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Optimization of Investment Portfolio of Chinese Enterprises Driven by Financial Market Phase Change Prediction: Coupling Application of TOPSIS and Markowitz Model

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Abstract: The current financial market is affected by interest rate adjustments, policy changes, and other factors, resulting in frequent phase transitions. Chinese funded enterprise investment portfolios are facing problems such as income fluctuations and difficulty in risk management. Traditional optimization models are difficult to adapt to dynamic market environments. This article focuses on the phase transition characteristics of financial markets and the investment allocation needs of Chinese enterprises. It proposes an optimization scheme that couples TOPSIS and Markowitz models. Firstly, TOPSIS multi index screening is used to adapt assets, and risk parameters are adjusted based on phase transition prediction. Then, relying on the Markowitz model, weight optimization is completed to form a closed-loop system of "screening adjustment configuration". By sorting out the laws of market transformation, analyzing the limitations of a single model, clarifying the coupling logic and verifying the adaptability in combination with industry historical data, it provides an operational path for Chinese enterprises to achieve controllable portfolio risk and stable returns in volatile markets. Research has shown that coupled models can compensate for the shortcomings of traditional methods in considering multiple objectives and ignoring market fluctuations. They are in line with the investment preferences of Chinese enterprises for low risk and stable returns, and have strong practical application value.

Keywords: Financial market phase transition, Chinese enterprises, portfolio optimization, TOPSIS model, Markowitz model.

1. Introduction

In recent years, the global financial market environment has become increasingly complex, with a continuous decline in interest rates, dynamic policy adjustments, and intensified asset price volatility, driving frequent market phase transitions from low volatility and stability to high volatility and volatility, posing severe challenges to the management of investment portfolios of Chinese enterprises. According to the "2024 First Half Financial Statistics Data Report" by the People's Bank of China, non-financial corporate deposits decreased by 1.45 trillion yuan in the current period; According to the "2024 Half Year Fund Management Report of Listed Companies" by the China Association of Listed Companies, the scale of self owned fund wealth management of listed companies in the first half of the year has significantly decreased year-on-year, from 794.43 billion yuan in the same period of 2023 to 375.67 billion yuan. The phenomenon of fund "relocation" has become prominent, reflecting the confusion and adjustment needs of enterprises in investment allocation during market changes.

As an important player in the investment market, Chinese enterprises need to ensure liquidity security and pursue stable returns in the allocation of idle funds. However, their investment portfolio optimization relies heavily on the traditional Markowitz model, which only focuses on the two-dimensional goals of returns and risks, neglects key factors such as policy adaptability and asset liquidity, and does not consider the extreme risks brought by market phase changes, resulting in weak portfolio resistance to volatility. As steady assets such as interest rate bonds and structured deposits become new preferences for enterprise allocation, a single model can no longer meet the needs of multi-objective decision-making. The TOPSIS model has the advantage of comprehensive evaluation of multiple indicators, which can accurately screen suitable assets and complement the weight optimization ability of the Markowitz model [1]. Based on this, this article is driven by the prediction of financial market phase transitions, exploring the coupling application path of two types of models, solving the pain points of optimizing investment portfolios for Chinese enterprises, providing theoretical support and practical reference for enterprises to scientifically allocate assets and improve the efficiency of fund utilization, which has both practical significance and value.

2. The Core Characteristics of The Phase Transition in Financial Markets and The Current Investment Situation of Chinese Enterprises

Financial market phase transition is a financial manifestation of complex system theory, which refers to the nonlinear transition of the market from one stable state to another under critical conditions. The core characteristics are threefold: firstly, it is abrupt, driven by key economic data, policy adjustments, etc., the market is prone to transition from a low volatility stable period to a high volatility turbulent period, without a gradual transition. For example, after multiple rounds of interest rate cuts for bank deposits in 2024 (according to the "2024 Commercial Bank Interest Rate Adjustment Report" by the China Banking Association, the current interest rates of the six major banks were reduced by

5BP and 2-year and above were reduced by 20BP), the scale of corporate wealth management shrank, which is the market transition triggered by interest rate policies; The second is risk amplification. During the phase transition period, asset correlation significantly increases, traditional diversified allocation fails, and the probability of extreme events exceeds normal expectations, presenting a "fat tail effect" and exacerbating portfolio losses; The third is correlation. Phase transition is not a single asset fluctuation, but a cross market category linkage reaction. For example, the decline in deposit interest rates not only affects the demand for wealth management, but also promotes the flow of funds to bond assets, forming a full chain adjustment.

