Evaluating the Performance of Systematic Trend-Following and Global Macro Strategies

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Abstract

This study conducts a detailed exploration of two prominent investment strategies: systematic trend-following and systematic global macro. Utilizing a comprehensive dataset encompassing diverse countries, asset classes, and economic indicators, we evaluate the performance of these strategies both independently and in combination. A key innovation in our systematic trend-following approach involves incorporating the magnitude of price movements, alongside their direction, significantly enhancing strategy performance. In the realm of global macro strategies, we delve into the intricate relationship between macroeconomic variables and market dynamics, uncovering insights into asset price determinants. When these strategies are integrated, they not only complement each other's strengths but also demonstrate a remarkable synergy. This amalgamation yields a diversified portfolio approach with minimal correlation to the equity market, thereby offering a potent tool for risk mitigation and portfolio diversification. Overall, our findings illuminate the nuanced intricacies of these strategies and their potential to redefine portfolio management paradigms.

1 Introduction

Financial markets have always been influenced by a blend of human psychology and macroeconomic factors. Historically, both scholars and practitioners have expounded principles that underpin modern investment strategies.

David Ricardo's famous aphorism, "Cut short your losses; let your profits run on," encapsulates the essence of trend-following strategies and these ideals still remain salient today [Ricardo, 1817]. Meanwhile, the late 20th century bore witness to financiers like George Soros, who adeptly executed global macro strategies, exemplified by his audacious bet against the British pound in 1992 [Slater, 1997].

Trend-Following Strategies

Trend-following strategies are premised on the market's propensity for directional momentum. Using quantitative methods, traders aim to identify emergent trends, positioning portfolios to capitalize on upward momentum and mitigate downside risks. The objective is to capture substantial price movements rather than predicting their onset or termination.

Global Macro Strategies

Global macro focuses on the impact of large-scale economic and political shifts to forecast price movements across various asset classes. Practitioners monitor a multitude of indicators, such as interest rates and geopolitical developments, to inform their trading decisions.

This study builds upon prior research, notably two papers published by AQR "Economic Trend" [Brooks et al., 2023] and "A Century of Evidence on Trend-Following Investing" [Hurst et al., 2017]. Our investigation serves a dual purpose: (i) to elucidate and, where necessary, refine these investment strategies, and (ii) to probe the interrelations among key asset classes and economic indicators. Additionally, we examine the feasibility and potential advantages of integrating these distinct strategies.

The remainder of this paper is organized as follows: Section 2 outlines the Data; Section 3 discusses the Methodology; Section 4 focuses on Trend-Following; Section 5 emphasizes Global Macro; Section 6 delves into their interactions; and Section 7 concludes.

2 Data

Countries:

We select countries from the G20, excluding the European and African Unions, to ensure robustness in our analysis, particularly in global macro strategies. This selection comprises 19 nations with varying levels of economic development, ensuring a balanced viewpoint. Alternative methodologies might consider OECD countries or select countries based on annual financial transaction volume.

Asset Classes:

Our study concentrates on four primary asset classes: country equity indices, government bonds, currencies, and commodities, aligning with seminal works such as "Value and Momentum Everywhere" [Asness et al., 2012] and "A Century of Evidence on Trend-Following Investing" [Hurst et al., 2017]. Although recent research has extended the analysis to interest rate swaps [Brooks et al., 2023, Babu et al., 2018], our scope is limited by data availability, primarily from Bloomberg.

Assets:

This study incorporates an expansive set of assets across multiple categories, ensuring a comprehensive analysis of modern financial markets.

- **Country Equity Indices:** We use Bloomberg MSCI indices for 19 countries, accessed via the Total Return Analysis (TRA) function.

- **Generic 1st Government Bonds:** These bonds serve as benchmark indicators for individual countries' bond markets. Data is sourced from Bloomberg using the Historical Price (HP) function.

- **Currencies:** Our analysis includes key currency pairs such as USD to EUR, USD to JPY, among others. For these currency pairs, we transform the returns so that positive returns indicate the appreciation of the non-USD currency relative to the USD, and negative returns indicate depreciation. This approach is adopted to ensure a consistent interpretation across all pairs. It is important to note that due to data limitations, this study focuses solely on the exchange rates between these

currency pairs, without incorporating the carry trade and interest rate differentials. The data for these currency pairs is obtained via the HP function in Bloomberg.

- **Commodities:** Our commodity dataset includes a variety of Bloomberg sub-indices such as Brent Crude, Gold, and Copper. Total return tickers were used for comprehensive market insight.

While futures data would provide a more direct measure for our analysis, our study utilizes available indices and spot prices due to data constraints. For an extensive list of asset tickers and countries considered, refer to the Appendix, Section A.1.

Fundamental Data:

We leverage key economic indicators from the International Financial Statistics of the IMF to yield a nuanced understanding of the subject countries:

- **GDP Growth:** The Gross Domestic Product, Real, Seasonally Adjusted in Domestic Currency, acts as a cornerstone for evaluating economic vitality. We procured exhaustive data on GDP growth for each country to illuminate their economic trajectories.

- **Inflation:** The Consumer Price Index, All Items, serves as the metric for inflation, representing the percentage alteration in the general price level over time. This measure elucidates both the purchasing power of a currency and the standard of living. Comprehensive data was collected for each country to provide an in-depth view of their macroeconomic landscapes.

- **Interest Rates:** Particularly, the Central Bank Policy Rates and the Monetary Policy-Related Interest Rate (Percent per Annum) are integral to financial scrutiny. These rates often reflect the economic stance of a country and serve as pivotal indicators of monetary policy directions. Our research includes data on these rates, offering an enriched understanding of the countries' monetary policies.

