

# Research on Tax System Arrangement under Supply-side Structural Reform

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**Abstract.** China proposes that supply-side structural reforms should be carried out in the context of serious contradictions and problems such as overcapacity and serious contradictions of upgrading of demand structure, and insufficient inner motivation for economic growth. From the perspective of short-term supply and demand management and long-term supply and demand management, this paper analyses the theoretical basis of taxation system arrangement under supply-side structural reform, construct the method of assessing the impact of taxation system under supply-side structural reform. From the perspective of supply-side structural reform and the construction of innovative taxation governance system, this paper puts forward policy suggestions on tax system arrangement under supply-side structural reform.

## Theoretical Basis of Taxation System Arrangement under Supply-side Structural Reform

Say's law: In 1803, French economist J.B.Say proposed that in the two exchange modes of exchanging product for money and money for products, the role of money is only momentary. After the transaction, the transaction is to exchange one kind of goods for another kind of goods. For either the seller or the buyer, supply creates demand.

Keynesian law: In the 1930s, the Great Depression broke out in the major capitalist countries of the world, the phenomenon that supply could not create demand on its own was gradually emerging. Keynes believes that under the combined influence of diminishing marginal propensity to consume, diminishing marginal efficiency of capital and rising interest rates caused by liquidity preference, aggregate demand will be insufficient and the economy will decline. He also believes that in response to the economic recession, governments should manage aggregate demand, and conduct expansionary fiscal and monetary policies to stimulate aggregate demand.

Theory of Supply-side Economics: In the early 1970s, stagflation generally occurred in developed capitalist countries. On the one hand, economic development stagnated, while on the other hand, prices were rising continually. The usual demand management tools of governments have encountered an unprecedented dilemma, at that time, supply-side economics proposed their theory. Supply-side economics believe that the lack of supply is caused by excessive intervention of governments in economy and excessive tax burden. Therefore, in order to cope with stagflation, it is necessary to replace demand management with supply management, and to stimulate aggregate supply by reducing intervention of governments in the economy and drastically reducing tax burden.

## Method Choice for Evaluating the Influencing Factors of Taxation System under Supply-side Structural Reform

### Research Methods

Analytic Hierarchy Process (AHP) is a hierarchical weight decision analysis method proposed by Thomas L. Saaty, US operational research expert and professor at University of Pittsburgh (Thomas

L. Saaty, 1980). This is a decision-making method that can simplify complex decision-making problems with no structural characteristics and many constraints on objectives and criteria. Based on in-depth analysis of internal relation and influencing factors of complex decision-making problems, according to a small amount of quantitative information, this method mathematicizes the decision-making process. The steps to determine the weight of indicators by using AHP method are as follows:

### ***Construct a Recursive Hierarchical Structure Model***

Firstly, divide the factors affecting the final evaluation problem into different levels, the indicators at the same level are independent of each other, they are dominated by indicators of the upper level and dominate indicators of the next level at the same time, form a recursive hierarchical structure model, as shown in Table 1.

Table 1, Recursive hierarchy structure model

$\mu_1$	$\mu_2$	$\mu_3$	...	$\mu_m$
$\mu_{11}$	$\mu_{12}$	$\mu_{13}$	...	$\mu_{1m}$
$\mu_{21}$	$\mu_{22}$	$\mu_{23}$	...	$\mu_{2m}$
...	...	...	...	...
$\mu_{n1}$	$\mu_{n3}$	$\mu_{n3}$	...	$\mu_{nm}$

### ***Construct a Judgment Matrix***

Judgment matrix is a pairwise comparison of the importance of the indicators, adopts "1-9" scale table. The recursive hierarchical structure model is determined, the affiliation between the indicators is also determined. For the multiple indicators of the same level, by comparing and analyzing the the importance of pairwise, obtain a comparison judgment matrix  $A=\{a_{ij}\}$  satisfying the following conditions, as shown in Table 2.

