



THE COLLEGE OF
WOOSTER

Constructing a "Chinese All-Weather" Strategy

Jerry Qicheng Cai

Advised by Prof. Huiting Tian & Dr. Changzhi Ma

Department of Economics and Data Science & Statistics, College of Wooster

Abstract

This study explores whether the All-Weather asset allocation framework can be applied effectively to China's continuous futures market. Drawing on equity index, government bond, and commodity futures, it constructs a dynamic Equal Risk Contribution (ERC) portfolio and further enhances it with short-term time-series momentum and dynamic rebalancing. The strategy is backtested over the 2021–2023 period against a traditional 60/40 portfolio. The results indicate that the proposed strategy achieves better risk-adjusted returns and lower drawdowns over the sample period. Specifically, the 60/40 benchmark records an annualized return of -6.16%, a Sharpe ratio of -1.142 and a maximum drawdown of 22.12%, whereas the enhanced All-Weather strategy delivers an annualized return of 10.85%, a Sharpe ratio of 0.617, and a maximum drawdown of 9.36%. Overall, the findings suggest that a risk-parity approach combined with trend-sensitive adjustments may improve downside protection in China's futures market, though the conclusions should be interpreted with caution given the short back test window.

Theoretical Framework

MPT demonstrates that a portfolio's overall risk is not simply the average of individual asset risks, but depends on the covariance and correlation between assets.

While point P (in Fig 3.2.1) maximizes the Sharpe ratio, nominal allocations like 60/40 suffer from extreme risk imbalance. Because equity volatility is typically 3-4 times that of bonds, over 90% of the portfolio's risk actually originates from equities.

The Security Market Line (SML) represents "fairly priced" assets where expected returns perfectly match their systematic risk. (β)

ERC Optimization by penalizing risk concentration and utilizing volatility targeting, ERC fundamentally manages tail risk and provides robust downside protection during crises.

$$\sigma_P^2 = w_A^2 \sigma_A^2 + w_B^2 \sigma_B^2 + 2w_A w_B \sigma_A \sigma_B \rho_{AB}$$

