

# Research and Application on the Prosperity Index Model for Chinese Private Enterprises

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**Abstract.** This article aims to construct a private enterprise prosperity index model, and use quantitative research methods to conduct empirical analysis on the development of private enterprises. China is accelerating the construction of a unified national market. Taking Yiwu private enterprises and commodity market as templates to construct the prosperity index of private enterprises, can help us to conduct more accurate research and prediction of the development of private enterprises, which is of positive significance for promoting a new development pattern. Yiwu Private Enterprise Prosperity Index consists of four sub-indices: Enterprise Operating Index, Enterprise Developing Index, Enterprise Confidence Index, and Market Circumstance Index. The model includes a total of 27 specific indicators, covering data from various fields such as macroeconomics, corporate finance, financial system, and market supervision.

**Keywords:** Private enterprises; Prosperity index; Model; Quantitative analysis.

## 1 Introduction

The development of private enterprises is of great significance to China's reform and opening up. In 2023, the added value achieved by private enterprises is 38.5 trillion yuan, accounting for 60.5% of GDP (Gross domestic product). The development of private enterprises not only plays an important role in economic growth, but also is of great significance to economic reform. At present, China is focusing on accelerating the construction of a unified national market, promoting the domestic circulation and the domestic-international dual circulation, promoting a more free flow of factor resources, and then fully releasing the potential of economic development.

In this context, it is of great value to study the development of private enterprises and commodity markets in Yiwu. Since the reform and opening up, Yiwu small commodity market was playing an important position in the country. Until nowadays, its level of prosperity remains an important position for judging the macroeconomic development trend. Yiwu private enterprises has established a close relationship in many key links with Yiwu commodity market, including commodity production, logistics, sales, export and so on. On one hand, the development of Yiwu private enterprises laid industrial foundation for the prosperity of the commodity market. And on the other hand, the key position of Yiwu commodity market made the development process of Yiwu private enterprises has typical significance nationwide.

Internationally, the research that can benchmark against China's private enterprises and small commodity markets includes a series of theories, such as new industrial space. Piore and Sabel use the concept of elastic specialization to explain the industrial development model based on the spatial agglomeration of specialized, technologically advanced small and medium-sized enterprises [1]. Scott proposed the new industrial space [2]. Porter proposed the concept of industrial cluster [3], which can interpret the spatial agglomeration of manufacturing enterprises. Cooke proposed the concept of regional innovation systems [4]. Amin and Thrift proposed the concept of institutional thickness [5]. In the domestic academic field, the research mainly focuses on the qualitative research of transformation and upgrading. Shi pointed out that it is important for enterprises to have economies of scale on the trading market [6]. The internal and external factors that promote the upgrading of private enterprises in Yiwu were further researched [7-10].

There are rich researches on the development of private enterprises in Yiwu, but there are still shortcomings, mainly including the lack of quantitative research, the lack of framing and analyzing data in the form of indicators. This research gap results in a lack of precise expectations for the development trend of private enterprises, as well as the lack of sufficient, convincing policy suggestions.

The research method of prosperity index has been widely introduced into economic research. For example, employment prosperity index is used to reflect the current situation and trend of employment, and can comprehensively reflect the macroeconomic operation and social harmony [11]. Prosperity index collects various relevant indicators of the research object through the prosperity survey and is generally compiled using the growth rate cycle method.

Based on the research project of Yiwu private enterprise prosperity index conducted by Yiwu Administration for Industry and Commerce and China Credit Research Center of Peking University, this paper tries to construct a set of Yiwu private enterprise prosperity index model, and uses the quantitative research method of prosperity index to systematically, quantitatively and long-term to track the development of Yiwu private enterprises, so as to summarize the development trend and patterns of Yiwu private enterprises in a period of time.

## **2 Research method**

### **2.1 Construction of Yiwu private enterprise prosperity index model**

Yiwu private enterprise prosperity index system is composed of four sub-indices, including enterprise operating index, enterprise developing index, enterprise confidence index, and market circumstance index, which measures the development of enterprises from the current situation of operation, the growth prospects, the confidence of business and the market circumstance in which the enterprise is located. Each sub-indices selects a number of core indicators that reflect the conditions of enterprises and the market. The indicator system includes a total of 27 items, covering macroeconomic indicators, corporate financial indicators, financial system indicators, market supervision indicators and other aspects.

