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# Cut taxes and fees or subsidize consumption?

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## Contents

## Introduction

- China's economic development faces the triple pressure of demand contraction, supply shock and weakening expectation.
- Starting from 2016, China began to implement large-scale tax and fee reduction policies.
- In response to a sharp drop in consumption due to the COVID-19 pandemic, the government has started issuing consumer coupon.

## Introduction

- Tax and fee reductions are concentrated on the supply side, while consumption coupon are concentrated on the consumption side.
- Under fiscal pressure, large-scale tax and fee reduction policies are unsustainable.
- This paper focuses on whether replacing tax and fee reduction policies with consumption subsidy policies will bring better policy results.

## Introduction

The possible marginal contributions of this paper are as follows:

- Through the simulation analysis of input-output method, this paper compares the influence of the two kinds of policies on output, labor compensation and added value, and provides decision-making reference for the current fiscal policy choice.

## Introduction

- This paper compares and analyzes the policy effects of the two kinds of policies in different industries to provide reference for the precise implementation of proactive fiscal policies in different industries.

## Theoretical Model

- Suppose there are three types of agents in the economy: residents, firms, and foreign sectors. The determinant of national income can be expressed as:

$$Y = C + I + NX \quad (1)$$

- C is household consumption,I is enterprise investment,NX is net export.

## Theoretical Model

- C can be divided into two parts: spontaneous consumption and induced consumption.Therefore, the consumption function is:

$$C = C_a + m_c(Y + Tr) \quad (2)$$

- $C_a$ is spontaneous consumption, $m_c$ is marginal propensity to consume, $Tr$ is a cash transfer payment from the government to residents.

## Theoretical Model

- Similarly,I can be divided into two parts: spontaneous investment and induced investment.so, the investment function is:

$$I = I_a + m_I(Y - T) \quad (3)$$

- $I_a$ is spontaneous investment, $m_I$ is marginal propensity to invest, $T$ is a enterprise tax and fee.

## Theoretical Model

- Substituting the above formula (2) and (3) back to the formula (1), the national income determination formula can be obtained:

$$Y = C_a + m_c(Y + Tr) + I_a + m_I(Y - T) + NX \quad (4)$$

- After the transfer, we get:

$$Y = \frac{C_a + I_a + NX + m_c Tr - m_I T}{1 - m_c - m_I} \quad (5)$$

## Theoretical Model

» Take the derivative of equation (5) .

(6)
$$\frac{\partial Y}{\partial C_a}=\frac{\partial Y}{\partial I_a}=\frac{\partial Y}{\partial NX}=\frac{1}{1-m_c-m_I}$$

$$\frac{\partial Y}{\partial Tr}=\frac{m_c}{1-m_c-m_I}$$

(7)
$$\frac{\partial Y}{\partial T}=\frac{-m_I}{1-m_c-m_I}$$

## Theoretical Model

» The policy effect of tax and fee reduction on national income can be obtained as follows:

$$\Delta Y=\frac{-m_I}{1-m_c-m_I}$$

(9)

» The policy effect of consumption subsidies on national income is as follows:

$$\Delta Y=\frac{m_c}{1-m_c-m_I}\Delta Tr=\frac{m_c}{1-m_c-m_I}\bullet\frac{1}{m_c}\Delta C=\frac{1}{1-m_c-m_I}\Delta C$$

## Theoretical Model

- Comparing formula (9) and formula (10), considering $0 < m_I < 1$ , Therefore, when the amount of tax and fee reduction is equal to the amount of consumption subsidy, the effect of consumption subsidy policy is better.

## Input-output Analysis

**I.Simulation analysis of tax reduction and fee reduction**

$$x = A^S x + V$$

$$V = IN + T + DE + RE$$

$x$ is the total output matrix,The composition elements of the direct distribution coefficient matrix $A^S$ are $a_{ij}(a_{ij} = Z_{ij}/x_i, \forall i, j)$ Matrix $Z$ represents the input-output relationship among various industries in each region.

## Input-output Analysis

- The added value matrix is V, including the labor compensation matrix IN, the net production tax matrix T, the fixed assets depreciation matrix DE, and the operating surplus matrix RE.

## Input-output Analysis

- Since this paper only analyzes the impact of tax changes on the economy, it can be assumed that other parts of added value remain unchanged, so, $V^n - V$ and $T^n - T$ then:

$$x^n = A^S x^n + V^n$$

$x^n, V^n, T^n$ represents the total output matrix, value added matrix and net production tax matrix after tax changes.

## Input-output Analysis

» $diag(x)^{-1}$is the inverse of the diagonal matrix $diag(x)$of matrix $x$, then:

$$x^n - x = A^S(x^n - x) + (T^n - T)$$

$$diag(x)^{-1}(x^n - x) = diag(x)^{-1} A^S (x^n - x) + diag(x)^{-1}(T^n - T)$$

Let $q = diag(x)^{-1}(x^n - x)$, $A^{S*} = diag(x)^{-1} A^S diag(x)$, $T^* = diag(x)^{-1}(T^n - T)$ we get:

$$q = A^{S*} q + T$$

## Input-output Analysis

» q is the matrix of output change rate, which represents the ratio of output change after tax and fee reduction to original output. Then the matrix of output change can be expressed as: $\delta x = diag(q)x$

» We can get: $\delta V = diag(v)\delta x$, $\delta IN = diag(in)\delta x$

# Input-output Analysis

**II.Simulation analysis of consumption subsidies**

$$x = Ax + f$$

$$f = c + in + ex + im$$

$x$ is the total output matrix,The composition elements of the direct distribution coefficient matrix $A$ are $a_{ij}(a_{ij} = Z_{ij}/x_i, \forall i, j)$ Matrix $Z$ represents the input-output relationship among various industries in each region.

# Input-output Analysis

- $f$ is the final demand matrix, including the consumption matrix $c$ , the investment matrix $in$ , the export matrix $ex$ , and the import matrix $im$.

## Input-output Analysis

- Since this paper only analyzes the impact of consumption changes on the economy, it can be assumed that other categories of final demand remain unchanged, so $f^n = f$, $c^n = c$ and then: $x^n = Ax^n + f^n$

$x^n$, $f^n$, $c^n$ are respectively the total output matrix, the final demand matrix and consumption matrix after changes.

## Input-output Analysis

- similarly， we get: $q = A^* q + c^*$
- and then: δx=diag(q)x
- we can also get: δV=diag(v)δx ， δIN=diag(in)δx

## Simulation results

- This paper assumes that each industry subsidizes consumption by 100,000 yuan and each industry cuts taxes and fees by 100,000 yuan, and then calculates the impact of tax and fee reduction and subsidized consumption on output, added value and labor compensation respectively, and compares the economic effects of these two policies.

## Simulation results

- After the consumption subsidies, the total output increased by 432.259 million yuan, the overall compensation of workers increased by 7.268 million yuan, and the added value increased by 15.30 million yuan.

## Simulation results

- After tax and fee reduction, the total output increased by 42.783 million yuan, the overall compensation of workers increased by 6.832 million yuan, and the added value increased by 14.643 million yuan.

## Conclusion

- This paper makes a comparative analysis of the policy effects of reducing taxes and fees and subsidizing consumption.
- The simulation analysis finds that, compared with reducing taxes and fees, subsidizing consumption can bring more output, added value and labor compensation, so it has better policy effects.