$$E(r_C) = r_f + \frac{E(r_P) - r_f}{\sigma_P} \sigma_C$$

$$E(r_i) = r_f + \beta_i (E(r_M) - r_f)$$

$$\min_w \sum_{i=1}^N \sum_{j=1}^N (w_i (\Sigma w)_i - w_j (\Sigma w)_j)^2$$

$$S_{i,t} = \text{sign} \left(\frac{P_t}{P_{t-22}} - 1 \right)$$

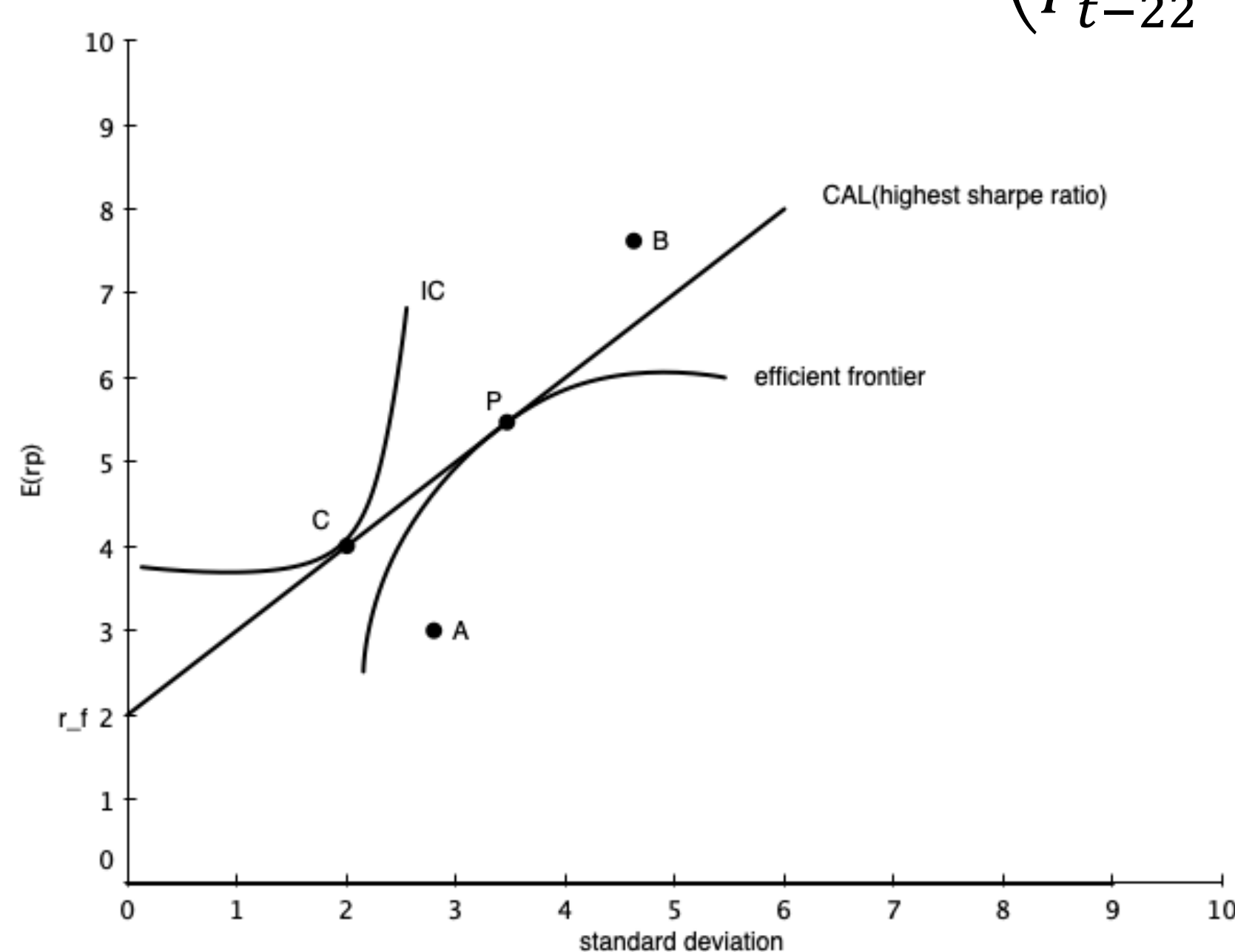


Figure 3.2.1: Modern Portfolio Theory

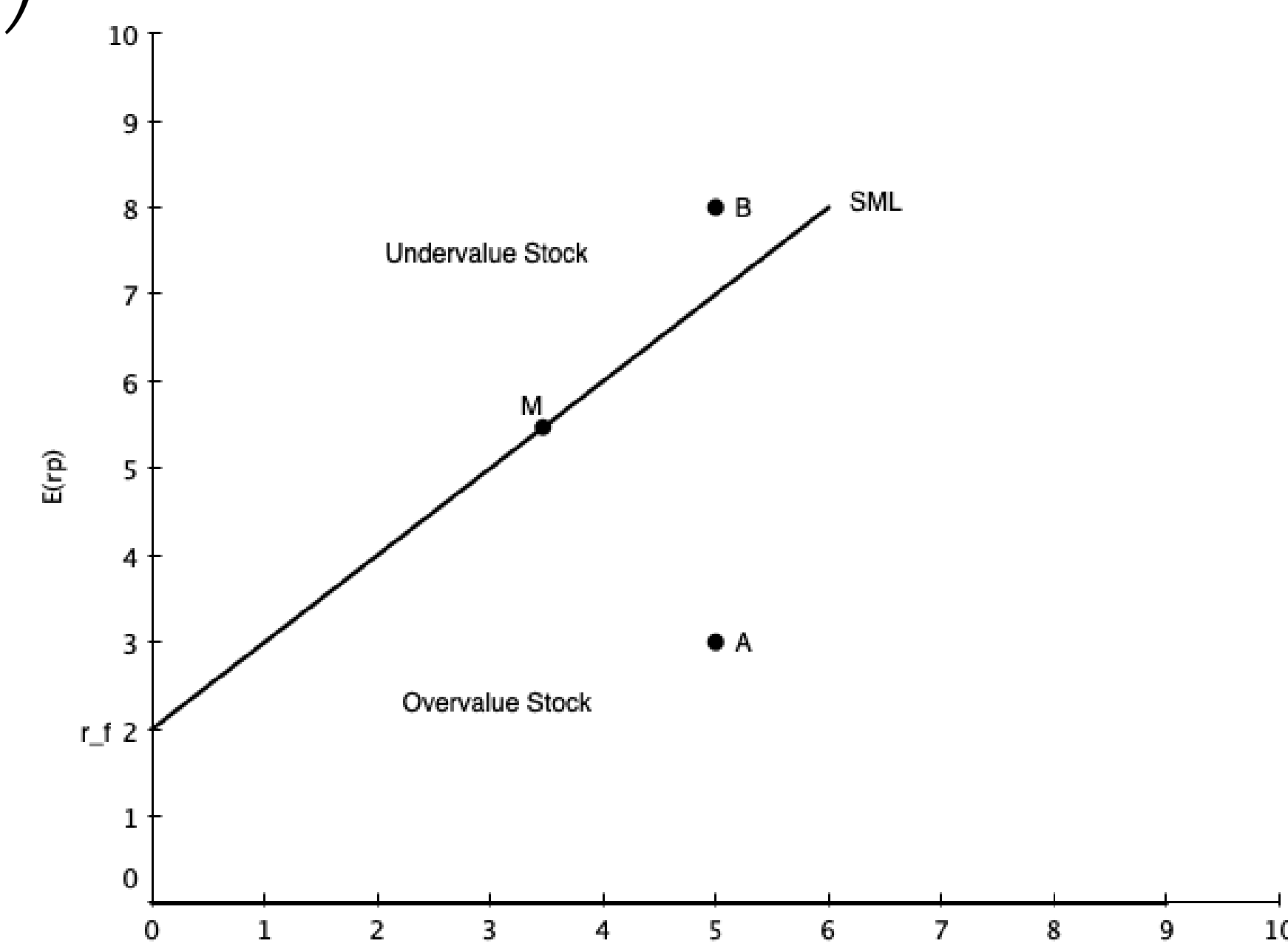
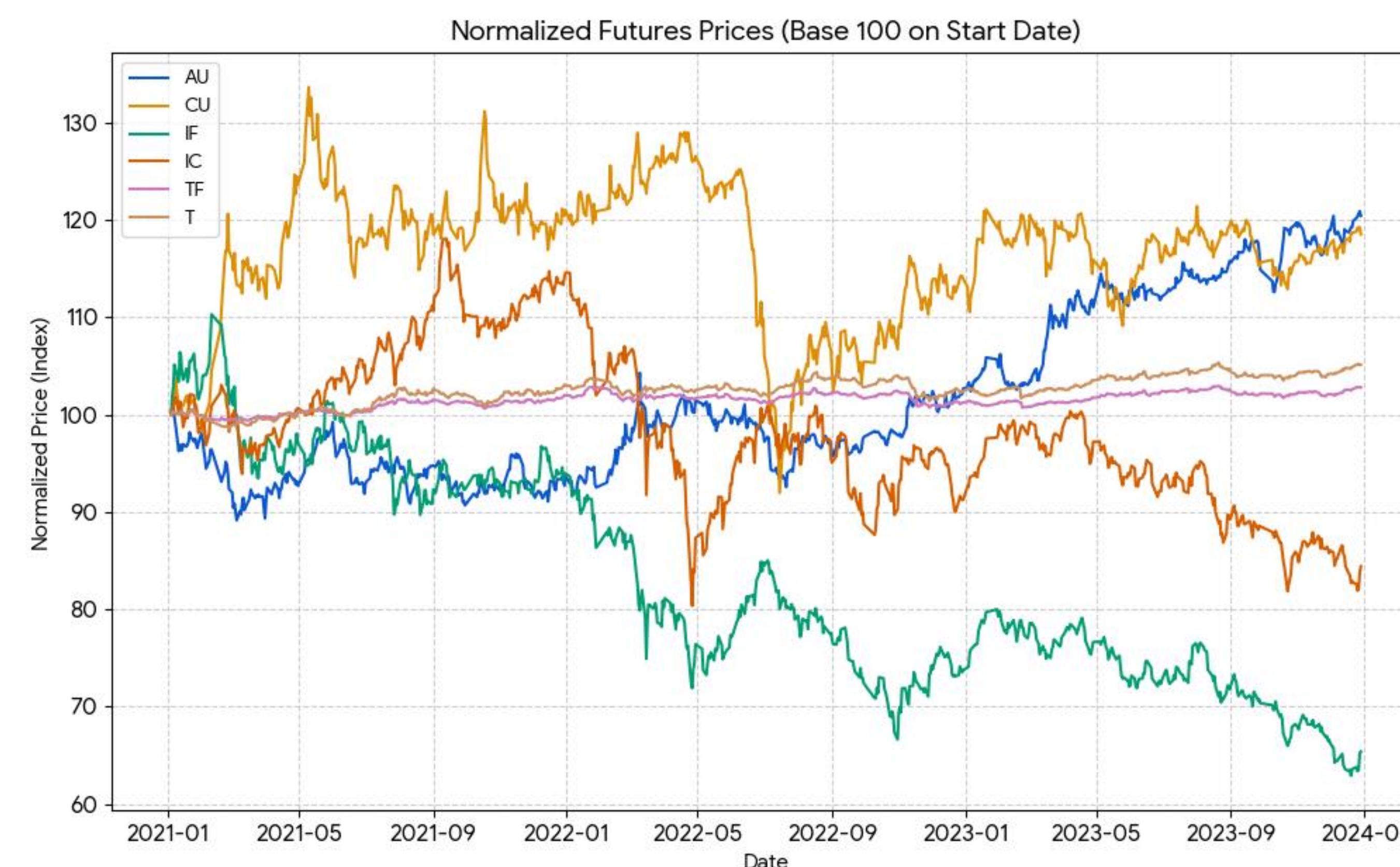