Table 2, Scale of judgment matrix

Scale	meaning
1	means that two factors are of equal importance
3	means one factor is slightly more important than the other factor
5	means that one factor is more important than the other factor
7	means that one factor is obviously important to the other factor
9	means that one factor is absolutely important to the other factor
2,4,6,8	is the median of the above adjacent scales
Reciprocal	Comparison of the importance of the exchange order of the corresponding two factors

### ***Calculate the Weights of Indicators at All Levels***

According to the judgment matrix, the steps for calculating the weights of indicators at all level are as follows:

Calculate the product  $M_i$  of each row element of the judgment matrix:

$$M_i = \prod_{j=1}^n b_{ij}, i=1, 2, 3, \dots, n \quad (1)$$

Calculate n-th root of  $M_i$ :

$$\overline{W}_i = \sqrt[n]{M_i}, i = 1, 2, 3, \dots, n. \quad n \text{ is the order of the matrix} \quad (2)$$

Pair vector

$$\overline{W} = (\overline{W}_1, \overline{W}_2, \dots, \overline{W}_n)^T \quad (3)$$

Make normalization, calculation is as follows:  $W_i$  is the weight of each indicator

### Calculate the Maximum Eigenvalue of the Judgment Matrix

$$\lambda_{\max} = \sum_{i=1}^n \frac{(A \cdot W)_i}{n \cdot W_i}, \text{ in the formula:}$$

$$A \cdot W = \begin{bmatrix} a_{11} & a_{12} & \cdots & a_{1n} \\ a_{21} & a_{22} & \cdots & a_{2n} \\ \vdots & \vdots & \cdots & \vdots \\ a_{n1} & a_{n2} & \cdots & a_{nn} \end{bmatrix} \cdot \begin{bmatrix} W_1 \\ W_2 \\ \vdots \\ W_n \end{bmatrix}$$

$$(A \cdot W)_i = a_{i1} \cdot W_1 + a_{i2} \cdot W_2 + \dots + a_{in} \cdot W_n \quad (4)$$

### Consistency Check

Consistency is an important indicator to evaluate whether the score is reasonable. The purpose of consistency check on the evaluation result of the judgment matrix is to measure the validity of the hierarchical order. Because the judgment matrix is quantified by relevant scholars and experts based on their subjective experience, it is impossible to be completely consistent, T.L.Saaty proposed that making judgment by determining the value of C•R, the random consistency ratio (Thomas L. Saaty, 1980). C•R is calculated as: C•R=C•I/R•I. When C•R is less than 0.1, it means that the judgment result of the comparison matrix can be accepted, and the consistency is satisfied. R•I is the average random consistency indicator, which is related to the order n of the judgment matrix.

First, calculate the consistency indicator C•I:  $C \cdot I = (\lambda_{\max} - n) / (n - 1)$ . and  $\lambda = \frac{1}{n} \sum_{i=1}^n \frac{(A \cdot W)_i}{W_i}$  A: the known judgment matrix; n: order of judgment matrix;  $W_i$ : relative weight column vector.

Secondly, check R•I, which is the average consistency index of the same order matrix.

Finally, calculate the consistency ratio C•R. C•R is equal to C•I/R•I, when C•R is equal to 0, A has complete consistency. When C•R is less than 0.1, A has satisfying consistency. When C•R is greater than or equal to 0.1, A has unsatisfactory consistency and should be adjusted or discarded.

R•I, the average consistency index of the same order matrix, is shown in Table 3.

Table 3, Average random consistency indicator

Order n	1	2	3	4	5	6	7	8	9
R <sub>1</sub>	0	0	0.58	0.90	1.12	1.24	1.32	1.41	1.45

Analytic Hierarchy Process (AHP) was proposed by Satty (T.L.Saaty) in the early 1970s, which is an American operational research expert and professor at University of Pittsburgh. As a method of combining quantitative analysis with qualitative analysis, it is widely used in economic management activities. The AHP method is used to obtain a judgment matrix by expert scoring, which is used to evaluate and judge the importance of each index to the index of the upper level criterion. The

following data is obtained by inviting about 30 experts including leaders of government departments and academic experts, and inviting them to use the AHP method and combine the importance of indicators to evaluate the influencing factors of taxation system under supply-side structural reform. In the following, A-B matrix uses AHP method to calculate the index weight.

