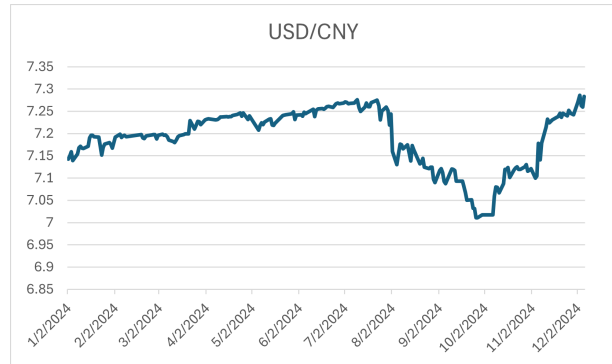
3.3.2. Euro

Recently, the euro-to-dollar exchange rate has fluctuated around 1.05, influenced by European economic data and European Central Bank policy expectations. In the short term (1 year), the euro is expected to remain stable in a high-interest-rate environment, though limited by slow economic growth. Over the medium term (3 years), the narrowing interest rate differential as other major economies raise rates could strengthen the euro. In the long term (5 years), if the eurozone's economic growth accelerates, the euro may see further appreciation.



3.3.3. CNY

Emerging market currencies, represented by the RMB (including the RMB, Thai Baht, and others), are expected to remain relatively stable in the short term (1 year) under a high-interest-rate environment, with potential for modest appreciation driven by capital inflows. In the medium term (3 years), as major global economies raise interest rates, interest rate differentials narrow, and the internationalization process advances, these currencies may gradually strengthen. Over the long term (5 years), with accelerated economic growth, these currencies are anticipated to appreciate further.



4. Asset Allocation Recommendation

4.1. Asset Selection

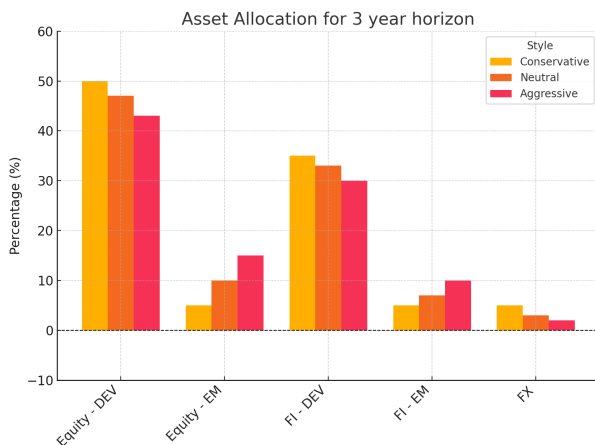
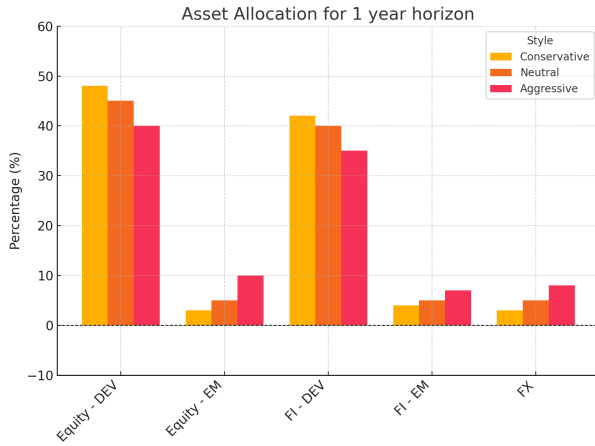
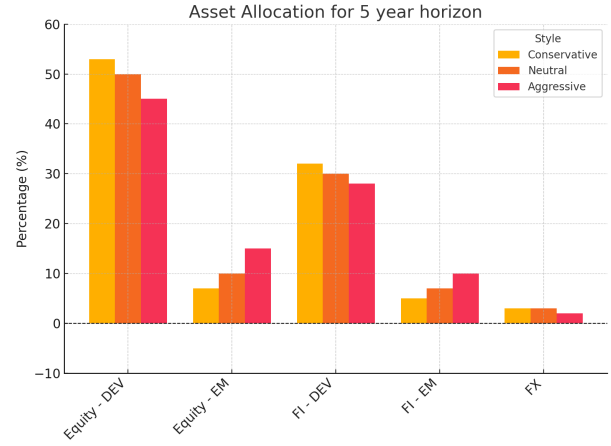
the MSCI indices for 16 countries were selected to represent equity performance, with the MSCI All Country World Index (ACWI) reflecting global markets, covering both emerging and developed countries. For fixed income, four bond indices from developed countries were chosen: Investment Grade Corporate Bond (LQD), High Yield Corporate Bond (HYG), UK government bonds (Gilts, IGLT.L), and Japanese government bonds (JGB, 2561.T). From emerging countries, three bond indices were selected: J.P. Morgan USD Emerging Markets Bond (EMB), J.P. Morgan EM Corporate Bond (CEMB), and J.P. Morgan EM High Yield Bond (EMHY). The data was sourced from iShares. Additionally, foreign exchange exposure included currencies from nine countries. The selected assets are listed in the table below.

