Research on Optimization Model and Simulation of Enterprise Asset Structure Facing Macroeconomic Fluctuation

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Abstract: This article focuses on the optimization of enterprise asset structure under the background of macroeconomic fluctuation. By constructing an enterprise asset structure optimization model oriented to macroeconomic fluctuations, the multi-objective programming algorithm combined with scenario analysis method is used to simulate the enterprise asset structure adjustment strategy under different macroeconomic scenarios. Taking a virtual manufacturing enterprise as an example, the simulation results show that when the economy is prosperous, the allocation ratio of fixed assets can reach 75%, the expected income is 15 million yuan, and the risk coefficient is about 0.3. When the economy is in recession, the allocation ratio of fixed assets will be reduced to 25%, the expected income will be 5 million yuan, and the risk coefficient will be around 0.18. The research shows that the model can provide reasonable asset structure adjustment strategies for enterprises in different macroeconomic environments and effectively balance the benefits and risks. This is of great guiding significance for enterprises to optimize their asset structure and improve their operational stability under the complex economic situation.

1. Introduction

Under the background of the acceleration of global economic integration, the dynamic change of macroeconomic environment has become an important factor that can not be ignored in enterprise operation [1]. Macroeconomic fluctuation is like a double-edged sword, which not only brings opportunities to enterprises, but also makes enterprises face many challenges [2]. In this situation, the optimization and adjustment of enterprise asset structure is particularly critical, which is related to the short-term survival and development of enterprises and affects the long-term strategic layout and the shaping of core competitiveness of enterprises [3].

Theoretically, the research on the relationship between macroeconomic fluctuation and enterprise asset structure is an extension and deepening of traditional enterprise financial management theory. Previous studies focused on the influence of internal factors on asset structure, but the consideration of macroeconomic fluctuation, an external key factor, was still insufficient [4]. Exploring the relationship between the two is helpful to improve the theoretical system of enterprise asset structure and provide new perspectives and ideas for subsequent academic research [5]. From a practical point of view, in the complex and changeable macroeconomic environment, if enterprises can accurately grasp the law of macroeconomic fluctuations and scientifically and reasonably optimize the asset structure, they can effectively reduce business risks, improve the efficiency of resource allocation and achieve sustainable development [6]. In the period of economic prosperity, enterprises can appropriately increase investment in venture assets to expand their income; During the economic recession, adjust the asset structure in time and increase liquid assets to resist the downward pressure on the economy [7]. In reality, many enterprises are in trouble in asset structure adjustment because of their failure to accurately cope with macroeconomic fluctuations, which leads to a decline in operating performance and even a crisis of survival.

By constructing a scientific optimization model and carrying out simulation, this article reveals the optimization path of enterprise asset structure under macroeconomic fluctuation, and provides powerful theoretical support and practical guidance for enterprises to make scientific decisions in complex economic environment.

2. Analysis of the relationship between macroeconomic fluctuations and enterprise asset structure

Macroeconomic fluctuations mainly affect the asset structure of enterprises through various channels [8]. First, the change of macroeconomic policy orientation plays a key role. In terms of monetary policy, when the money supply increases and the interest rate decreases, the financing cost of enterprises decreases, and they may tend to increase investment in long-term assets such as fixed assets to expand the scale of production. Under the loose monetary policy, manufacturing enterprises may purchase advanced equipment to increase production capacity. Fiscal policy should not be underestimated. The government's increased support for specific industries, such as tax incentives and subsidies, will guide enterprises to adjust their asset structure and tilt to the supported industries [9]. Second, the change of market supply and demand has a significant impact on the asset structure of enterprises. In the stage of economic prosperity, the market demand is strong. In order to meet the demand, enterprises may increase inventory assets and increase investment in assets such as production facilities. On the contrary, during the economic recession and shrinking demand, enterprises will reduce inventory and even dispose of some fixed assets to withdraw funds. At the same time, the adjustment of enterprise asset structure will also have feedback on macroeconomic fluctuations [10]. If many enterprises increase investment in fixed assets at the same time, it will drive the development of related industries and stimulate economic growth; On the contrary, a large number of enterprises selling assets may trigger market panic and aggravate the downward pressure on the economy. The asset structure of enterprises in different industries is influenced by macroeconomic fluctuations. Capital-intensive industries are more sensitive to macroeconomic fluctuations, such as steel industry. When the economy fluctuates, it is difficult and costly to adjust their fixed assets. However, labor-intensive industries are relatively flexible and can cope with economic fluctuations by adjusting the scale of labor employment and the allocation of current assets.