- **Exchange Rates:** The Real Effective Exchange Rate based on the Consumer Price Index is vital for apprehending the international value of a currency. This variable provides insights into the global competitiveness and relative currency value of each nation.

Risk-Free Rate:

The risk-free rate, an indispensable component in a plethora of financial models, epitomizes the return on an investment that carries theoretically zero risk. This metric provides a benchmark for evaluating the returns of other assets. In this study, we sourced the risk-free rate data from the Fama-French database, furnishing a robust foundation for our subsequent analyses.

3 Methodology

Our methodology employs a structured, two-stage approach that integrates trend-following and global macro strategies with a subsequent risk-parity application. Initially, we generate asset weights based on trend-following and global macro analyses, focusing on historical performance trends and macroeconomic indicators. These preliminary weights are

then processed through our risk-parity framework. In this phase, the focus is on adjusting the weights derived from the first stage to ensure equalized risk contributions from each asset. This comprehensive approach combines the foresight of trend and macro analysis with the risk-balanced discipline of risk-parity, providing a well-rounded strategy for asset allocation. Detailed explanations of each strategy's implementation and their cumulative contribution to the portfolio's construction follow in the ensuing subsections.

3.1 Risk-Parity

Risk-parity is a portfolio allocation strategy that aims to equalize the contribution of each asset to the portfolio's overall volatility. Contrary to traditional methods like mean-variance optimization, which are solely based on expected returns, risk-parity emphasizes the covariance structure of asset returns.

To calculate the optimal weights for assets in the portfolio, we minimize the difference between each asset's contribution to portfolio risk and the risk parity target. Mathematically, let w denote the asset weight vector, and Σ denote the covariance matrix of asset returns. The portfolio variance σ^2 is given by,

$$\sigma^2 = w^\top \Sigma w \tag{1}$$

The asset's risk contribution RC_i is formulated as,

$$RC_i = \frac{w_i(\Sigma w)_i}{\sigma^2} \tag{2}$$

We aim to minimize the objective function $f(w)$ subject to the constraint $\sum_i w_i = 1$,

$$f(w) = \sum_{i=1}^{n} \left(RC_i - \frac{1}{n} \right)^2 \tag{3}$$

The optimization is conducted using Sequential Least Squares Quadratic Programming (SLSQP) with initial weights set uniformly across assets. The solution to this optimization problem provides the optimal risk-parity weights.

To further refine the portfolio, we incorporate any external weights, normalize the combined weights, and scale them to achieve a pre-defined target annual volatility. This strategy is applied on a rolling basis, utilizing a 3-year historical window to calculate asset covariances and update the portfolio weights accordingly.

The risk-parity approach ensures a balanced risk contribution from each asset, thereby making the portfolio more resilient to market volatility. This facilitates a more robust risk-adjusted performance, which is especially beneficial in turbulent market conditions.

3.2 Trend-Following

Trend-following is a strategy that seeks to capture gains or mitigate losses by investing in assets that have exhibited upward or downward trends over a predefined time horizon. In contrast to risk-parity, trend-following is guided by past returns adjusted for their corresponding volatilities.

We employ a multi-timeframe approach, considering asset returns over the past 1, 3, and 12 months. Each of these is adjusted for its respective volatility, computed over a rolling 36-month window, as follows:

$$\text{Risk-Adjusted Signal}_t = \frac{\text{Cumulative Return}_t}{\text{Rolling Volatility}_t \times \sqrt{m}} \tag{4}$$

where t is the period and m is the number of months.

To mitigate the influence of outliers, we truncate each risk-adjusted signal between -2 and 2. Subsequently, we aggregate these risk-adjusted signals across the 1, 3, and 12-month timeframes by averaging them. The resulting combined signal serves as the trend-following weight for each asset in the portfolio.

3.3 Global Macro

In our global macro strategy, we analyze the directional impact of changes in key economic indicators on various asset classes. Specifically, we focus on changes in GDP Growth, CPI Growth, and interest rates, defined as the difference between the current and previous values. For exchange rates, we define the change as the relative change, calculated as (current value − previous value)/previous value. These relationships between economic indicators and asset prices are consistent with findings in the literature, such as the 'Economic Trend' study by [Brooks et al., 2023], which provides empirical support for the predictive power of macroeconomic trends in investment strategies.

- **Equity Indices and GDP Growth:** Positive (6-month lag). Strong GDP growth often translates into higher corporate profits and positive investor sentiment, benefiting equities.

- **Government Bonds and GDP Growth:** Negative (6-month lag). Higher GDP can lead to inflation concerns and potential interest rate hikes, adversely affecting bonds.

- **Currencies and GDP Growth:** Positive (6-month lag). A strong economy typically attracts foreign investment, appreciating the domestic currency.

- **Equity Indices and Inflation (CPI):** Negative (3-month lag). Inflation can lead to tighter monetary policies, negatively impacting equities.

- **Government Bonds and Inflation:** Negative (3-month lag). Inflation erodes the real value of bond payments, decreasing bond prices.

- **Currencies and Inflation:** Positive (3-month lag). Higher inflation often leads to interest rate hikes, strengthening the currency.

- **Equity Indices and Interest Rates:** Negative (1-month lag). Increased interest rates can hinder economic growth and equity performance.

- **Government Bonds and Interest Rates:** Negative (1-month lag). Interest rate hikes generally lead to a drop in bond prices.

- **Currencies and Interest Rates:** Positive (1-month lag). Higher interest rates can increase the attractiveness of a currency, leading to appreciation.

- **Equity Indices and Exchange Rates:** Negative (1-month lag). Currency appreciation can impact exports negatively, potentially affecting corporate profits and equity indices.

- **Government Bonds and Exchange Rates:** Positive (1-month lag). Stronger currency might attract foreign investment in the bond market, increasing bond prices.

