

# **An Analysis of the Impact of the Reform of Business Tax to VAT in Transportation Industry & A Case of Inner Mongolia**

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**Abstract.** By analyzing the economic effect and its mechanism of the reform of business tax to VAT on transportation industry in Inner Mongolia, we built the VAT-CGE model, and analyzed the impact of different tax rates and different forms of value added tax policy on the Inner Mongolia economy. The results showed that, if the transportation and warehousing tax rates are set to 11% and 6% respectively, the fixed asset investment is allowed to be deductible. Tax revenue will be reduced in Inner Mongolia, but the actual GDP will increase by 5.494% , the employment rate of the transport sector will raise 9.264%, the welfare of the residents will also added. So the “business tax to VAT” of transportation industry helps to optimize the investment structure of fixed assets in each industry and accelerate industrial transformation and upgrading.

## **Introduction**

Transportation industry is the key to the effective operation of the national economy. It is considered a way to increase profits [1]. The shortcomings of the business tax is double taxation, the input tax is not deductible, which restrict the development of modern transportation. Therefore, the transportation industry carry out “business tax to VAT” is necessary.

At present, the transformation of VAT has become the highlight of structural tax reductions. Many domestic and foreign scholars are keen to study the impact of business tax to value-added tax on China's economy. Joseph A Pechman (1987) believes that the VAT reform can solve some problems, such as the repeated levy of wholesale tax and turnover tax [2]; Liqin Li (2012) proposed to use the transfer payment system to compensate for the loss of local government interests and so on [3]. Most of the researches are based on the industry of the developed areas, such as Shanghai. However, transport industry of the Inner Mongolia region is still in the primary stage, the logistics cost is higher, technical level of production equipment is backward. It is difficult to analyze influences of VAT reform on local economy based on the results of developed areas. Therefore, the transportation industry as the research object of VAT, take the Inner Mongolia Autonomous Region as an example, the VAT-CGE model was constructed , and analysis the impact of the VAT broadening on the economy of Inner Mongolia area.

## **The mechanism of business tax to VAT on the economy of Inner Mongolia**

VAT reform is the highlight of China's structural tax reductions, the goal of the reform is broaden the scope of VAT tax base, reduce the tax burden on taxpayers [4]. The positive effect of the VAT reflected that VAT solved the problem of double taxation of goods and services in the business tax [5].

Industrial structure. VAT as the off-price tax, it just to levy intermediate links of value-added part

of the tax, VAT can eliminate the business tax double taxation problem. Transportation industry as the intermediate link of the whole industrial chain, VAT reform can make its the input tax of relevant upstream and downstream industries reduction, It can also strengthen the upstream service industry and downstream manufacturing industry, and realize the externalizes of the production service industry, achieve the optimization of its industrial structure.

**Resident Welfare.** The VAT taxpayer is the production operator, but the real taxpayer is the consumer. In theory , VAT is tax on the value added part of the intermediate links. Therefore, " business tax to VAT" on the basis of the elimination of repeated taxation, with the price transmission mechanism to reduce the residents' tax burden, increases household disposable income; the welfare level of the residents can be improved.

**Sector output.** VAT as an indirect tax, the reform of VAT is bound to impact on the production decision of the VAT payers. Due to the implementation of transportation " business tax to VAT" reduce transport costs of the related industries, encourage enterprises to reduce the cost of production, stimulate the increase of the industry department in investment and output.

**Sector employment.** The VAT replace the double taxation of business tax, reduce the tax burden on goods and services in all sectors of the industry, achieve the most fundamental objectives of the sector to reduce the cost of production, stimulate the industrial sector continued to expand output; And then increase the new labor demand, create new social employment opportunities, ultimately improve the level of employment rate.