4.2. asset allocation

With our views on the global economy, we give global asset allocation recommendation at horizon 1, 3 and 5 years at conservative, neutral and aggressive risk aversion level. Detail of the asset allocation is presented in Appendix and here is the summary of the portfolios :

Table 1: Asset Selection Table

EQ	FI	FX
USA	LQD	AUD
Canada	HYG	CAD
Germany	IGLT.L	EUR
Japan	2561.T	JPY
UK	EMB	GBP
France	CEMB	KRW
Italy	EMHY	CNY
Australia		MXN
South Korea		THB
China		
India		
Brazil		
South Africa		
Mexico		
Thailand		
Indonesia		



ties and fixed income from emerging markets. This suggestion stems from the observation that emerging markets generally have a weaker connection to the US economy but exhibit higher volatility, which can offer greater potential returns. These markets have performed well in recent years, and we anticipate continued economic growth. That said, developed markets still hold the largest share in the portfolios due to their ability to provide more consistent and stable returns over time.

We also suggest that investors maintain a smaller allocation to currencies, both as a hedge and an asset class. While currencies tend to have low correlation with other assets, they do not offer the steady income potential seen in equities or fixed income, particularly for long-term investments. Therefore, their role in a portfolio should remain limited.

Lastly, it is important to acknowledge that these asset allocation recommendations are based on expected return and risk estimates. While they can serve as a general framework for global portfolio strategies, investors should tailor them to their specific objectives and remain mindful of the inherent limitations of such models.

4.3. Advice

For any investment horizon, we encourage aggressive investors to consider higher exposure to equi-

Appendix A. Prediction Methodology

Appendix A.1. Strategic Asset Allocation(SAA)

We assume that over the long term, asset returns converge to their equilibrium levels. To estimate equilibrium returns for SAA, equilibrium models are employed.

For equities, the World CAPM model is applied:

$$E(r) = r_f + \beta E(r_{WM} - r_f) \quad (A.1)$$

Where: r_{WM} is global market returns, approximated by MSCI ACWI. r_f is risk-free rate, approximated by U.S. Treasury bill rates, which is 4.45%.