- **Currencies and Exchange Rates:** Positive (1-month lag). A direct relationship, where the appreciation or depreciation of a currency is self-evident.

The lags in our global macro strategy are aligned with the typical release frequency of economic data. We employ a 6-month lag for GDP due to its quarterly release schedule, ensuring that the most recent data is available for analysis. CPI data, released monthly, is analyzed with a 3-month lag to account for the delay between data publication and our access to it. Similarly, the 1-month lag for interest rates and exchange rates corresponds to the timeliness of these data streams, ensuring we are utilizing the latest available figures in our strategy.

For each asset-indicator pairing, we assign a weight of either 1 or -1, based on the directional relationship indicated by the respective economic indicator. These weights are purely directional, reflecting whether an asset is expected to appreciate or depreciate given the change in the economic indicator. Subsequently, for each asset class and macroeconomic indicator, we sum up these weights to create composite weights. This process allows us to aggregate the directional influences of various economic indicators, culminating in a comprehensive global macro strategy that systematically capitalizes on the predictive power of economic trends.

4 Trend-Following

4.1 History of Trend Following

Trend-following as a trading strategy has its roots in seminal academic literature and has been widely adopted by hedge funds and individual investors alike. This strategy is grounded in the assertion that financial markets exhibit momentum, a phenomenon where past returns predict future performance. The evolution of trend-following strategies has moved from simplistic rules-based approaches to sophisticated quantitative methodologies, adapting to modern computational and analytical advancements, reflecting its enduring relevance in the ever-changing financial landscape.

Early empirical explorations into trend-following date back to the middle of the 20th century. A notable work by [Faber, 2007] demonstrated the efficacy of a simple trend-following strategy using a 10-month moving average to time the market, showcasing the potential for trend-following to deliver superior risk-adjusted returns across various asset classes.

The discovery of momentum as a factor of return was a significant milestone in the academic validation of trend-following. [Jegadeesh and Titman, 1993] provided robust evidence of momentum in stock returns. Their study illustrated that buying past winners and selling past losers generated significant positive returns over 3 to 12 month holding periods.

In recent years, the trend-following landscape has been enriched by more sophisticated quantitative methodologies. [Moskowitz et al., 2011] delved into time-series momentum across various asset classes and found consistent trend-following premia. They also highlighted the diversification benefits of trend-following strategies when combined with traditional asset allocation models.

On a global stage, trend-following has proven effective across diversified asset classes. [Hurst et al., 2017] conducted a comprehensive analysis spanning over a century, demonstrating the persistent performance of trend-following across diverse market regimes. Their findings underscored the global and multi-asset class nature of trend-following premia, thus reinforcing its role in modern portfolio construction.

The application of trend-following in risk management and drawdown control has further solidified its position in modern portfolio theory. [Greyserman and Zakamulin, 2014] explored trend-following as a tool for managing drawdowns and protecting capital during market downturns, showing its efficacy in risk mitigation.

The fusion of machine learning and trend-following represents a cutting-edge frontier in the discipline. A study by [Sepp, 2018] provides a practical analysis of how the skewness and convexity profiles of trend-followers depend on the trend smoothing parameter, differentiating between slow-paced and fast-paced trend-followers. This work underscores the evolving nature of trend-following strategies, incorporating advanced analytical techniques to enhance performance and risk management.

## 4.2   Regressions of Past Results on Future Returns

To evaluate the predictive capacity of past returns on future performance, we conducted regressions for each asset class. Iteratively, for lookback periods ranging from 1 to 120 months, we examined the relationship between cumulative returns (independent variable X) and returns in the subsequent month (dependent variable Y), given both data points existed. This methodological rigor allowed us to populate the datasets for regression analysis, ensuring a robust examination of the predictive signals.

The t-statistics obtained from these regressions, illustrated in Figures 1a and 1b, are particularly telling. High t-statistics indicate that past returns—both their direction and magnitude—have statistically significant predictive power over future returns. The pronounced t-statistics for the initial 1 to 12-month periods, consistently above 5 for sign and above 7 for magnitude, underscore the momentum effect, suggesting that recent performance trends are likely to continue in the short term. These empirical findings provide strong support for the inclusion of momentum-based signals in our investment strategies.

The high t-statistics observed for the sign of returns within the preceding 12 months, consistently above 5, reaffirm the presence of a strong trend factor in the markets. This momentum is even more pronounced when analyzing the magnitude of returns, with t-statistics surpassing 7, suggesting that the size of past returns is a robust indicator of future performance.

The choice of 1, 3, and 12 months as lookback periods is not arbitrary; these intervals are well-established in the literature, including in "A Century of Trend-Following Investing," [Hurst et al., 2017] and align with the periodicity of economic data releases. This methodological simplicity also serves to allay concerns regarding data mining, as these periods represent natural divisions in economic and market cycles.

