

A cost-benefit analysis on Tobacco Control in China

Introduction

There are more than 300 million smokers in China, nearly one-third of the world's total. According to WHO's data, approximately one million deaths every year in China are caused by tobacco – around one in six of all such deaths worldwide and approximately 100,000 people die as a result of exposure to second-hand smoke each year. The smoking is becoming a huge threat to China's public health.

In 2016, The State Council of China issued an outline of the country's 2030 health plan. According to the outline, by 2030 the smoking rate of Chinese citizens above 15 years old should be reduced to 20 percent. Meanwhile the outline pointed out China will enhance tobacco control with the measures of price, tax and law.

Although these market-based smoke-free policies will improve public health in the long run by decreasing cigarette consumption and reducing exposure to secondhand smoke, there exists debate/concern on the tobacco control in the short-term. The counterargument is tobacco control would bring about a reduction in not only employment in related sectors but also in tax revenues and economic growth.

To respond to the debate and develop the most effective policy strategies, the government should make a trade-off between public health and economic development. In order to provide reference for policy decision, this study will

do a cost-benefit analysis on tobacco control by constructing China's computable general equilibrium model for tobacco policy.

In this study, we will design different policy scenarios with different policy measures and targets. By doing simulation with CGE model, we will explore the direct costs: reduction on employment, tax revenue. We will also investigate the direct benefits: the saving of health insurance expense and health benefits. And more importantly, we will examine the indirect effects and aggregated/equilibrium effects on macro economy and consumer welfare. Based on the all analysis the paper will show policy implications for decision-makers.

Production, Consumption and Tax of Tobacco in China

China is the world's largest tobacco producer and consumer. In 2014, China's tobacco planting area reached 14.631 million hectares. China's tobacco planting is widely distributed and Yunnan Province is the biggest planter. From 2010 to 2014, Yunnan, Guizhou, Henan, Sichuan, Hunan, Fujian and Hubei provinces are the top 7 planter for tobacco, accounting for more than 80% of China's total tobacco planting area.

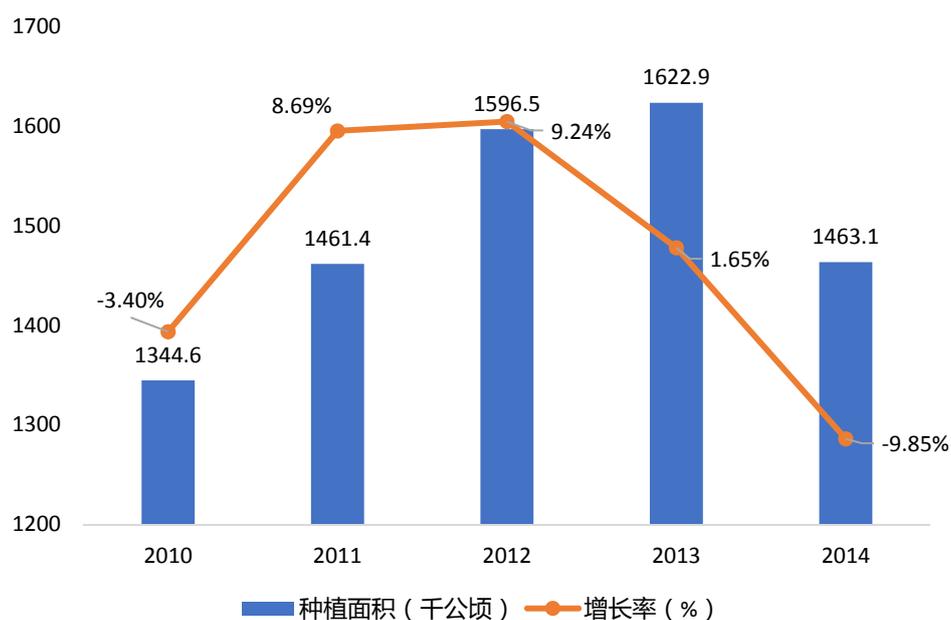


Fig 1 Cultivated area of tobacco (1000 hectares)