The parameters are estimated using the regression:

$$E(r) - r_f = \alpha + \beta(r_{WM} - r_f) + \varepsilon \quad (A.2)$$

Below are β values for major countries:

Table A.2: β Values for Major Countries

Horizon	US	Germany	UK	Japan
1-year	0.91	0.94	0.77	1.10
3-year	1.04	1.09	0.81	0.82
5-year	1.06	1.06	0.95	0.76

For bonds, the expected return is given by:

$$E(r) = y - DE(\Delta y) + E(\Delta ls) \quad (A.3)$$

The yield and duration was obtained in the bond index description. The prediction of yield changes is based on our assessment of the current national and global economic conditions. We only consider currency impacts for Δls , which is predicted in the following paragraph. Below are fixed income returns for four bond indexes of developed countries:

Table A.3: bond return estimates for FI-dev

Horizon	LQD	HYG	IGLT.L	2561.T
1-year	6.03%	7.39%	3.36%	1.03%
3-year	7.71%	7.98%	4.32%	1.21%
5-year	9.4%	8.58%	6.59%	1.44%

Currency equilibrium returns are estimated using the Relative Purchasing Power Parity (RPPP) model:

$$1 + s_{t,t+k,DC/FC} = \frac{1 + \pi_{t,t+k}^{DC}}{1 + \pi_{t,t+k}^{FC}} \quad (A.4)$$

Where: $s_{t,t+k}$ is currency return from t to $t+k$. π is expected compounded inflation over t to $t+k$ for domestic (DC) and foreign (FC) currencies.

Here are currency return forecasts for major currencies against the U.S. dollar:

Table A.4: Currency Forecasts (%)

Horizon	EUR	JPY	GBP	CAD
1-year	-0.34%	-0.13%	-0.21%	-0.02%
3-year	0.01%	0.05%	-0.06%	0.10%
5-year	0.17%	0.28%	0.19%	0.36%

Appendix A.2. Tactical Asset Allocation(TAA)

Appendix A.2.1. Monte Carlo Simulation

We applied the Monte Carlo method to analyze the short-term trends (6 months) of 32 assets. Based on the time-series characteristics of asset returns, short-term returns exhibit significantly stronger correlations compared to long-term returns. Additionally, due to the presence of short-term memory effects and momentum effects, we selected weekly data spanning from 2023/12/10 to 2024/12/01 to predict asset returns for the next 6 months (24 weeks).

To better capture market short-term volatility and consider the impact of the recent international environment, we set the volatility factor to 2, adjusting the standard deviation of asset returns accordingly. After verification, the correlation matrix was found to be positive definite, allowing us to use Cholesky decomposition to incorporate inter-asset correlations into the random number generation process. Using this setup, we conducted 20000 simulations for 24 future time steps starting from 2024/12/01. The cumulative returns from these 20000 simulations were averaged to represent the predicted changes in future asset returns.

Appendix A.2.2. Short-Term Trend Analysis

The 32 assets were divided into the following 5 groups: Developed market equities (9 assets), Emerging market equities (7 assets), Developed market bonds (4 assets), Emerging market bonds (3 assets), Currencies (9 assets).

For the first four groups, we calculated the cumulative average returns of the group over the next 6 months (24 weeks) and plotted the results (Figure 1).

Based on Figure 1, we summarize the following key insights:

- **Insight 1 (P1):** Developed market equities outperform emerging market equities.
- **Insight 2 (P2):** Emerging market bonds outperform developed market bonds.
- **Insight 3 (P3):** Developed market equities outperform developed market bonds.
- **Insight 4 (P4):** Emerging market bonds outperform emerging market equities.

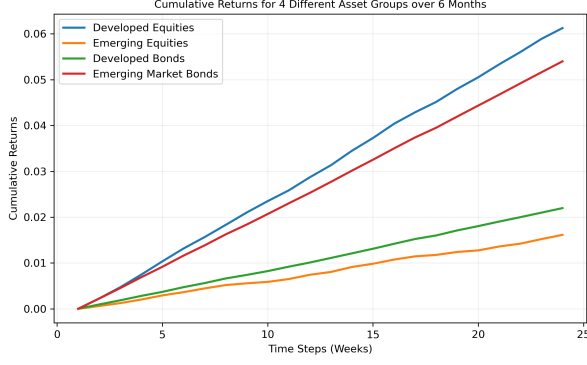


Figure A.1: Cumulative Returns for 4 Different Asset Groups over 6 Months

These findings are consistent with the theoretical analysis presented at the beginning of the report.