Specifically, enterprise operating index includes the gross domestic product, self-operated exports, the amount of bank acceptance bills issued, the sales profit, the increase or decrease in the number of workers, the change in the gross profit margin of the enterprise, electricity

consumption, the year-on-year change in accounts receivable, and the operating cost. The enterprise developing index includes the number of new registrations of enterprises, the amount of new registered capital of enterprises, the bank loan balances, the expected sales orders for the next quarter, the increase in fixed assets, the number of deregistration of business cases, and the non-performing loan ratio. The enterprise confidence index includes the short-term business confidence, the long-term business confidence, the small commodity prosperity index, the investment in intellectual property rights, and the investment in R&D or innovation. The market circumstance index includes indicators such as the small commodities market trading volumes, the number of foreign enterprises Yiwu offices, the added number of locally registered trademarks, the added number of locally registered patents, the credit index, and the number of intellectual property infringement cases.

The data sources are official government departments and enterprise survey questionnaires. The weights of each indicator and sub-indices are given in Table 1.

**Table 1.** Yiwu private enterprise prosperity index system.

Index	Sym bol	Wei ght	Sym bol	Data source
1 Enterprise operating index	$A$	0.35	$\alpha$	
1.1 Gross domestic product	$A_1$	0.25	$\alpha_1$	Yiwu Bureau of Statistics
1.2 Self-operated exports	$A_2$	0.15	$\alpha_2$	Yiwu Foreign Trade and Economic Cooperation Bureau
1.3 The amount of bank acceptance bills issued	$A_3$	0.05	$\alpha_3$	Yiwu Banking Regulatory Bureau
1.4 Sales profit	$A_4$	0.20	$\alpha_4$	Enterprise Questionnaires
1.5 Increase or decrease in the number of workers	$A_5$	0.25	$\alpha_5$	Enterprise Questionnaires
1.6 Change in the gross profit margin	$A_6$	0.15	$\alpha_6$	Enterprise Questionnaires
1.7 Electricity consumption	$A_7$	0.15	$\alpha_7$	Yiwu Bureau of Statistics
1.8 Year-on-year change in accounts receivable	$A_8$	-0.15	$\alpha_8$	Enterprise Questionnaires
1.9 Operating costs	$A_9$	-0.05	$\alpha_9$	Enterprise Questionnaires
2 Enterprise development index	$B$	0.30	$\beta$	
2.1 The number of new registrations of enterprises	$B_1$	0.30	$\beta_1$	Yiwu Administration for Industry and Commerce
2.2 The amount of new registered capital	$B_2$	0.15	$\beta_2$	Yiwu Administration for Industry and Commerce
2.3 Bank loan balances	$B_3$	0.20	$\beta_3$	Yiwu Banking Regulatory Bureau
2.4 expected sales orders for the next quarter	$B_4$	0.25	$\beta_4$	Enterprise Questionnaires
2.5 Increase in fixed assets	$B_5$	0.30	$\beta_5$	Enterprise Questionnaires
2.6 Deregistration of business cases	$B_6$	-0.10	$\beta_6$	Yiwu Administration for Industry and Commerce
2.7 Non-performing loan ratio	$B_7$	-0.10	$\beta_7$	Yiwu Administration for Industry and Commerce
3 Enterprise confidence index	$C$	0.20	$\varepsilon$	
3.1 Short-term business confidence	$C_1$	0.15	$\varepsilon_1$	Enterprise Questionnaires
3.2 Long-term business confidence	$C_2$	0.15	$\varepsilon_2$	Enterprise Questionnaires

3.3 Small Commodity Prosperity Index	$C_3$	0.35	$\varepsilon_3$	Ministry of Commerce
3.4 Investment in intellectual property rights	$C_4$	0.15	$\varepsilon_4$	Enterprise Questionnaires
3.5 Investment in R&D or innovation	$C_5$	0.20	$\varepsilon_5$	Enterprise Questionnaires
4 Market circumstance index	$D$	0.15	$\varphi$	
4.1 Small commodities market trading volumes	$D_1$	0.30	$\varphi_1$	Yiwu Industrial and Commercial Bureau
4.2 Number of foreign enterprises Yiwu office	$D_2$	0.15	$\varphi_2$	Yiwu Bureau of Statistics
4.3 Added number of locally registered trademarks	$D_3$	0.20	$\varphi_3$	Yiwu Administration for Industry and Commerce
4.4 Added number of locally registered patents	$D_4$	0.20	$\varphi_4$	Yiwu Administration for Industry and Commerce
4.5 Credit index	$D_5$	0.25	$\varphi_5$	Yiwu Administration for Industry and Commerce
4.6 Number of intellectual property infringement cases	$D_6$	-0.10	$\varphi_6$	Yiwu Administration for Industry and Commerce

## 2.2 Model formula

Each indicator of Yiwu private enterprise prosperity index is weighted according to their respective assigned proportion. The weighted average of the indicators yields the four sub-indices. The weighted average of the four sub-indices yields the comprehensive index  $Y$  of the Yiwu Private Enterprise Prosperity Index. The composite index  $Y$  is calculated as follows:

$$Y = \alpha A + \beta B + \varepsilon C + \varphi D = \sum_i^9 \alpha_i A_i + \sum_i^7 \beta_i B_i + \sum_i^5 \varepsilon_i C_i + \sum_i^6 \varphi_i D_i. \quad (1)$$

where,  $A$ ,  $B$ ,  $C$  and  $D$  represent the four sub-indices, and  $\alpha$ ,  $\beta$ ,  $\varepsilon$  and  $\varphi$  represent the weight of each indicator and sub-indices.