### Establishment of Evaluation Indicators

#### *Constructing the Judgment Matrix of Relative Importance of Each Indicator to the Influencing Factors of Taxation System Under Supply-side Structural Reform*

Table 4, Judgment matrix indicator weight evaluation table

influencing factors of taxation system A	Capital Factor B <sub>11</sub>	Labor Factor B <sub>12</sub>	Technical Factor B <sub>13</sub>
Capital Factor B <sub>11</sub>	1	7	2
Labor factor B <sub>12</sub>	1/7	1	1/5
Technical factor B <sub>13</sub>	1/2	5	1

#### *Calculate the Judgment Matrix*

The product  $M_i$  of each row of the matrix, then open the  $n$ th power of  $M_i$ , and obtain the  $n$ -th root  $\bar{W}_i$

$$\sqrt[3]{1 \times 7 \times 2} = 2.41 \quad \sqrt[3]{\frac{1}{7} \times 1 \times \frac{1}{5}} = 0.3 \quad \sqrt[3]{\frac{1}{2} \times 5 \times 1} = 1.36 \quad (5)$$

#### *Indicator Weights*

Normalize the vector  $\bar{W}$ , then obtain the eigenvector  $W$ , which is the index weight

$$\left[ \frac{2.41}{2.41 + 0.3 + 1.36} \quad \frac{0.3}{2.41 + 0.3 + 1.36} \quad \frac{1.36}{2.41 + 0.3 + 1.36} \right] = [0.6 \quad 0.07 \quad 0.33] \quad (6)$$

#### *Consistency Check*

The process of estimating the consistency of the judgment matrix is as follows:

Use the vector  $W$  to multiply the transpose matrix of the judgment matrix to get a new vector:

$$[0.6 \quad 0.07 \quad 0.33] \begin{bmatrix} 1 & \frac{1}{7} & \frac{1}{2} \\ 7 & 1 & 5 \\ 2 & \frac{1}{5} & 1 \end{bmatrix} = [1.75 \quad 0.22 \quad 0.98] \quad (7)$$

The corresponding components of the new vector are divided by each of the vectors  $W$  in turn, then obtain another vector:

$$\left[ \frac{1.75}{0.6} \quad \frac{0.22}{0.07} \quad \frac{0.98}{0.33} \right] = [2.92 \quad 3.12 \quad 2.95] \quad (8)$$

By summing the components of this vector and dividing by the number of components, then obtain an approximation of the maximum eigenvalue  $\lambda_{\max}$ :

$$\lambda_{\max} = \frac{(2.92 + 3.12 + 2.95)}{3} = 3.01 \quad (9)$$

Calculate the consistency indicator CI:

Calculated by Equation 3,

$$CI = \frac{\lambda_{\max} - n}{n - 1} = \frac{3.01 - 3}{3 - 1} = 0.005 \quad (10)$$

Calculate the random consistency ratio CR:

Calculated by Equation 4,

$$CR = \frac{CI}{RI} = \frac{0.005}{0.52} = 0.009 \quad (11)$$

### Analysis and Conclusion

The consistency judgment of matrix is performed. Due to  $CR=0.009<0.1$ , the judgment matrix in Table 1 can be considered to have satisfactory consistency. Therefore, the eigenvector of the AB matrix is obtained as: [0.6 0.07 0.33]. The index weight of capital factor  $B_1$  relative to the influencing factor A of taxation system under supply-side structural reform is 0.6; the index weight of labor factor  $B_2$  relative to the influencing factor A of taxation system under supply-side structural reform is 0.07; the index weight of technical factor  $B_3$  relative to the influencing factor A of taxation system under supply-side structural reform is 0.33.

Using the AHP method to obtain the judgment matrix by expert scoring, it can be seen that the capital factor indicator is the most important indicator relative to the influencing factors of taxation system under supply-side structural reform. Therefore, the reform of capital factors is particularly important, including the reform of resource tax system, the reduction of the proportion of turnover taxes, and the reform of fees.