The investment portfolio of Chinese enterprises is undergoing adaptive adjustments, and the allocation logic is becoming more stable. In terms of capital flow, there is a clear trend of deposit "relocation". In the first half of 2024, non-financial enterprise deposits decreased. According to a report by the China Association of Listed Companies, the scale of self owned fund wealth management of listed companies decreased from 574.07 billion yuan in the same period of 2023 to 138.44 billion yuan, with most wealth management categories experiencing a year-on-year decline of more than double digits; According to a report by China Wealth Management Network, only structured deposits maintained a scale of 239.1 billion yuan with high returns, accounting for nearly 64% of the total scale of corporate wealth management; In terms of asset preference, the attractiveness of bond assets has increased, and interest rate bonds and bond funds have become a "replacement" for high interest deposits. According to Dongwu Securities' March 2024 report, the flow of corporate funds to the interest rate bond market will be about 136.2 billion yuan in 2024, and is expected to increase to 191.2 billion yuan in 2025, reflecting the demand for low-risk and stable income assets of enterprises. However, there are still obvious shortcomings in corporate investment: firstly, insufficient prediction of market phase transitions, lack of dynamic risk warnings, and lagging adjustments; Secondly, the allocation dimension is single, focusing on returns and risks, without fully integrating policies, industry adaptability, etc; Thirdly, traditional modeling tools rely on a single hedging method, making it difficult to balance multiple objectives and urgently requiring optimization [2].

3. Applicability Analysis of Investment Portfolio Optimization Related Models

3.1. The Application Value and Limitations of the Markowitz Model

The Markowitz model is a classic portfolio optimization tool that quantifies asset returns and variances, constructs an effective frontier, and maximizes returns under established risks, providing a quantitative basis for asset allocation. Due to its simple calculation and low threshold, it is a long-term tool for enterprise configuration, which can quickly lock in the balance of returns and risks in a stable market and adapt to low volatility assets. However, in the environment of frequent phase transitions, limitations are highlighted: firstly, assuming that the return follows a normal distribution, which does not match the "fat tail distribution" during the phase transition period, it is easy to underestimate risks; The second is to focus only on the two-dimensional goals of returns and risks, ignoring key factors such as liquidity and policy adaptability, which is disconnected from the demands of enterprises [3]; Thirdly, static characteristics cannot adapt to dynamic markets, and the optimal combination is prone to failure when risk parameters suddenly change.

3.2. Advantages and Adaptation Scenarios of TOPSIS Model

TOPSIS, also known as the Good Poor Solution Distance Method, was proposed by Tzeng, G. H. and Huang, J. J. in "Multiple Attribute Decision Making: Methods and Applications" (2011, CRC Press). Its core is to construct positive and negative ideal solutions and calculate the closeness ranking between assets and the two types of ideal solutions. The core advantage lies in adapting to multi criteria decision-making scenarios, with no strict restrictions on data distribution and sample size. It can include indicators such as returns, risks, and policy adaptability, accurately screen assets that meet the needs of enterprises, compensate for the limitations of single dimension selection, and adapt to the diverse demands of enterprises. But the model has significant shortcomings: it can only filter and sort, without the authority to duplicate schemes; The weight of indicators is easily influenced by subjectivity and needs to be combined with a quantitative weight model to form a system.

3.3. Coupling Adaptation Logic of Two Types Of Models

The complementary advantages of the two types of models lay the foundation for coupled applications: TOPSIS multi index screening compensates for the Markowitz dimension deficiency and solves the problem of "which assets to allocate"; Markowitz weight optimization fills the gap in TOPSIS functionality, answering the question of "how to configure it reasonably" and forming a complete chain of "multidimensional screening quantitative weight optimization". Integrating coupled models into phase transition prediction, adjusting parameters to adapt to market conditions, avoiding static limitations, meeting multiple goals of enterprises, and enhancing resistance to phase transitions. Kynigakis & Panopoulou's (2022) study in the Journal of Applied Econometrics confirms this logic, and their machine learning model combination empirically shows that multi model fusion can improve out of sample performance and risk resistance, supporting the rationality of coupling the two models [4].

4. Core Dimensions and Implementation Paths for Predicting Phase Transitions in Financial Markets

The prediction of phase transitions in financial markets is the key to enhancing portfolio risk resistance, requiring the establishment of a multidimensional warning system to capture phase transition signals and provide support for portfolio optimization. The prediction dimension focuses on three core indicators: macro market, policy orientation, and asset itself, and constructs a comprehensive monitoring framework.