3. Construction of enterprise asset structure optimization model oriented to macroeconomic fluctuation

Under the complex background of macroeconomic fluctuation, it is very important for enterprises to construct a scientific and reasonable asset structure optimization model for realizing the effective allocation and stable development of resources. The purpose of this model is to provide enterprises with the optimization scheme of asset structure in different economic environments by comprehensively considering various factors. Firstly, the goal of model construction is to maximize the economic benefits and stability of enterprises. Under the influence of macroeconomic fluctuations, enterprises should not only pursue short-term profit growth, but also pay attention to long-term risk resistance. Therefore, the model will be oriented to the improvement of the comprehensive value of enterprises, taking into account the profitability and security of assets. The model construction is based on a series of reasonable assumptions. Assuming that macroeconomic fluctuations are predictable, by analyzing historical data and the current economic situation, we can make a general judgment on the future economic trend. At the same time, it is assumed that the business decision-making of enterprises is rational, aiming at maximizing their own interests, and there are certain constraints in resource acquisition and allocation.

In the method selection, this article uses multi-objective programming algorithm combined with scenario analysis method to build the model. Multi-objective programming algorithm can seek the optimal balance between multiple conflicting objectives. For the optimization of enterprise asset structure, there are many goals that need to be considered at the same time, such as maximizing the return of assets, minimizing risks and maintaining liquidity at a reasonable level. The enterprise asset portfolio is set up as follows:

$$X = (x_1, x_2, \cdots, x_n) \quad (1)$$

Where: x_i stands for the allocation ratio of the i asset. The asset return function can be expressed as:

$$R(X) = \sum_{i=1}^{n} r_i x_i \quad (2)$$

Where: r_i is the expected rate of return of i-type assets, and this function aims to measure the expected return brought by various asset combinations of enterprises. The risk function adopts the common variance measurement method, which can be expressed as:

$$\sigma^2(X) = \sum_{i=1}^{n} \sum_{j=1}^{n} x_i x_j \, \sigma_{ij} \quad (3)$$

Where: σ_{ij} is the covariance of the return on assets of assets i and j. This function is used to evaluate the risk level of portfolio. Liquidity function assumes that the liquidity of enterprise assets is related to the time and cost of realizing assets, and l_i is the liquidity coefficient of i assets, so the liquidity function can be written as:

$$L(X) = \sum_{i=1}^{n} l_i x_i \quad (4)$$

This function reflects the liquidity of enterprise assets. Through the multi-objective programming algorithm, these objectives can be transformed into mathematical functions, and the optimal solution or non-inferior solution set can be solved under certain constraints, providing enterprises with a variety of feasible asset allocation schemes.

Scenario analysis method is used to simulate different macroeconomic fluctuation scenarios. Macroeconomic fluctuations are uncertain, and different economic situations will have different effects on the asset structure of enterprises. By setting a variety of scenarios, such as economic prosperity, steady growth and recession, and assigning corresponding probability p_k and economic parameters to each scenario, we can more comprehensively reflect the impact of macroeconomic fluctuations on the asset structure of enterprises. Assume that under the k macroeconomic scenario, the total amount of funds faced by enterprises is C_k, the debt ratio is d_k, and the lower limit of fixed assets investment is $f_{min,k}$. The total amount of funds constraint can be expressed as:

$$\sum_{i=1}^{n} p_i x_i \leq C_k \quad (5)$$

Where: p_i is the price of the i asset. The debt ratio limit constraint is:

$$\frac{\sum_{j=1}^{m} d_j}{\sum_{i=1}^{n} p_i x_i} \leq d_k \quad (6)$$

Here d_j is the j liability of the enterprise. The lower bound of fixed assets investment is:

$$\sum_{s \in S} x_s \geq f_{min,k} \quad (7)$$

Where: S is the set of fixed asset categories. The multi-objective programming algorithm is used to solve the problem in different scenarios, that is, the objective function is optimized under the above constraints, and the optimal asset allocation strategy of the enterprise in various possible economic environments is obtained.