Moreover, the generally higher t-statistics for magnitude compared to sign fortify our decision to incorporate the magnitude of returns in our analysis. This approach adds a layer of depth to the traditional trend-following models, which often consider only the direction of returns, thereby enhancing our strategy with a more comprehensive understanding of market dynamics.
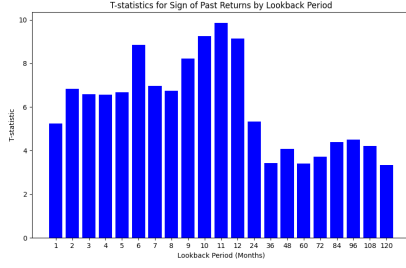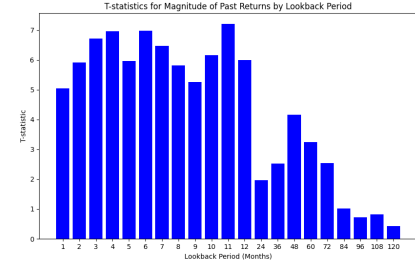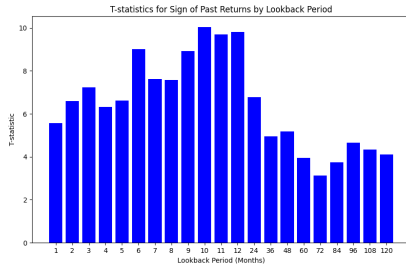
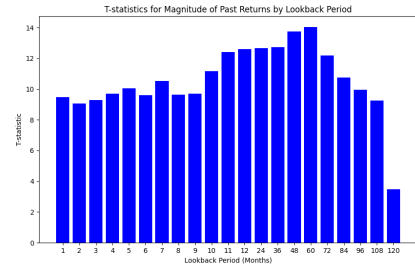(a) Sign of all assets
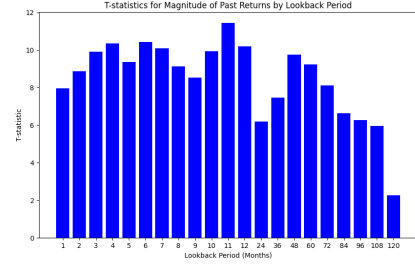
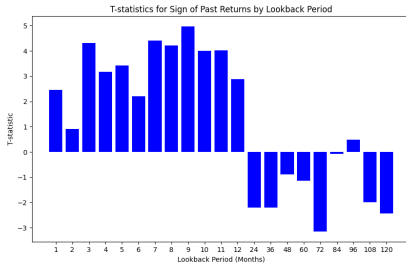(b) Magnitude of all assets
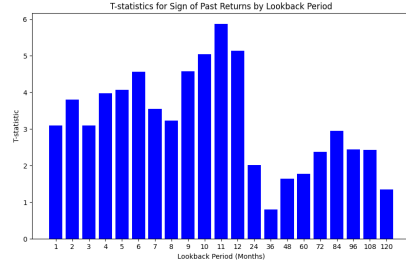
(c) Sign for commodities
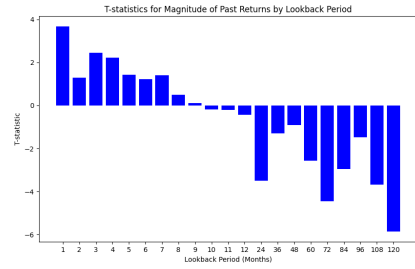
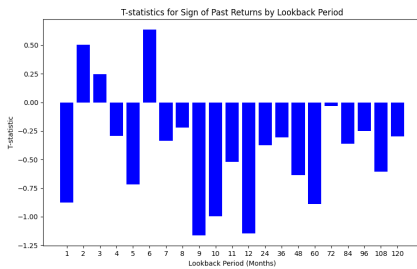(d) Magnitude for commodities

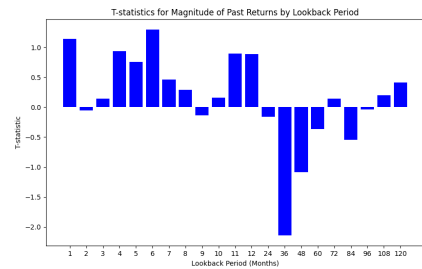(e) Sign for currencies

(f) Magnitude for currencies

(g) Sign for equity indices

(h) Magnitude for equity indices

(i) Sign for government bonds

(j) Magnitude for government bonds

Figure 1: T-statistics for Sign and Magnitude of Past Returns by Lookback Period for Various Asset Classes

4.3 Results of a Trend Following Strategy

Trend-following strategies have demonstrated robust performance across diverse asset classes, as evident from the consistently positive Sharpe ratios. This widespread effectiveness underscores the strategy's adaptability and potential for portfolio diversification.
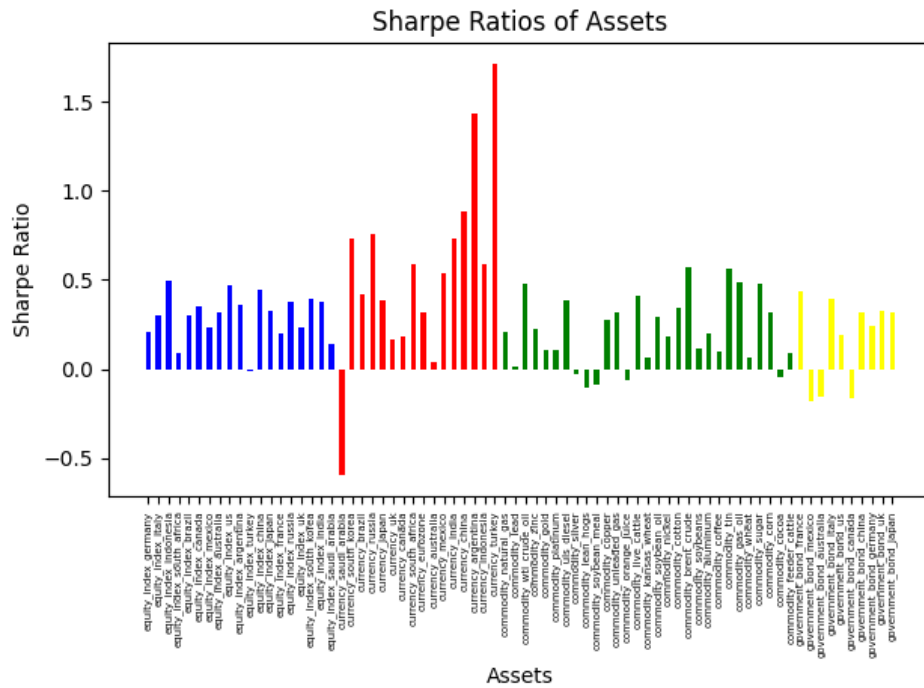