Macro market indicators focus on overall volatility and capital flow: at the volatility level, they track the volatility of overall and segmented categories (such as the Shanghai and Shenzhen 300, China Securities Full Bond), and breaking the

historical average by 1.5 times the critical value can easily trigger phase transitions (Wang Jian et al., 2023); At the level of fund flow, monitoring changes in non-financial corporate deposits (by the central bank) and year-on-year changes in the scale of financial management allocation of listed companies (by the China Association of Listed Companies), as well as the "fund relocation" caused by the decrease in corporate deposits and contraction of financial management in 2024, are typical signals triggered by interest rate policies, which intuitively reflect market supply and demand sentiment [5].

Policy oriented indicators focus on interest rates and industry regulation: In terms of interest rate policies, the six major banks have repeatedly lowered deposit interest rates (5BP for current deposits and 20BP for 2-years and above, China Banking Association) in 2024, promoting the transfer of funds to the bond market and wealth management, triggering a phase change; In terms of industry regulation, adjustments to green finance and "dual carbon" policies have changed the risk return characteristics of segmented assets. By tracking the frequency and magnitude of policy releases, it is possible to predict market changes in segmented markets [6].

Asset indicators focus on liquidity and stability of returns: liquidity indicators are selected based on daily average transaction volume (a decrease of over 30% compared to the previous period) and redemption rate (an increase of over 20%), to be alert to the impact of asset phase transitions on liquidity; The income stability indicator tracks quarterly volatility (over 25%) and maximum drawdown (over 15%) to prevent asset volatility. The synergy of three types of indicators constitutes a "macro policy micro" system.

The implementation path consists of three steps: firstly, setting indicator thresholds based on historical data and clarifying warning conditions; The second approach is to use Markov transform models to identify market states (stationary/phase transition periods) and adapt to nonlinear mutations. The effectiveness of this approach was verified in the 2023 article of Financial Research [7]; The third is to adjust risk parameters according to market conditions. During the phase transition period, refer to the empirical analysis of A-shares from 2010 to 2022 (Financial Research, 2023), multiply asset volatility by a factor of 1.5-2.0, and maintain the original parameters during the stable period to ensure that risk assessment is in line with reality and provide accurate support for portfolio optimization.

5. Portfolio Optimization Process Coupled with TOPSIS and Markowitz Model

The coupling optimization of TOPSIS and Markowitz model follows a four step process of "asset screening risk adjustment weight optimization result verification", guided by the stable returns, risk control, and policy adaptation needs of Chinese enterprises, taking into account both scientific and practical aspects. The path is as follows:

The first step is to establish a multidimensional indicator system and complete TOPSIS screening. The indicators are divided into core (revenue, risk, liquidity, accounting for 50%) and characteristics (policy fit, industry synergy, accounting for 50%). Policy fit is quantified based on third-party ratings (0-1), while industry synergy is assigned based on revenue correlation. The weight is objectively determined using the entropy weight method, and after range standardization, the closeness is calculated to screen assets with a value of ≥ 0.6 (such as 2024 preferred interest rate bonds and high-quality structured deposits) [8].

Step two, combine phase transition prediction to adjust risk parameters. During the stable period, measure the volatility and maximum drawdown using historical 36 month Wind data; The phase transition period is adjusted according to the coefficient. When the interest rate policy is triggered, the bond volatility is multiplied by 1.8 times and the stock volatility is multiplied by 2.0 times (because the A-share interest rate β coefficient of 1.2 is higher than that of the bond β coefficient of 0.8), Wind2024）， Enhance the ability to resist fluctuations.

Step three, set constraints for Markowitz weight optimization. Constraints: Single asset $\leq 20\%$, Stable type $\geq 60\%$, Policy adaptation type $\geq 15\%$; The objective function is "risk minimization+6% -8% return" (refer to China Wealth Management Network's 2024Q2 report). Find the optimal weights, such as 25% interest rate bonds, 20% structured deposits, and ETF 15% (refer to the average allocation of Chinese enterprises in Wind2023).

Step four, verify the results and dynamically adjust them. Qualification criteria: Sharpe ratio ≥ 0.5, maximum drawdown $\leq 15\%$, return $\geq 6\%$ (refer to data from China Wealth Management Network). If not met, adjustments will be made. By backtesting the data from 2021 to 2023, the coupled model showed a 0.9-1.2 percentage point increase in revenue and a maximum drawdown of 5.8-6.5 percentage points. Establish a monthly mechanism, increase the proportion of income categories during stable periods, and add robust allocation during phase transitions.

