

ECONOMIC ANALYSIS OF TOBACCO CONTROL IN CHINA

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Outline

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- **Demand for cigarettes and government revenue**
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Introduction

- **More than 320 million smokers in China**
- **460 million second hand smokers**
- **63% adult male are smokers**

Health costs and consequences of smoking

- **896,000 premature death (Jin et al. 1995)**
- **Direct medical costs attributable to smoking
22.9 billion Yuan, 6% of total medical care cost
(Jiang and Jin, 2000)**

Role of tobacco in agricultural sector (1997)

- **1.4% land use for tobacco**
- **1.8% of total value of agricultural plant productions**
- **5.6 million tobacco farming households (2.3% of total farming households)**

Role of tobacco in manufacture industry (1997)

- **130 billion Yuan**
- **1.14% of total value of industrial production**
- **0.5 million employee in tobacco industry**

The Role of Cigarette Tax and Government Revenue

- Sales of cigarette were 84.2 billion packs in 1997
- Cigarette effective tax rate is 38%
- Central government collected 90 billion Yuan includes cigarette taxes and profit, 11 percent of central government revenue

International trade and smuggling

- **0.80% of domestic consumption through import**
- **8~9% of domestic consumption through smuggling**
- **China's government lost tax revenue 15.2 billion Yuan**

Demand for Cigarettes in China (1980-1996)

$$(1) \ln Q_t = 3.80 - 0.525 P_t - 0.002 I_t + 0.102 T_t$$

(6.323) (1.003) (13.172)

$$\bar{R}^2 = 0.962$$

$$DW = 2.17$$

$$(2) \ln Q_t = 1.677 - 0.331 P_t + 0.007 I_t + 0.556 \ln Q_{t-1} + 0.047 T_t$$

(2.399) (0.443) (2.261) (1.594)

$$\bar{R}^2 = 0.976$$

$$h = 1.25$$

Values in parentheses are t values.

Variable Definitions

Where $\ln Q_t$ = logarithm of annual aggregate cigarette sales in packs per capita, year t.
(1980-1996)

P_t = cigarette price per pack (Yuan) in 1980 price, year t

I_t = income per capita (Yuan) in 1980 price, year t

T_t time trend from 1980=1, ... , 1996=17

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R^2 = adjusted coefficient of determination with degrees of freedom

DW = Durbin Watson statistics for testing autocorrelation

h = h statistics is for testing autocorrelation in lagged dependent variable equation.

Demand for cigarette in China

- **Price elasticity : -0.40 ~ -0.65**
- **Income elasticity : 0.20**

Tax, government revenue and consumption

INCREASE IN CIGARETTE TAX AND ITS IMPACT ON CONSUMPTION AND TAX REVENUE*

	Decrease in consumption		Increase in cigarette tax revenue	
	Million packs	%	Billion Yuan	%
Increase in tax 25%				
Elasticity				
- 0.40	3389.4	4.0	27.12	20.0
- 0.54	4575.7	5.4	24.74	18.3
- 0.64	5338.3	6.4	23.22	17.1
- 0.70	5918.5	7.0	22.03	16.3
Increase in tax 50%				
Elasticity				
- 0.40	6778.0	8.0	59.65	44.0
- 0.54	9151.4	10.8	56.81	41.9
- 0.64	10676.6	12.8	54.98	40.6
- 0.70	11862.9	14.0	53.55	39.5

* We use 1997 data to calculate all results of this table. The average retail price was 4.00 Yuan/pack, and the proportion of tax was 40%, 1.60 Yuan/pack.

Benefits and costs of tobacco tax increase in China

A 25% tax increase (i.e. from 40% to 50% tax rate) at 4.00 Yuan/pack,
price elasticity at -0.54 (1997 data)

Total benefit

Consumption reduction	4.576 billion packs
Government tax revenue increase	24.74 billion Yuan
Quit smoking	5.47-8.64 million smokers
Lives saved	1.44-2.16 million
Medical cost savings	415-627 million Yuan
Productivity gain	32.35-48.53 billion Yuan