Figure 3.4.1: CAPM Model

Data



Historical data (2021 - 2024) sourced from the JoinQuant platform. High-frequency minute-level data was aggregated to daily and monthly returns for modeling. Growth: CSI 300 (IF) & CSI 500 (IC) Index Futures. Stability: 10-Year (T) & 5-Year (TF) Treasury Bond Futures. Inflation: Gold (AU), Copper (CU), and Crude Oil (SC) Futures.

Modeling

Strategic Layer A(Underlying Assets) based on the "Growth-Inflation-Interest Rate" triadic risk framework of China's futures market.

Core Algorithm B(Allocation Logic) is grounded in Bucher & Osterrieder (2021)'s Equal Risk Contribution (ERC) optimization.

Tactical Overlay C(Enhanced Returns) integrates Cho et al. (2019)'s short-cycle time-series momentum with Ning et al. (2023)'s dynamic band rebalancing.

However, constrained by the availability of instruments in China's financial derivatives market. This study constructs a Three-Bucket Risk Framework

$$TRC_{growth} = TRC_{stability} = TRC_{inflation}$$

$$\min_w \sum_{i=1}^N \sum_{j=1}^N (w_i (\Sigma w)_i - w_j (\Sigma w)_j)^2$$

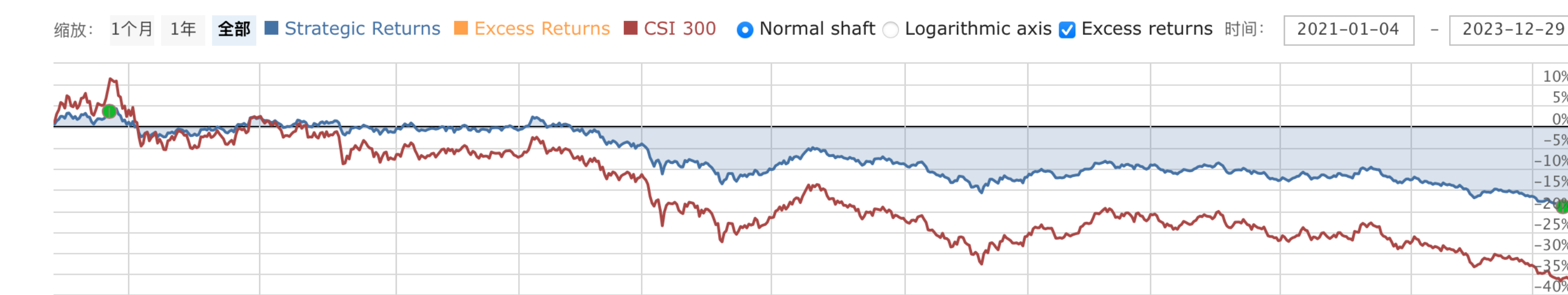
$$S_{i,t} = \text{sign} \left(\frac{P_t}{P_{t-22}} - 1 \right)$$