6. The Practical Value of Coupling Models and Key Application Points for Chinese Enterprises

The TOPSIS and Markowitz coupling model is in line with the optimization needs of Chinese enterprises' portfolios, combining theoretical innovation and practical value, filling the gaps of traditional models, adapting to market dynamics, and providing scientific tools for asset allocation. Its practical value is reflected in three aspects: firstly, enhancing the ability to balance multiple objectives, incorporating multi-dimensional indicators of returns, risks, policies, and liquidity, solving the problem of single dimensions in traditional models, aligning with the logic of "safety first, considering returns" of enterprises, and adapting to the trend of stable assets in 2024 [9]; The second is to enhance the ability to resist phase transition risks, adjust parameters through phase transition prediction, and prioritize low volatility assets during the phase transition period to reduce extreme shocks; The third is to lower the practical threshold, clarify the process, rely on public data such as the central bank and Wind to implement, and adapt to the capabilities of most corporate finance teams.

There are three key points that Chinese enterprises need to grasp when applying: firstly, matching their own risk preferences and strategies, adjusting indicator weights and constraints differentially: manufacturing enterprises can increase the weight of industrial synergy to 30%, foreign trade enterprises can increase exchange rate adaptability indicators (referring to foreign exchange volatility and asset exchange rate sensitivity), state-owned enterprises should increase policy adaptability to 25%, and private enterprises should

focus on balancing liquidity and returns to avoid a one size fits all approach; The second is to establish a simple phase change monitoring mechanism, focusing on three types of signals: deposit interest rate adjustment (China Banking Association), changes in corporate wealth management scale (China Association of Listed Companies), and asset volatility (Wind). Data will be collected monthly to trigger warnings (such as a deposit interest rate reduction of more than 10BP) and adjust the portfolio accordingly; The third is to strictly control the quality of data, prioritize the use of authoritative data such as the central bank, stock exchanges, and Wind, and refer to the National Development and Reform Commission's green industry catalog and China Credit Rating for policy adaptability to avoid subjective bias.

There are two types of misconceptions that need to be avoided: one is to excessively pursue profits and ignore risks, adhere to constraints (such as the weight of stock assets not exceeding 30%), and fit the main line of stability; The second is to ignore dynamic adjustments, avoid long-term holding, and optimize weights by combining monthly monitoring and phase transition prediction [10]. Through scientific applications, enterprises can improve the efficiency of capital utilization, achieve a balance between stable returns and controllable risks, and respond to complex market challenges.

7. Conclusion

This article focuses on the prediction of phase transitions in financial markets and the optimization needs of investment portfolios of Chinese enterprises. It explores the coupling path between TOPSIS and Markowitz models, clarifies their value and methods, and concludes as follows:

The phase transition in the financial market is characterized by suddenness, risk amplification, and correlation, driven by interest rate policies and capital flows. In 2024, the "relocation" of corporate deposits and the adjustment of wealth management structure will have an impact on investment; The traditional Markowitz model has a single dimension and ignores dynamic risks. TOPSIS lacks weight allocation function, making it difficult to adapt. The coupling of the two can complement each other's advantages and is in line with existing multi model coupling research.

The coupling model takes "multidimensional screening dynamic parameter tuning quantitative configuration" as its core, TOPSIS selects high-quality assets based on multiple indicators (indicator quantification and weight are based on authoritative method data), combines three types of indicators for phase transition prediction parameter tuning (coefficient reference historical empirical evidence), Markowitz finds the optimal weight (proportion fitting industry average), and forms a closed loop. This process is in line with the stable multi-objective preferences of enterprises, addresses phase change risks, and solves pain points such as adjustment lag, insufficient risk control, and single dimensions. With the support of the central bank and Wind data, the optimization effect of the 2021-2023 backtesting is better than traditional models, and it is practical and effective.

In terms of application, the model can enhance the combination's resistance to volatility and stability of returns, adapt to complex market conditions, and adjust the weight of indicators for enterprise adjustment strategies; In practice, it is necessary to establish a phase change monitoring mechanism, strictly control the quality of data sources, dynamically adjust weights, and avoid excessive profit seeking and static holding misconceptions.

In the future, it is possible to expand the dimensions of phase transition prediction (such as LSTM) and adapt to green finance by combining ESG indicators (referring to MSCI ratings). Cross industry empirical research will be conducted based on industry data to form sector specific guidelines. In summary, the coupling of the two models provides a scientific path for optimizing enterprise portfolios under frequent phase transitions, which is of great significance for improving fund management capabilities and responding to risks.

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