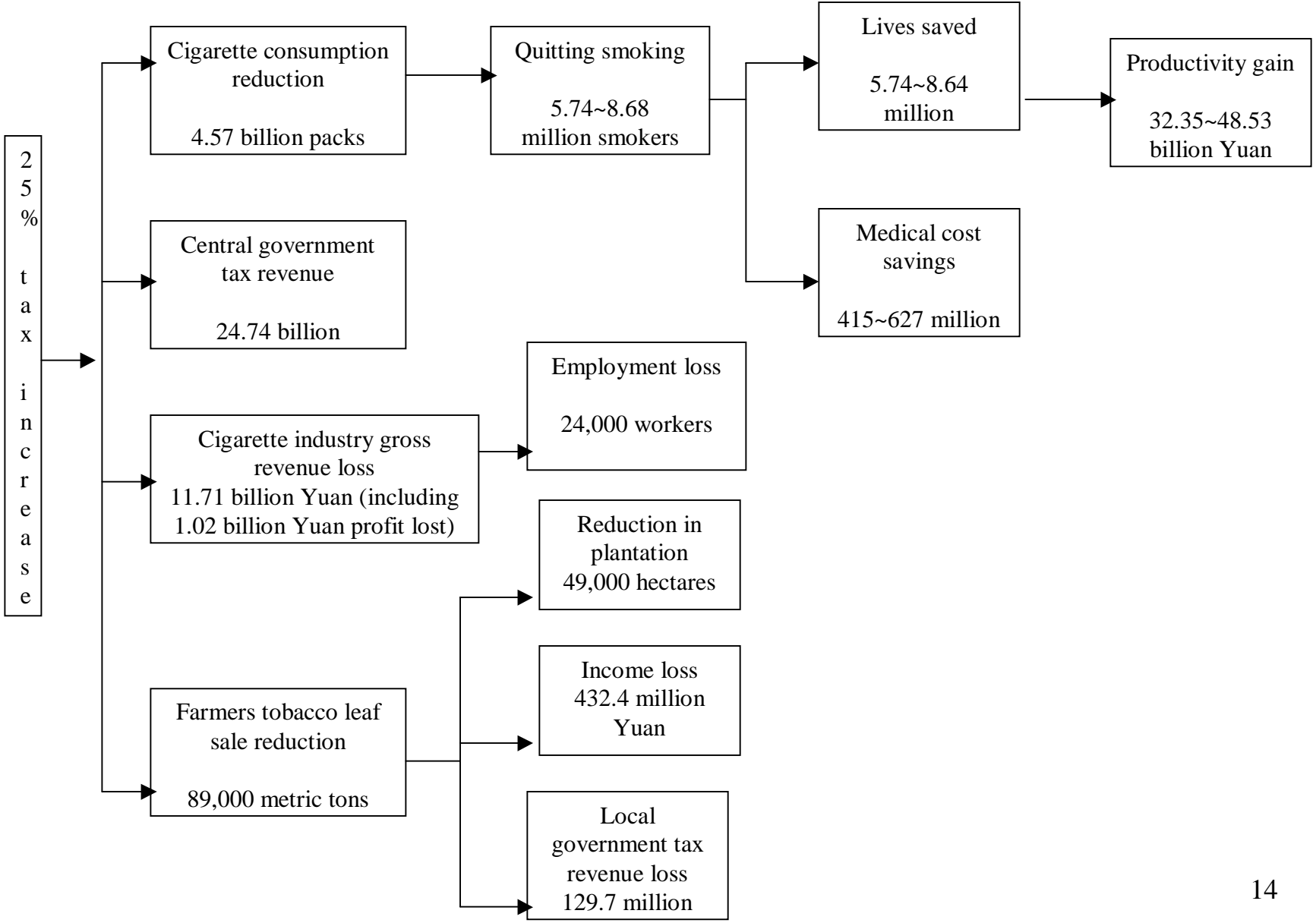
Cost to cigarette industry

Gross revenue loss	11.71 billion Yuan
Profit loss	1.02 billion Yuan
Employment loss	24,400 workers

Cost to tobacco farmers and local government

Reduction in tobacco leaf sale	89,900 metric tons
Reduction in plantation	49,000 hectares
Income loss	432.4 million Yuan
Local government tax revenue loss	129.7 million Yuan

Benefit and costs of tobacco tax increase in China



Conclusions and recommendations

- Benefit of tax increase in cigarette exceeds the negative impact on agricultural and cigarette industry
- Government may transfer tobacco tax revenue to subsidize tobacco farmers, cigarette industry and health care programs