Figure 2: Pervasiveness of Trend-Following: Sharpe Ratios Across Asset Classes

When these positive signals are combined into a single trend-following strategy, the cumulative returns graph below illustrates a superior trajectory when compared to the risk-parity portfolio, with minimal drawdowns over the examined period.
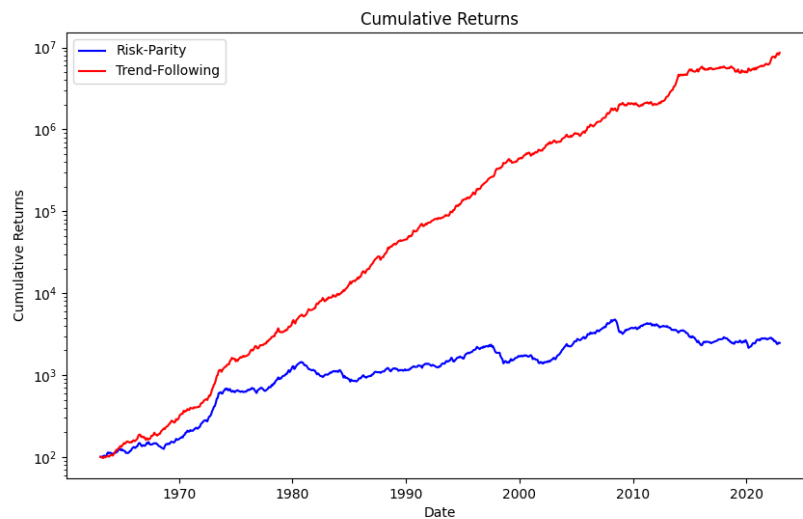

Figure 3: Cumulative Returns: Trend-Following vs. Risk-Parity

The summary statistics table provides a clear comparison between the trend-following and risk-parity strategies. The trend-following strategy not only yields a higher annual return but also maintains a similar level of volatility, resulting in a significantly higher Sharpe ratio, indicating superior risk-adjusted returns.

Metric	Risk-Parity	Trend-Following
Annual Return	3.92%	19.41%
Annual Volatility	11.06%	11.53%
Sharpe Ratio	0.35	1.68
Kurtosis	1.05	0.37
Skew	-0.14	0.15

Table 1: Summary Statistics: Risk-Parity vs. Trend-Following

The lower kurtosis and positive skew of the trend-following strategy suggest fewer extreme losses and more frequent outsized gains, respectively, when compared to the risk-parity approach.

5 Global Macro

5.1 History of Global Macro

Global macro strategies harness macroeconomic data to predict market movements across various asset classes. The approach encompasses a broad range of activities, including trade, interest rates, and geopolitical events, underpinned by macroeconomic theories and the relationship between economic indicators and market performance.

One of the earliest and most notable global macro traders was George Soros, who demonstrated the potential of macroeconomic analysis in financial markets. His bets against the pound sterling in 1992 underscored the impact that macroeconomic factors could have on currency valuations [Slater, 1997].

The advent of global macro strategies marked a significant development in the landscape of investment strategies. These strategies leverage macroeconomic data across national economies to predict market movements in asset classes like equities, bonds, currencies, and commodities.

As computational power and data availability expanded, systematic global macro strategies began to emerge. These strategies utilize quantitative models to exploit economic trends and are exemplified by AQR's "A Half-Century of Macro Momentum" approach. The methodology, developed by [Brooks, 2017], incorporates a range of macroeconomic indicators to forecast market direction and create diversified portfolios.

The transition to a more systematic approach was further emphasized in research such as "Economic Trend," which investigated the trend effect in macro markets and their predictive power regarding asset returns [Brooks et al., 2023]. This body of work has provided empirical support for the application of macroeconomic trends in investment strategies.

The sophistication of global macro strategies has continued to evolve, with modern approaches often incorporating risk parity and other risk management techniques to balance portfolio exposure across various assets. This evolution is marked by the integration

of macroeconomic analysis with quantitative risk models, aiming to achieve a more stable performance throughout different market conditions.

In the current investment landscape, global macro strategies remain a vital component of hedge funds and institutional portfolios, providing a dynamic tool to navigate complex market environments. The continued development of these strategies is characterized by the adoption of machine learning techniques and advanced econometric models, allowing for more nuanced interpretations of global economic data.

5.2 Determining the Relationships Between Asset Classes and Economic Data

We examine the influence of lagged fundamental data on asset prices through regression analysis. For each asset and indicator pairing, we select common countries from both datasets to ensure consistency. The lagged fundamental indicators are then regressed on asset returns across different time lags: contemporaneously, at the first investible point (6 months for GDP, 3 months for CPI, and 1 month for interest and exchange rates), and at 12 months for completeness.
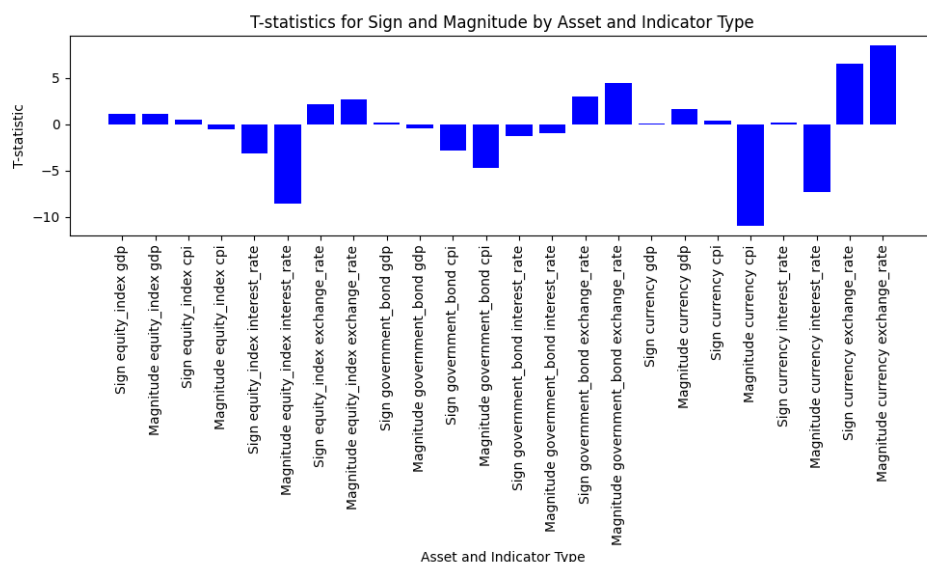