According to the Global Adult Tobacco Survey (GATS) in China in 2010, nearly one-third (28.1%) of the population smokes, including 52.9% of men and 2.4% of women. More than half (52.7%) of smokers aged 20-34 years started smoking daily before the age of 20. According to Input-Output Table, in 2012, China's rural residents consumed 72.882 billion yuan of tobacco products, about 3.96% of total expenditure. Urban residents consume 17.754 billion yuan of tobacco products, about 4.47% of total expenditure. Fig 2 shows the share of tobacco consumption in total expenditure for households by income quintile. The data denotes the lower the income, the higher the proportion of tobacco consumption in total expenditure.

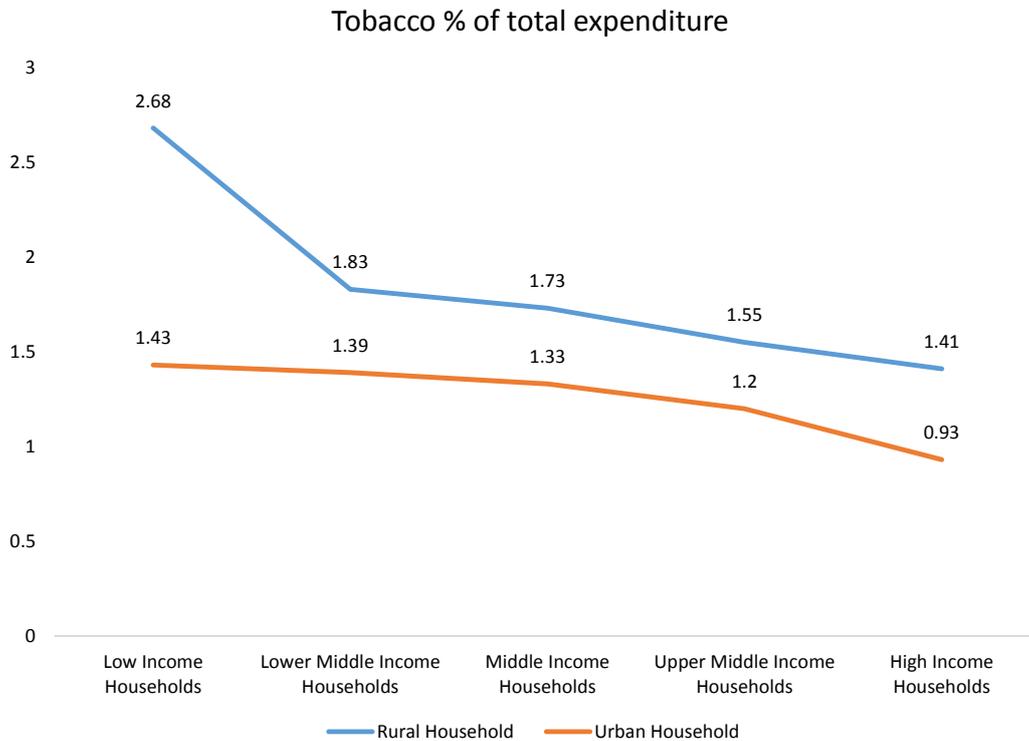


Fig Tobacco expenditure for household by Income Quintile (%)

There are many types of tax imposed on tobacco in China. Agricultural specialty agricultural tax was imposed on tobacco before 2006 and after that it is replaced with tobacco tax. Consumption tax, value-added tax and other tax are imposed on cigarettes. In 2010, China's tobacco industry paid taxes by 498.8 billion yuan, of which tobacco tax is 7.6 billion yuan, consumption tax

is 281.1 billion yuan, value-added tax is 102.3 billion yuan, and other tax and fee are 107.8 billion yuan. Tobacco & cigarettes taxes accounted for about 6.0% of China's total fiscal revenue¹.