## 2.3 Data quality control

The data required for Yiwu private enterprise prosperity index comes from official government statistics and enterprise questionnaire surveys. This research usually verifies the data based on its actual situation. Firstly, mean method, median method, and regression models are used to estimate the missing data. Secondly, two methods are used for data outliers. One method is excluding data outliers, the deviation from the normal data filtering, to reach the desired data results. The other method is using appropriate statistical methods to handle the outlier, such as using robust statistical methods or conducting non parametric statistical analysis to adjust the data in order to meet the requirement of accuracy and integrity of data.

## 3 Results

Yiwu private enterprise prosperity index is based on 2010Q2, that is, the index is 100 in 2010Q2, and the index of each subsequent quarter is compared with the base period. Generally speaking, the Enterprise Prosperity Index closes between 0 and 200. The index is in a “declining” level with closing below 70, a “concern” level between 70 and 90, a “normal”

level between 90 and 110, a “prosperity” level between 110 and 130, and an “overheating” level above 130.

### 3.1 Trend of Yiwu private enterprise prosperity index

This part uses Yiwu private enterprise prosperity index model to study the development trend of Yiwu private enterprises from 2010Q2 to the 2018Q2, and summarizes its development law on this basis.

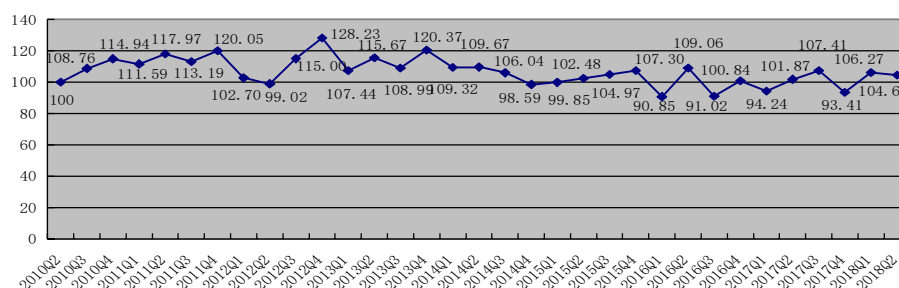


Fig. 1. The trend of Yiwu private enterprise prosperity index.

From the 2010Q2 to 2018Q2, the prosperity index of Yiwu private enterprises generally rose steadily. 2010Q2 was the base period of the index, with the benchmark index at 100, and the business climate index in 2018Q2 was 104.60, up 4.60 basis points from the base period (Figure 1).

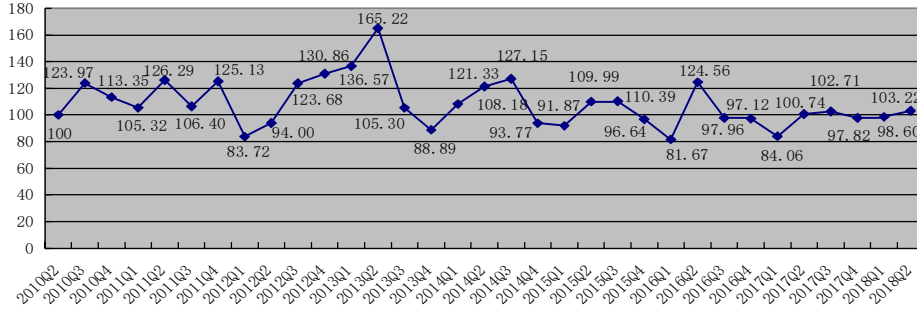
### 3.2 Trends of sub-indices

Yiwu private enterprise operating index showed an overall fluctuating upward trend during the period from 2010 Q2 to 2018Q2, closing at 103.22 in 2018Q2, an increase of 3.22 basis points over the base period. Taking the eight-year observation cycle as the observation period, it can be considered that the operation of Yiwu private enterprises is relatively good (Figure 2a).