Figure 4: T-statistics for Sign and Magnitude by Asset and Indicator Type at No Lag
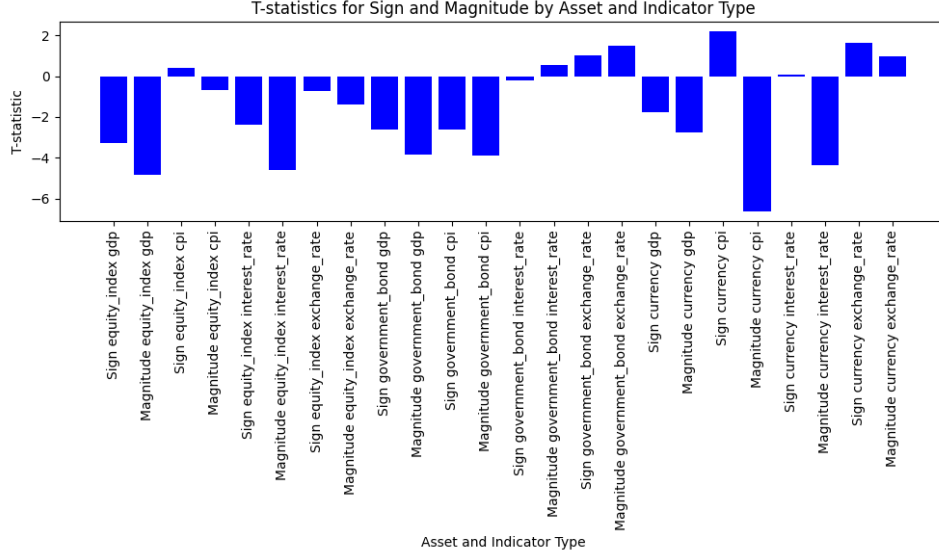
Figure 5: T-statistics for Sign and Magnitude by Asset and Indicator Type at First Investible Point
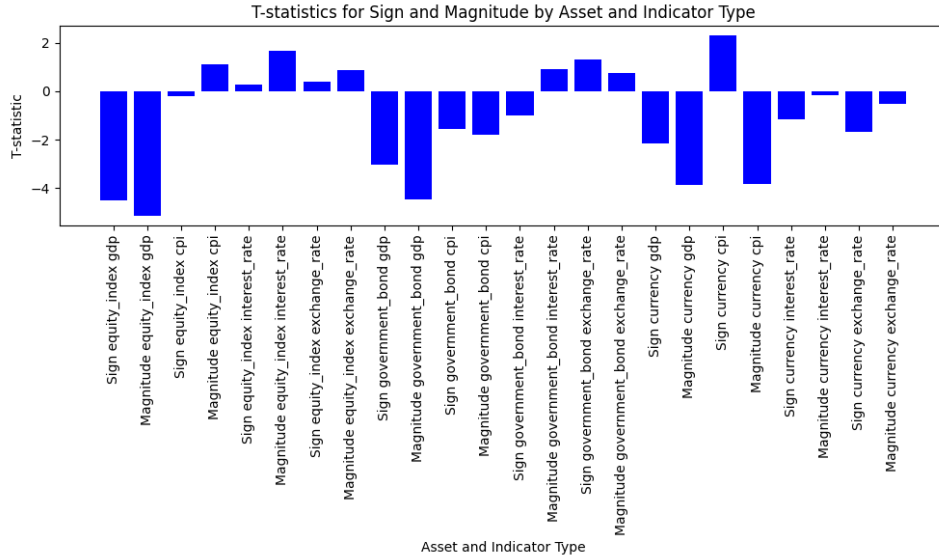

Figure 6: T-statistics for Sign and Magnitude by Asset and Indicator Type at 12 Months

The regression results, particularly at the first investible point, generally align with our expectations, showcasing significant t-statistics in the anticipated directions. This affirms the predictive power of economic indicators on asset performance and supports the integration of these relationships into our global macro strategy.