## Policy Recommendations for Taxation System Arrangement Under the Supply-side Structural Reform

### Taxation System Reform from the Perspective of Supply-side Structural Reform

#### *From the Perspective of Labor Force, Gradually Implement Personal Income Tax System Combining the Combination of Comprehensive Collection and Classified Collection*

At present, China's collection model of personal income tax for individuals is levied on the basis of income taxation, ignoring the difference in the specific payment ability of different taxpayers, while the comprehensive collection model can fully consider the individual's tax burden level and can better promote fairness in income distribution. However, the comprehensive collection model has higher requires higher ability of tax collection and management, and the design of the current tax system is mainly adapted to the needs of corporate income tax collection and management, and it is still difficult to meet the needs of taxation for individuals and families. Therefore, it is considered that there is no conditions for the complete implementation of comprehensive collection at present. At present, China began to implement personal income tax system combining the combination of comprehensive collection and classified collection in 2019.

#### *From the Perspective of Capital, Promote Capital Optimization and Promote Supply-side Structural Reform*

The tax cost of enterprises should be reduced by reducing the proportion of turnover tax. In the structure of tax source, the ratio of income tax should be increased. The distinctive feature of income tax is that it is collected according to the income of enterprise, which can better reflect the tax fairness

and is more conducive to promoting capital optimization. Reducing the proportion of turnover tax will help companies fully participate in market competition. Based on the principle of tax shifting, the tax burden of commodities, goods and services will be transferred from upstream enterprises to downstream enterprises and finally transferred to consumers. From the perspective of reducing the turnover tax, the prices of commodities, goods and services are reduced, and production costs are reduced.

### ***From the Perspective of Technology, Increase Tax Incentives and Promote Enterprise Innovation and Development***

Small and medium-sized enterprises (SMEs) are important force to promote sustainable development of China's economy, and technological innovation is the key to promote supply-side structural reform. Therefore, by providing greater tax incentives for small and medium-sized technological innovative enterprises, technology-based SMEs can obtain greater tax incentives, we can create more relaxed economic environment for technology-based SMEs, and make technology-based SMEs more focused on technical research and development, stimulate SMEs to technically improve total factor productivity, and promote the changes of supply-side structural reforms and economic structure. First, we increase the R&D expenses plus deduction ratio of technology-based SMEs, tax returns or carry-forward are allowed for underdeductible portion. Secondly, the investment losses of technology-based SMEs are allowed to be deducted. Finally, we establish implementation rules for innovative tax incentives, strengthen implementation capacity of policies, and gradually improve regular assessment mechanism of policies.

### **Constructing an Innovative Tax Governance System**

#### ***Strengthen Reform and Management of Tax Collection, and Serve Supply-side Structural Reform***

Tax authorities have broad space for tax collection and management reform and services. Deepen the reform of the administrative examination and approval system, reduce administrative examination and approval matters, clean up administrative power matters and responsibilities, enhance the transparency of tax enforcement; optimize taxation services, further improve the "one-stop" tax service model, and implement a general system for handling tax matters within the province; simplify the number of tax payment, reduce the burden on taxpayers; implement specialized services for key enterprises for serve "going out" enterprises, sort out overseas tax risks, and strengthen tax disputes, tax coordination and other issues, from the perspective of management service improvement, bring new impetus to supply-side structural reform.

#### ***Use "Internet +" to Promote the Transformation of Information Management Tax to Big Data Taxation***

Promote the transformation of information management tax to big data taxation. Make full use of the advantages of big data and cloud computing, and explore tax-related information through multiple channels, truly realize the value-added value of data.

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## References

- [1] Li Chong. On the theoretical basis and policy choice of supply-side reform [J]. *Comparative Economic and Social Systems*, 2016, 01:10-12.
- [2] Feng Zhifeng. Theoretical logic and implementation path of supply-side structural reform [J]. *Economic Issues*, 2016, 02: 12-17.
- [3] Ma Haitao, Duan Qi. Reconstruction of Tax System under the Background of "Supply Side" Fiscal Reform——Based on the Angle of Relative Relationship between Direct Tax and Indirect Tax[J]. *Journal of Suzhou University, Philosophy and Social Sciences*, 2016, 03: 106-109.
- [4] Niu Li, Liu Qun, Wang Chuancheng. International Reference Research on Tax Promoting Supply-side Structural Reform [J]. *Tianjin Economy*, 2016, 09: 47-49.
- [5] Mo Fei. Interpretation of Tax System Reform from the Perspective of Supply Side——Reform of Tax System Based on the 13th Five-Year Plan [J]. *Development Research*, 2016. 05: 63-66.