Appendix A.2.3. Currency Trend Analysis

For the fifth group (currencies), we calculated the cumulative returns for each of the 9 assets over the next 6 months and plotted the trends (Figure 2).

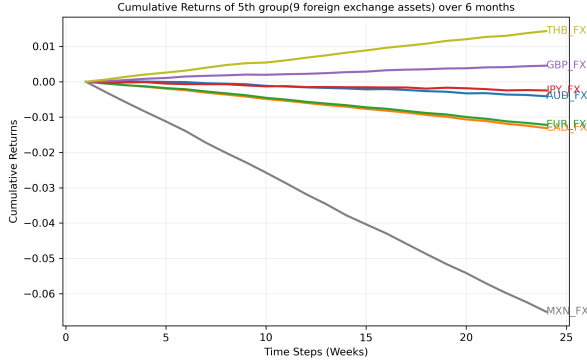


Figure A.2: Cumulative Returns of 5th group(9 foreign exchange assets) over 6 months

Based on Figure 2, we derived the following short-term trends:

- **Insight 5 (P5):** Currencies of Thailand (THB) and the United Kingdom (GBP) are expected to appreciate. The Japanese Yen (JPY) is expected to remain stable. Currencies of Australia (AUD), the Eurozone (EUR), Canada (CAD), and Mexico (MXN) are expected to depreciate.

Appendix A.2.4. View Matrix and Return Differences Analysis

Based on the Black-Litterman (BL) model, we defined the view matrix P, assigning positive weights to relatively superior assets and negative weights to underperforming assets. Using the 5 insights

outlined above, we constructed a 5×32 view matrix P.

Table A.5: Final cumulative results for the first four groups

	EQ-dev	EQ-eme	FI-dev	FI-eme
Cumulative Returns	0.061	0.016	0.020	0.054

Next, by calculating the cumulative return differences between superior and inferior assets, we derived a 5×1 return difference vector q.

Appendix A.2.5. Conclusion and Reliability Assessment

Our quantitative results align well with the theoretical trends analyzed earlier, suggesting the reliability of these insights. Based on this, we set the Omega matrix as a diagonal matrix with all diagonal values equal to 1, simplifying the stability assessment of the predictions.

Appendix A.3. Covariance Estimation and Expected Return Adjustment

The modeling process consists of two parts: First, we estimate the covariance matrix using the Exponential Weighted Mean (EWM) method. Then, we use Black-Litterman (B-L) model to combine Strategic Asset Allocation (SAA) and Tactical Asset Allocation (TAA) and generate adjusted expected returns.

We used historical weekly data for 1 year to estimate $E(r)$ and $Cov(r)$ for the future 1-year horizon. Similarly, we used historical 3-year and 5-year monthly data to estimate $E(r)$ and $Cov(r)$ for the future 3-year and 5-year horizons. After estimation, we annualize both $E(r)$ and $Cov(r)$ for all 1-year, 3-year, and 5-year results to ensure consistency in comparison and interpretation.

Step 1: EWM Covariance Estimation

The core idea of Exponential Weighted Moving (EWM) estimation method is that, when estimating the covariance matrix, observations from different periods within the window should have varying degrees of influence. Thus, more recent samples should be given higher weights to better capture the dynamics of the market, thus improving the accuracy of the estimation of the covariance matrix. The EWM formula is expressed as:

$$\sigma_{i,j} = \frac{\sum_{k=0}^n \lambda^{n-k} r_{i,k} r_{j,k}}{\sum_{k=0}^n \lambda^{n-k}}$$

Where:

- $\sigma_{i,j}$: Covariance between asset i and j , i.e., the (i, j) -th element of the covariance matrix Σ .
- λ : Forgetting factor. A higher λ gives higher weight on recent samples. According to the commonly used values, we select $\lambda = 0.94$ for 1 year estimation, 0.97 for the 3-year and 5-year estimation).
- $r_{i,k}$: Return of asset i at time k .