5.3   Evaluating Global Macro Strategy Performance

The global macro strategy is designed to go long or short in equity indices, government bonds, and currencies, leveraging lagged fundamental indicators like GDP, CPI, interest rates, and exchange rates. We assign weights to asset-indicator pairs and aggregate them into intermediate and integrated portfolios for a comprehensive investment approach.
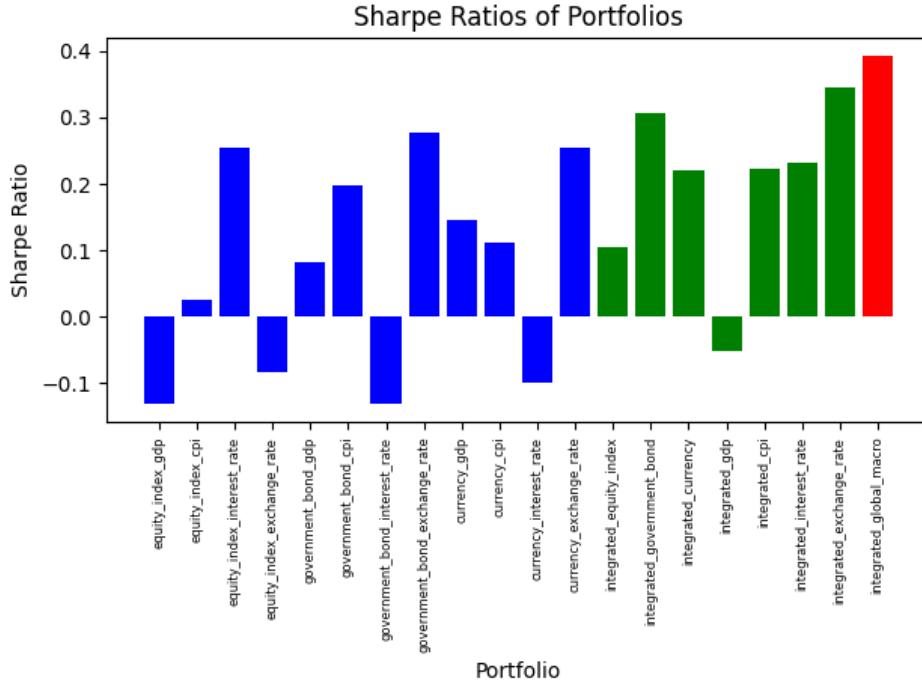
Figure 7: Sharpe Ratios of Global Macro Portfolios

The strategy's validity is supported by positive Sharpe ratios in 8 out of 12 individual asset portfolios and 6 out of 7 intermediate portfolios, with the integrated global macro portfolio achieving the highest ratio of just under 0.4.

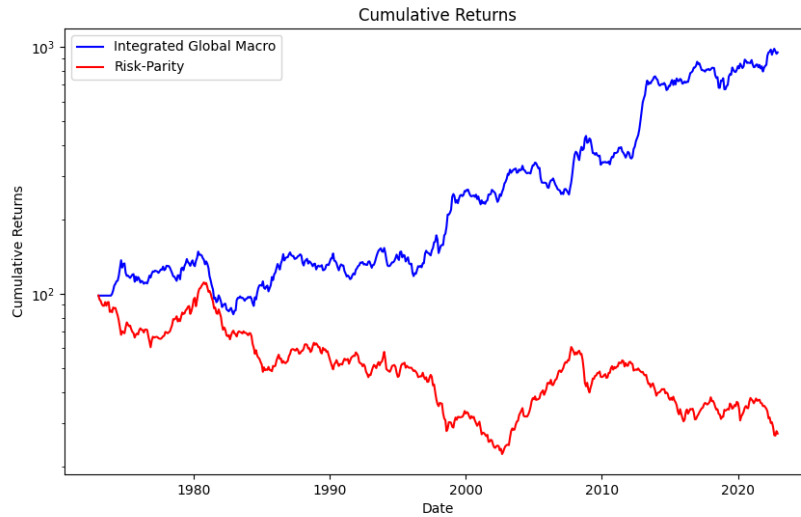Figure 8: Cumulative Returns of Global Macro vs. Risk-Parity

The cumulative returns graph shows a solid outperformance of the global macro portfolio over the risk-parity strategy, which is concentrated in the assets included in the global macro portfolio, emphasizing currencies. The exclusion of commodities and the resulting emphasis on currency positions, which have generally been negative due to the

dollar's appreciation, offer a possible explanation for the lower Sharpe ratio compared to analyses that include a broader range of assets.

The summary statistics reinforce the global macro strategy's outperformance, delivering a positive Sharpe ratio and underscoring the potential benefits of expanding the asset base and incorporating additional indicators to further enhance performance.

Metric	Risk-Parity	Integrated Global Macro
Annual Return	-2.58%	4.60%
Annual Volatility	10.79%	11.70%
Sharpe Ratio	-0.24	0.39
Kurtosis	0.19	1.04
Skew	-0.32	0.19

Table 2: Summary Statistics: Risk-Parity vs. Integrated Global Macro

In summary, despite a challenging period for currencies, the integrated global macro strategy shows a promising risk-adjusted performance, suggesting that a diversified approach that includes commodities and new indicators could yield even more robust results.

6 Interaction and Diversification

The examination of the correlation between the trend-following strategy and the integrated global macro strategy reveals a correlation coefficient of 0.211, indicating a low to moderate relationship. This level of correlation suggests that while there is some degree of co-movement between the strategies, they remain largely independent, providing a diversification benefit. The relatively low correlation coefficient is promising for the construction of a multi-strategy portfolio as it implies that the strategies may perform differently under various market conditions, thus potentially smoothing the overall return profile and reducing the volatility of a combined portfolio.

The combined portfolio, with an 80% weight in trend-following and 20% in global macro, is designed to leverage the broader empirical support and asset range of trend-following, while still capitalizing on the global macro's strengths.

Metric	Risk-Parity	Trend-Following	Global Macro	Combined
Annual Return	3.92%	19.41%	4.60%	17.87%
Annual Volatility	11.06%	11.53%	11.70%	10.28%
Sharpe Ratio	0.35	1.68	0.39	1.74
Kurtosis	1.05	0.37	1.04	-0.10
Skew	-0.14	0.15	0.19	0.07

Table 3: Summary Statistics of Investment Strategies

The superior Sharpe ratio of the combined portfolio indicates an enhanced risk-return profile, suggesting that investors could achieve better risk-adjusted returns compared to investing solely in traditional risk-parity strategies.