The model construction specifically includes the setting of objective function and constraint conditions. By combining multi-objective programming algorithm with scenario analysis, the objective function is solved under various constraints, so as to construct an enterprise asset structure optimization model facing macroeconomic fluctuations. This model can help enterprises to work out a scientific and reasonable asset structure optimization scheme based on their own actual situation and the judgment of future economic trends in the complex and changeable macroeconomic environment, and enhance their anti-risk ability and market competitiveness.

4. Model simulation and result interpretation

In order to verify the effectiveness and practicability of the enterprise asset structure optimization model for macroeconomic fluctuations, it is necessary to carry out simulation experiments on the model and deeply interpret the results. In this simulation experiment,

professional economic simulation software is selected to set a variety of macroeconomic fluctuation scenarios, including three typical situations: economic prosperity, moderate growth and recession. In each scenario, different macroeconomic indicators are set, such as GDP growth rate, interest rate and inflation rate. According to the enterprise itself, the parameters such as total assets and initial asset structure are set to ensure that the simulation experiment can comprehensively simulate the operation of the enterprise in the actual economic environment.

In the simulation process, the asset structure adjustment strategy is generated for the enterprise according to the optimized model, and the key index data is recorded. Taking a virtual manufacturing enterprise as an example, the simulation results are displayed. Under different macroeconomic scenarios, the enterprise's asset allocation ratio, income level, risk degree and other indicators show obvious differences. Figure 1 shows the dynamic changes in the allocation ratio of fixed assets to current assets of enterprises under different macroeconomic scenarios. It can be clearly seen from the figure that when the economy is prosperous, enterprises tend to increase investment in fixed assets to expand production scale and obtain higher income; During the economic recession, enterprises drastically cut fixed assets, increase current assets, improve asset liquidity and avoid risks.
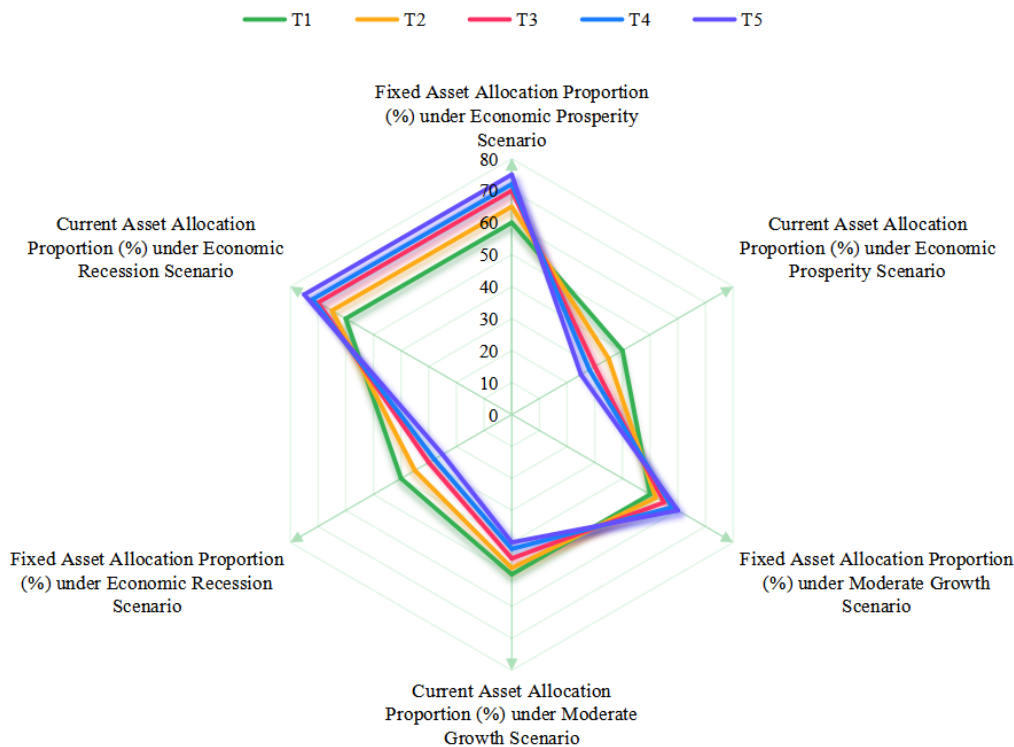