Due to space constraints, we only report the covariance matrix of the first five assets in 3 horizons. These assets represent the equity of the USA, Canada, Germany, Japan, and the UK.

Table A.6: Annualized 1-Year EWM Covariance Matrix for the First 5 Assets

	USA	Canada	Germany	Japan	UK
USA	0.0219	0.0167	0.0109	0.0177	0.0105
Canada	0.0167	0.0165	0.0111	0.0168	0.0100
Germany	0.0109	0.0111	0.0222	0.0172	0.0147
Japan	0.0177	0.0168	0.0172	0.0344	0.0136
UK	0.0105	0.0100	0.0147	0.0136	0.0147

Table A.7: Annualized 3-Year EWM Covariance Matrix for the First 5 Assets

	USA	Canada	Germany	Japan	UK
USA	0.0328	0.0302	0.0317	0.0230	0.0206
Canada	0.0302	0.0312	0.0324	0.0217	0.0228
Germany	0.0317	0.0324	0.0464	0.0277	0.0288
Japan	0.0230	0.0217	0.0277	0.0228	0.0177
UK	0.0206	0.0228	0.0288	0.0177	0.0233

Table A.8: Annualized 5-Year EWM Covariance Matrix for the First 5 Assets

	USA	Canada	Germany	Japan	UK
USA	0.0357	0.0337	0.0345	0.0224	0.0244
Canada	0.0337	0.0357	0.0359	0.0213	0.0270
Germany	0.0345	0.0359	0.0482	0.0269	0.0317
Japan	0.0224	0.0213	0.0269	0.0219	0.0179
UK	0.0244	0.0270	0.0317	0.0179	0.0266

Step 2: Black-Litterman (B-L) Model

The Black-Litterman model uses a Bayesian approach to combine the subjective views of an investor regarding the expected returns (TAA) with the market equilibrium vector of expected returns (SAA) to form a new, mixed estimate of expected returns. The B-L formula is expressed as:

$$r = \left((\tau\Sigma)^{-1} + P'\Omega^{-1}P \right)^{-1} \left((\tau\Sigma)^{-1}\Pi + P'\Omega^{-1}q \right)$$

Where:

- r : Adjusted expected return vector (shape: $N \times 1$).
- τ : A scalar representing the uncertainty of the SAA covariance matrix. A small τ places greater weight on SAA results and less on the investor's views (TAA results), whereas a large τ reflects higher uncertainty, allowing more influence from investor's views. For our analysis, we adopt the commonly used $\tau = 0.025$ for all 3 horizons.
- Σ : Covariance matrix of asset returns (from EWM estimation of Step 1).
- Π : SAA equilibrium returns vector (shape: $N \times 1$).
- P : TAA portfolio weight matrix (shape: $k \times N$, where k is the number of views).
- q : TAA returns vector (shape: $k \times 1$).
- Ω : The covariance matrix of the TAA returns (shape: $k \times k$).

Due to space constraints, we only report the $E(r)$ of the first five assets in 3 horizons. These assets represent the equity of the USA, Canada, Germany, Japan, and the UK.

Table A.9: Annualized Expected Returns ($E(r)$) for the First 5 Assets

	USA	Canada	Germany	Japan	UK
1-Year	0.245449	0.248127	0.250454	0.287276	0.213730
3-Year	0.073603	0.070932	0.074925	0.067469	0.067358
5-Year	0.117152	0.112607	0.117112	0.096714	0.109209

Following this approach, the model effectively captures both the long-term strategic outlook and short-term tactical adjustments. It providing a robust $E(r)$ and $Cov(r)$ estimation for portfolio construction.