### **Construction of VAT-CGE model in Inner Mongolia**

The VAT-CGE model consists of 6 modules. The basic structure of the CGE model and the standard equations are similar to the structural modeling of the Pang Jun (2005). Specific equations are as follows:

$$\text{VAT}(a) = \tau_{\text{vat}}(a) * \text{PKL}(a) * \text{QKL}(a) - 0.01 * \text{PKD}(a) * \text{DK}(a) \quad (1)$$

Business tax as the tax with the price, the tax basis is according to the full levy of the collection object value.

$$\text{VAT}(a) = \text{vatrp}(a) * \text{adjfactor}(a) * (\text{PKL}(a) * \text{QKL}(a) + \text{PINTA}(a) * \text{QINTA}(a)) - \sum(c, \text{vatrpc}(c) * \text{QINT}(c, a) * \text{PC}(c)) - 0.06 * (\text{wkdist}(a) * \text{AWK}) * \text{QKD}(a) \quad (2)$$

Vat as off-price tax, it just to levy intermediate links of value-added part of the business turnover, and intermediate input can be deductible.

VAT-CGE model parameter calibration and Inner Mongolia social accounting matrix (IMSAM). The calibration of CGE model parameters mainly depends on the basic data, namely the social accounting matrix (SAM)[6], thus the establishment of the Inner Mongolia Autonomous Region's macro and micro IMSAM. IMSAM table data comes from the Inner Mongolia Autonomous Region in 2007 input-output table, "Inner Mongolia Statistical Yearbook 2008 ", " China Statistical Yearbook ", China Statistical Yearbook 2008 "and so on.

**Reliability test of model.** Before the operation of GAMS program, this paper carries out 4 tests: Walras test, model sensitivity test, price homogeneity test and model consistency check [7]. Firstly, the sensitivity of the test model is adjusted to the value of the elasticity coefficient, the results show that the model has little change in the simulation results; Secondly, benchmark price variables in the model are multiples of raise, found that the price variable is increased by the same multiple, the rest of the number variables did not change, and ensure that the zero price homogeneous of model price; Finally, the consistency test of the model, using the base year SAM table data to calibrate the parameters of the VAT-CGE model, if the calibration process is correct, the base year solution is the base year SAM. In the process of modeling joined the Walras variables, running after Walras

variable value is equal to zero, pass the Walrasian test. The above tests, we have ensured the correctness and rationality of the model.

### Scenario design

In order to analyze the effects of different tax rates and tax deductible policies on the economy of Inner Mongolia, this paper designs five simulation scenarios:

Scenario one use the principle of the production VAT, tax on the value added part of all goods or services, transport and warehousing tax rates are set to 17%.

Scenario two uses the principle of income tax, allowing the middle input part of the deduction, transportation and warehousing industry tax rates are set to 17%.

Scenario three is reduced VAT rates to 11% and 6% on the basis of scenario two.

The principles of scenario four uses consumption-based VAT, the fixed assets investment allows all deductions, and tax rates were set at 11% and 6%.

Scenario five based on scenario four to further reduce the VAT rate to 6%.

### Simulation result analysis

Tab1.The rate of Value-added tax and business tax changes

		Agriculture	Heavy industry	Light industry	Construction industry	Transportation industry,
Bench mark	Business tax	—	—	—	0.340096	0.309064
	VAT	—	1.183016	0.374208	—	—
Scenario one	Business tax	—	—	—	0.425216	—
	VAT	—	1.170826	0.323215	—	0.821413
Scenario two	Business tax	—	—	—	0.336750	—
	VAT	—	0.732911	0.266485	—	0.824651
Scenario three	Business tax	—	—	—	0.335868	—
	VAT	—	0.936068	0.320240	—	0.466218
Scenario four	Business tax	—	—	—	0.342143	—
	VAT	—	0.582325	0.116049	—	0.329929
Scenario five	Business tax	—	—	—	0.302136	—
	VAT	—	0.665738	0.136839	—	-0.12842

Analysis on the impact of taxation. With the transportation industry VAT rate from 17% down to 6%, the intermediate input and fixed assets input tax deduction mechanism is healthiness. Scene two to five data show that Inner Mongolia region of the business tax and VAT income is reduced. Scenario five and scenario four had the most significant impact on tax revenue, sales tax revenues were down 29.376% and 39.404% respectively, VAT revenues were down 23.671% and 31.159% respectively. Business tax as a local tax, its income paid the local government. Scene two to five, “business tax to

the VAT” and VAT rate reduced, the VAT deduction chain is not healthiness, the revenue of local government is reduce. For scenario one, transportation industry “ business tax to VAT” makes the tax revenue decreased, but the VAT revenue will be increased due to the expansion of the scope of VAT collection. Among them, the business tax was reduced by 3.259 billion, the VAT revenue increased by 0.896 billion.