Figure 1 Dynamic diagram of enterprise asset allocation ratio under different macroeconomic scenarios

The performance of the model is quantitatively evaluated by Table 1. The table records the key indicators such as expected income, risk coefficient and asset structure adjustment cost of enterprises under different scenarios. Taking the economic prosperity scenario as an example, after the enterprise adjusts the asset structure according to the model, the expected income reaches 15 million yuan, the risk coefficient is controlled at around 0.3, and the cost of asset structure adjustment is 2 million yuan. Under the moderate growth scenario, the expected income is 10 million yuan, the risk coefficient is 0.25, and the adjustment cost is 1.5 million yuan. In the economic recession scenario, the expected income drops to 5 million yuan, the risk coefficient is 0.18, and the adjustment cost is 1 million yuan.

Through the analysis of the data in Table 1, it can be seen that the model can provide relatively reasonable asset structure adjustment strategies for enterprises under different macroeconomic scenarios. When the economy is prosperous, although the risk coefficient is relatively high, the expected income is considerable, and enterprises can obtain high returns by expanding investment.

During the economic recession, the model guides enterprises to reduce risks. Although the income is reduced, it effectively controls risks and ensures the survival of enterprises. The cost of asset structure adjustment is also within the acceptable range, indicating that the model has practical application value. Comprehensive simulation results and model performance evaluation show that the optimization model can better adapt to macroeconomic fluctuations, provide scientific and effective asset structure optimization suggestions for enterprises, and help enterprises make reasonable decisions in a complex and changeable economic environment to achieve steady development.

Table 1 Performance evaluation table of enterprise asset structure optimization model under different macroeconomic scenarios

Macroeconomic scenario	Expected income (ten thousand yuan)	Risk factor	Cost of asset structure adjustment (ten thousand yuan)
Economic prosperity	1500	0.3	200
Moderate growth	1000	0.25	150
Economic recession	500	0.18	100

5. Conclusions

The optimization model of enterprise asset structure oriented to macroeconomic fluctuation constructed in this article is verified by simulation experiments, which shows good practicability and effectiveness. Under different macroeconomic scenarios, the model provides scientific and reasonable strategies for enterprise asset structure adjustment.

In the stage of economic prosperity, enterprises increase their investment in fixed assets according to the model, and the allocation ratio of fixed assets is as high as 75%, and the expected return is significantly increased to 15 million yuan. Although it is accompanied by a risk coefficient of about 0.3, the higher return meets the expansion needs of enterprises. In the moderate growth stage, the allocation of fixed assets and current assets is more balanced, and enterprises can maintain a relatively stable operating state. During the economic recession, enterprises drastically reduced their fixed assets to 25% and increased their current assets to improve their liquidity. The expected income dropped to 5 million yuan, and the risk coefficient was also reduced to 0.18, effectively avoiding the downside risks of the economy.

On the whole, the model comprehensively considers the impact of macroeconomic fluctuations on the asset structure of enterprises through quantitative analysis and multi-scenario simulation, and successfully helps enterprises to optimize their asset structure in a complex economic environment. However, some complex economic factors were simplified in the process of model construction. Future research can consider including more complex variables to further improve the accuracy of the model and provide more forward-looking and accurate decision support for enterprises to cope with macroeconomic fluctuations.

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