Appendix B. Portfolio Optimization

In this part, we hope to optimize our investment strategy, and it is worth noting that we need a benchmark as a reference. In this case, we are finding the optimal risky portfolio but not the combination with risk-free asset. In this report, we will let the investors to determine the combination between risky portfolio and risk-free asset according to their own preference. In order to give recommendation with respect to different level of risk aversion, we will adjust the benchmark ratio in equity vs. bond vs. currency. In particular, we put

more weights on bond for high risk aversion and more on equity for less risk aversion. Here are the benchmark weights we put on the asset classes under three levels of risk aversion:

Table B.10: Risk Aversion and Cumulative Returns

	EQ-dev	EQ-eme	FI-dev	FI-eme
Conservative	43%	7%	45%	1%
Neutral	43%	3%	50%	0%
Aggressive	40%	10%	37%	3%
Cumulative Returns	0.061	0.016	0.020	0.054

Objective Function

$$\max_{\mathbf{x}} \frac{\mathbf{x}^\top \boldsymbol{\mu} - r_f}{\sqrt{\mathbf{x}^\top \boldsymbol{\Sigma} \mathbf{x}}} \quad (\text{B.1})$$

where:

- $\mathbf{x} = [x_1, x_2, \dots, x_n]$ is the vector of asset weights;
- $\boldsymbol{\mu} = [\mu_1, \mu_2, \dots, \mu_n]$ is the vector of expected returns for each asset;
- r_f is the risk-free rate;
- $\boldsymbol{\Sigma}$ is the covariance matrix of asset returns.

Constraints

1. **Total weight equals 1 (Full Investment Constraint):**

$$\sum_{i=1}^n x_i = 1 \quad (\text{B.2})$$

2. **Asset Class Weight Limits:** For each asset class j (e.g., EQ-dev, EQ-eme, etc.), the weight must lie within the interval $[t_j - \text{max_te}, t_j + \text{max_te}]$, where t_j is the benchmark weight and max_te is the allowable tracking error.

$$t_j - \text{max_te} \leq \sum_{i \in \text{class } j} x_i \leq t_j + \text{max_te}, \quad \forall j \quad (\text{B.3})$$

3. **Individual Asset Weight Limits:**

$$-1 \leq x_i, \quad \forall i \in \{1, 2, \dots, n\} \quad (\text{B.4})$$

Explanation

- **Objective Function:** Maximizes the Sharpe ratio of the portfolio, which is the ratio of excess return to risk (volatility).
- **Constraint 1:** Ensures that the total weight of the portfolio equals 1, reflecting the full investment.
- **Constraint 2:** Ensure that the weight of each asset class remains close to the benchmark weight, with deviations bounded by max_te.

- **Constraint 3:** Limits individual asset weights to the range $[-1, n]$, where short selling is restricted to a maximum of 1 units. This is because short-selling is a very dangerous behavior for a general investor. I believe that the investors should take care when they are shorting.

After the computation, we get the weights for each asset which are shown in the main report "Asset Allocation Recommendation" section, and the optimal results summary which covers the annualized return, annualized standard deviation and for three risk styles over three horizons.

Table B.11: 1-Year Optimal Results Summary

Metric	Conservative	Neutral	Aggressive
Annualized Return	0.1137	0.1104	0.1102
Annualized Std Dev	0.0006	0.0005	0.0006
Sharpe Ratio	4.7125	4.7226	4.6653

Table B.12: 3-Year Optimal Results Summary

Metric	Conservative	Neutral	Aggressive
Annualized Return	0.0482	0.0475	0.0482
Annualized Std Dev	0.0007	0.0007	0.0007
Sharpe Ratio	1.8586	1.8453	1.8409

Table B.13: 5-Year Optimal Results Summary

Metric	Conservative	Neutral	Aggressive
Annualized Return	0.0651	0.0612	0.0650
Annualized Std Dev	0.0009	0.0008	0.0009
Sharpe Ratio	2.1323	2.0823	2.1160