$$\left| \frac{w_{current,i} - w_i^*}{w_i^*} \right| > 0.40$$

Results

Benefits Overview

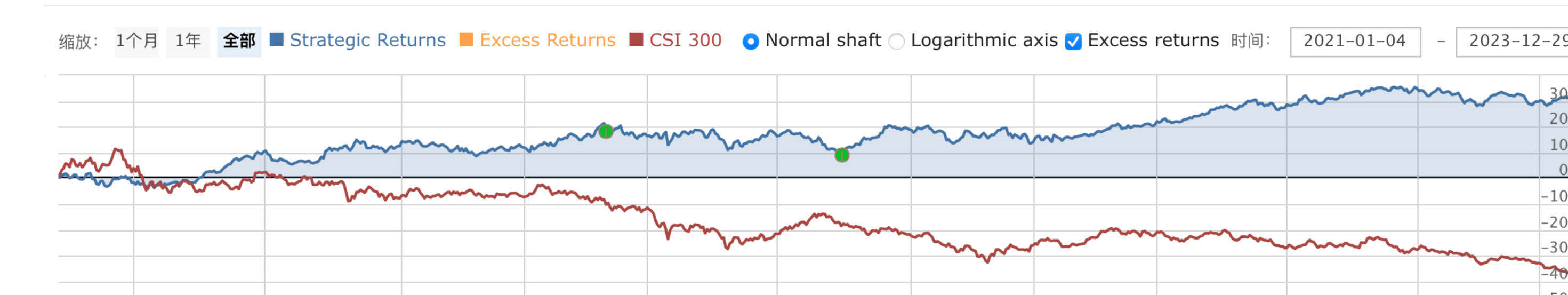
Strategy Benefits	Strategic annualized returns	Excess returns	Benchmark earnings	Alpha	Beta	Sharpe ratio	Winning rate	Profit and loss ratio	Maximum drawdown	Sotino ratio
-16.87%	-6.16%	26.26%	-34.16%	-0.017	0.484	-1.142	0.510	0.593	22.12%	-1.782
Average daily excess return	The maximum drawdown of excess returns	Excess return Sharpe ratio	Daily win rate	Number of profits	Number of losses	Information ratio	Strategy volatility	Benchmark volatility	Maximum retracement range	
0.03%	9.09%	0.459	0.508	25	24	0.766	0.089	0.177	2021/02/10,2023/12/20	



Annualized Return was -6.16%, with a cumulative strategy return of -16.87%. While it generated a 26.26% Excess Return relative to the CSI 300 Index (-34.16%), this merely signifies that it "lost less than the market" without altering the fact of absolute loss. The model's Sharpe Ratio stands at -1.142. Alpha is -0.017 and its Beta is 0.484. Maximum Drawdown reached 22.12%

Benefits Overview

Strategy Benefits	Strategic annualized returns	Excess returns	Benchmark earnings	Alpha	Beta	Sharpe ratio	Winning rate	Profit and loss ratio	Maximum drawdown	Sotino ratio
34.93%	10.85%	104.94%	-34.16%	0.114	0.263	0.617	0.521	1.423	9.36%	0.866
Average daily excess return	The maximum drawdown of excess returns	Excess return Sharpe ratio	Daily win rate	Number of profits	Number of losses	Information ratio	Strategy volatility	Benchmark volatility	Maximum retracement range	
0.10%	15.57%	1.454	0.557	364	334	1.471	0.111	0.177	2022/01/24,2022/07/15	



Chinese All-Weather strategy achieved a 10.85% annualized return. Reach a cumulative three-year strategy return of 34.93%. Excess return is 104.94%. Strategy's maximum drawdown is 9.36%. Sharpe ratio surged significantly to 0.617. Alpha of 0.114, Beta value was only 0.263. Substantial Advantage in Risk-Adjusted.

Hypothesis:

H1: China's all-weather strategy offers a significant advantage in terms of risk-adjusted returns.

H2: China's all-weather strategy is capable of mitigating tail risks

References

- Asness, C. S., Frazzini, A., & Pedersen, L. H. (2012). Leverage aversion and risk parity. *Financial Analysts Journal*, 68(1), 47–59. <https://doi.org/10.2469/faj.v68.n1.1>
- Bucher, M., & Osterrieder, J. (2021). Risk parity strategies: A literature review. *Risks*, 9(7), 130. <https://doi.org/10.3390/risks9070130>
- Ning, Y., Yang, S., & Zheng, W. (2022). Dynamic rebalancing of a risk parity investment portfolio. *Journal of Investment Strategies*, 11(4), 1–29. <https://doi.org/10.21314/JOIS.2022.012>
- Pu, X., Wang, K., Yang, J., & Zhang, Y. (2023). Network momentum. *Journal of Financial Economics*. Advance online publication. <https://doi.org/10.1016/j.jfineco.2023.102823>