The impact on GDP. Scenario one, scenario two and scenario five have a negative impact on the actual GDP and the real GDP is compared to the base period were decreased by 6.138%, 1.974% and 3.023%. Scenario three and scenario four make the actual GDP increased by 1.868% and 5.494%. With the VAT rate from 17% down to 11%, intermediate input and fixed assets to expand the scope of deduction, GDP growth tends to rise as a whole. The actual GDP growth can be explained in the following two aspects: the consumption of residents and the driving of the total social investment.

The impact on employment rate. Scenario one and two make the employment rate drop. The reason is that 17% of the VAT rate is higher than business tax rate, the departments of intermediate input and fixed asset investment input tax is not deductible, resulting in the sector reduce production, the labor demand is decreased. Scene fifth employment rate is also reduced, Transportation industry as the intermediate link in the whole industry chain, the low VAT rate caused other industries serious burden, unable to stimulate the development of the regional economy of Inner Mongolia. The scenario three sets a lower VAT rate, lower VAT rate reduce the tax burden of enterprises and the production cost of the various departments, resulting in various departments of labor demand has increased. Scenarios Four results are satisfactory, the employment rate of all sectors are improved, transportation, warehousing, heavy industry employment are increased by 9.264%, 12.209%, 17.363% respectively, coal, petroleum, natural gas and thermal power four energy sector employment rate were increased by 16.499%, 37.907%, 33.342%, 2.229% respectively.

The impact on welfare of the residents. Scenario one and two, the VAT rate is too high and departments input tax is not deductible, increase the production cost of the various departments, inhibited the residents purchasing power, the welfare from urban and rural residents are reduced. Scene three to five, with the reduction of tax rates and the improvement of the deduction mechanism, increases the purchasing power of residents. Scenario four residents welfare gains increased more, urban and rural residents welfare gains were increased by 0.29 billion and 1.04 billion. The reason is that the transportation will promote the development of the upstream and downstream industries, leading to the increase of labor demand.

The impact on sector output . Scenario one and scenario two, the sector VAT rate is too high and input deductible is incomplete, decrease departments production. Scenario three and scenario four VAT rate reduced to a certain degree, input tax deduction mechanism of intermediate input and fixed assets investment is healthiness, the output level of the department gradually rise, especially scenario four. Heavy industry, light industry, service industry and transportation sector output increased by 7.028 billion, 1.411 billion, 1.543 billion and 1.021billion. The influence of the transport industry “business tax to VAT” is weak to agricultural sector, only in the base period level increased by 0.16%, but this reform could improve the Inner Mongolia agricultural products circulation situation. According to the principle of tax optimization, VAT rate is too low will not be able to protect national and local financial revenue, inhibit the development of the regional economy of Inner Mongolia, so scenarios five results show most departments output decreased.

## Conclusions

Impact on taxes. The implementation of the transport industry “business tax to VAT” reduces the tax revenue in Inner Mongolia area. VAT-CGE model only study the VAT rate and VAT deduction scope, and there is not subdivision deductible item and tax burden of each department. But we don't have to put emphasis on the risk of reduction in tax revenues. We should see the neutral tax effect of VAT. Transportation industry " business tax to VAT” still can achieve optimal the investment structure of fixed assets, accelerate industrial transformation and upgrading.

Impact on macroeconomic. Transportation industry " business tax to VAT " caused some negative effects in Inner Mongolia's macroeconomic, but the scenarios four simulation results, along with reduced VAT rates and the input tax deduction mechanism healthiness gradually, the economy of Inner Mongolia is improving.

Impact on sector output. The “business tax to VAT” reduce the transportation cost of related enterprises, part of the input tax are deductible, reduce production costs, increase output. Transportation industry as the intermediate link in the industrial chain, VAT reform can promote upstream heavy industry, light industry, services industry and other departments to expand production, stimulate downstream industries such as coal, petroleum, natural gas and thermal power energy sector to expand production. The implementation of the " business tax to VAT " in the transportation industry will help promote the transformation of the economic development and the adjustment of the industrial structure in Inner Mongolia.

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