Further reinforcing the combined portfolio's effectiveness, the correlation with the MSCI US Index is -0.058, suggesting that it could serve as a diversifying component

against standard US equity benchmarks. This negative correlation highlights the portfolio's potential in providing a hedge during market downturns or when traditional equity markets underperform.

The inclusion of the combined portfolio in an investor's asset allocation could offer significant diversification advantages, especially during periods of volatility in the US equity markets. The negative correlation with the MSCI US Index implies that the combined portfolio may follow a different return pattern, providing a buffer and potentially reducing overall portfolio risk. Moreover, the high Sharpe ratio indicates that the risk taken per unit of return is lower, which is a desirable feature for any investment strategy aiming for long-term capital appreciation and stability.

7 Conclusion

This paper provided an empirical examination of systematic trend-following and global macro strategies, highlighting their individual merits and the synergistic benefits of their integration. In this study, we advance trend-following methodologies by integrating the magnitude of past returns, a departure from traditional models that consider only direction. This novel approach significantly boosts the strategy's predictive capabilities, as demonstrated by our robust empirical results. By accounting for the scale of previous price changes, our refined model captures nuanced market signals, offering an edge over conventional trend-following frameworks. This innovation not only strengthens the strategy's foundational premise but also enriches its application, potentially setting a new benchmark for trend-following in the realm of systematic investment strategies.

The global macro strategy's use of lagged economic indicators to inform asset positioning further delineates the relationship between macroeconomic forces and market dynamics.

The combined portfolio approach, allocating a significant weight to trend-following due to its empirical robustness and broad asset coverage, yields a superior Sharpe ratio, indicating an optimal risk-return balance. Notably, the negative correlation of the combined portfolio with the MSCI US Index points to its value as a diversification tool within a broader investment context. The performance metrics underscore this, with the trend-following strategy achieving a Sharpe ratio of 1.68, the global macro strategy 0.39, and the combined portfolio an impressive 1.74.

In conclusion, the strategies examined offer compelling alternatives to traditional market benchmarks, providing valuable avenues for portfolio diversification and risk management. However, it is crucial to acknowledge certain limitations of this study, primarily pertaining to data constraints. An ideal expansion of this research would leverage futures data for all assets, include a broader array of financial instruments such as interest rate swaps, individual stocks, individual bonds, and commodities (for the global macro portfolio) and integrate additional economic indicators like war, employment, and risk aversion metrics. Comparisons with hedge fund indices and a global 60/40 portfolio would also offer a more comprehensive evaluation. Future research, with these enhancements, could potentially lead to even more robust investment frameworks, providing an enriched canvas for portfolio construction and risk assessment.

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A Appendix

A.1 Detailed Asset Information

This subsection provides an exhaustive list of the asset tickers and countries considered in the study.

A.1.1 Country Equity Indices

The following MSCI equity indices from Bloomberg were used:

- Argentina (MXAR)

- Australia (MXAU)

- Brazil (MXBR)

- Canada (MXCA)

- China (MXCN)

- France (MXFR)

- Germany (MXDE)

- India (MXIN)

- Indonesia (MXID)

- Italy (MXIT)

- Japan (MXJP)

- Mexico (MXMX)

- South Korea (MXKR)

- Russia (MXRU)

- Saudi Arabia (MXSA)

- South Africa (MXZA)

- Turkey (MXTR)

- United Kingdom (MXGB)

- United States (MXUS)

A.1.2 Generic 1st Government Bonds

The data for the following Generic 1st government bonds were obtained:

- Australia (XM1 COMB Comdty)
- Canada (CN1 Comdty)
- China (TFT1 Comdty)
- France (OAT1 Comdty)
- Germany (RX1 Comdty)
- Italy (IK1 Comdty)
- Japan (JB1 COMB Comdty)
- Mexico (DW1 Comdty)
- United Kingdom (G 1 Comdty)
- United States (TY1 COMB Comdty)

A.1.3 Currencies

Currency pairs accessed include:

- USD to ARS (USDARS)
- USD to AUD (USDAUD)
- USD to BRL (USDBRL)
- USD to CAD (USDCAD)
- USD to CNY (USDCNY)
- USD to EUR (USDEUR)
- USD to GBP (USDGBP)
- USD to IDR (USDIDR)
- USD to INR (USDINR)
- USD to JPY (USDJPY)
- USD to KRW (USDKRW)
- USD to MXN (USDMXN)
- USD to RUB (USDRUB)
- USD to SAR (USDSAR)
- USD to TRY (USDTRY)
- USD to ZAR (USDZAR)

A.1.4 Commodities

Commodities incorporated from Bloomberg sub-indices:

- Aluminum (BCOMALTR)
- Brent Crude (BCOMCOT)
- Cocoa (BCOMCCTR)
- Coffee (BCOMKCTR)
- Copper (BCOMHGTR)
- Corn (BCOMCNTR)
- Cotton (BCOMCTTR)
- Feeder Cattle (BCOMFCT)
- Gas Oil (BCOMGOT)
- Gold (BCOMGCTR)
- Kansas Wheat (BCOMKWT)
- Lead (BCOMPBTR)
- Lean Hogs (BCOMLHTR)
- Live Cattle (BCOMLCTR)
- Natural Gas (BCOMNGTR)
- Nickel (BCOMNITR)
- Orange Juice (BCOMOJT)
- Platinum (BCOMPLTR)
- Silver (BCOMSITR)
- Soybean Meal (BCOMSMT)
- Soybean Oil (BCOMBOTR)
- Soybeans (BCOMSYTR)
- Sugar (BCOMSBTR)
- Tin (BCOMSNTR)
- ULS Diesel (BCOMHOTR)
- Unleaded Gasoline (BCOMRBTR)
- Wheat (BCOMWHTR)
- WTI Crude Oil (BCOMCLTR)
- Zinc (BCOMZSTR)