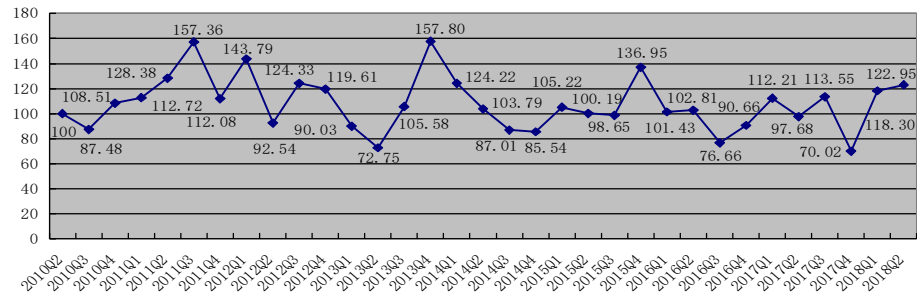
Yiwu private enterprise developing index fluctuated greatly during the period from 2010Q2 to 2018Q2, closing at 122.95 in 2018Q2, an increase of 22.95 basis points over the base period. Taking the eight-year observation period as the observation period, it can be considered that the development potential of Yiwu private enterprises based on the medium and long term is not stable enough (Figure 2b)

Yiwu private enterprise confidence index also fluctuated greatly during the period from 2010Q2 to 2018Q2, closing at 85.39 in 2018Q2, down 14.61 basis points from the base period. Taking the eight-year observation cycle as the observation period, it can be found that Yiwu private enterprises should be paid more attention to the expected stability of the future market and industry development (Figure 2c)

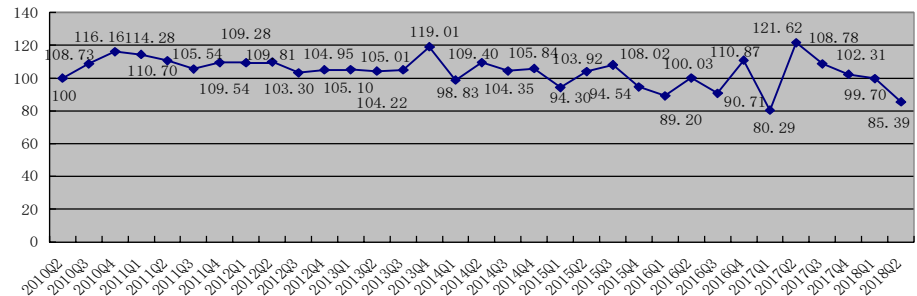
Yiwu private market circumstance index has declined to a certain extent, during the period from 2010Q2 to 2018Q2, closing at 96.72, down 3.28 basis points from the base period. Taking the eight-year observation cycle as the observation period, it can be considered that the stability of the survival and development environment of Yiwu private enterprises needs to be improved (Figure 2d).



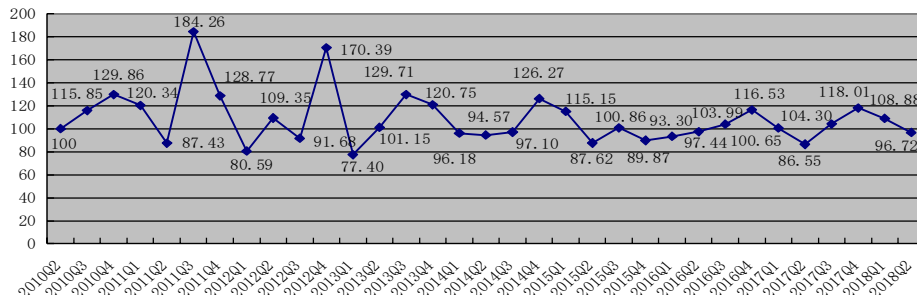
(a) Enterprise operating index



(b) Enterprise developing index



(c) Enterprise confidence index



(d) Market circumstance index

Fig. 2. The trend of Yiwu private enterprise prosperity sub-indices.

## 4 Conclusions

China is strengthening the construction of a unified domestic market. Yiwu private enterprises and commodity market is an important window to observe China's market and the flow of productive factors, and the quantitative research on the development law of Yiwu private enterprises plays an important role in promoting the reform of the domestic market.

Yiwu private enterprise prosperity index model can dynamically reflect the prosperity and development trend of Yiwu private enterprises, providing a set of professional quantitative tools for judging and grasping the market situation of Yiwu. The model, as a research framework, also provide a useful reference for observing and studying the development trend of private enterprises in China, revealing the development law of private enterprises, and providing reference for enterprise operation and government decision-making, so as to promote the further development of China's private enterprises, and fully release the potential of economic development.

In the future, this index model should be further supplemented and improved. Firstly, introduce new indicators into the model. It mainly includes three aspects: adding indicators of environmental protection, such as carbon peak and carbon neutrality indicators, adding the indicators of information, which is a new kind of productive resource , and adding indicators that reflect the development of high-level original brands and capabilities of scientific and technological innovation, and appropriately increasing the proportion of these indicators. Second, this research will expand the application regions of this index model, such as Shenzhen, Wuhan, Chengdu and so on, and conduct comparative research on the eastern, central, and western regions, so as to provide more detailed references for policies.

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