Literatures on tobacco control

China is the world's largest tobacco country and smoking population accounts for about 30% of the total number of people living in the world. Chen et al. (2015) used the Cox regression method to compare the differences in the mortality rates between different sex smokers and non-smokers, and analyzed the current status of smoking in China. It was suggested that China's smoking population would increase by 1 million in 2020, 2 million in 2030 and 3 million in 2050. International research on tobacco control in China is rare, and most of the studies have shown that raising tobacco taxes is a powerful measure for Chinese tobacco control. T.-w.Hu (1997) summarizes the international experience in implementing tax policy on cigarettes and advises on tobacco control in China. Tobacco control should focus on health and disease issues. Increasing cigarette taxes is an effective measure to reduce tobacco consumption. TW Hu and Mao (2002) estimated the price elasticity of cigarettes (between -0.4 and -0.7), studied the effect of raising tobacco taxes on China's economy, and found that the increase in tax revenues from cigarette taxes was due to the increase in tobacco taxes Industry-related income (income from tobacco growers and tobacco taxes). Therefore, they believe that a comprehensive consideration of health and economic factors, in China to improve cigarette tax is an effective and desirable measures. Ross and Chaloupka (2006) concluded that the increase in tobacco taxes would have an impact on income distribution as the poor were more sensitive to price changes. In China, reducing cigarette consumption can release household consumption for more food, housing and other goods that improve living standards, so in the long run, tobacco control will effectively alleviate social inequality. TW Hu et al. (2006) estimates the tobacco demand function in China and calculates the price elasticity of tobacco, and further estimates the effect of the increase in tobacco tax on the tobacco growing industry and the tobacco industry by the linear regression model. It is found that China's

¹ <http://www.jxaic.gov.cn/jx/sjyw/20121227/214406.html>

increase in cigarette tax increases tax revenue While effectively reducing cigarette consumption. Yang et al. (2007) used the sample data of urban residents in two cities of Xi'an and Hangzhou to study the residents' understanding of WHO FCTC tobacco control policy and analyzed the smoking behavior of residents by descriptive statistics and multivariate logistic regression analysis The impact of the change found that most residents have a supportive attitude towards the "policy" policy and that raising the price of cigarettes will effectively control the consumption of tobacco for urban residents. The impact of the increase in tobacco taxes on cigarette consumption, tax revenue, health, tobacco cultivation and tobacco industry employment and income levels is calculated by calculating the price elasticity of demand for Chinese cigarettes. T.-w.hu, Mao, Shi, and Chen (2010) It is also considered that raising tobacco taxes is the most effective measure for controlling tobacco consumption in China. Levy, Rodriguezbuno, Hu, and Moran (2014) for the Chinese 15-74 year-old population, using the computer simulation model of the World Health Organization Framework Convention on Tobacco Control (WHO FCTC) under the tobacco control provisions of China's future smoking rate The potential impact. Contrast found that the increase in cigarette sales tax is the most effective way to control tobacco in China, and the implementation of the "policy" policy will reduce the number of people living in China by 20% by 20%, effectively reduce the tobacco-related health burden in a large part, and in life expectancy and To achieve success in prosperity.

Some studies have also emphasized the importance of other tobacco control methods such as media promotion, health education, and policy implementation, while analyzing tobacco taxes. Li et al. (2012) compared the issue of China's tobacco prices in 2007-2010 compared to the effect of China's tobacco control policy in 2009, and found that China's cigarette tax in 2009 was not transferred to the retail price of cigarettes, so the tobacco control effect was not Significantly. Gao, Zheng, and Hu (2012) also studied China's cigarette price-making mechanism in the case of the failure of China's cigarette taxation policy in 2009, saying that China's tobacco market was monopolized by the government and that the tax increase was not added. And only the tobacco tax control policy will be invalid. In addition, Wang et al. (2014) conducted qualitative and semi-structured face-to-face interviews and

panel discussions on some rural residents in Shandong Province, including villagers, village leaders and village doctors, and stressed the development of tobacco control measures for the unique culture of rural China, The education of rural residents smoking and secondhand smoke, and the importance of providing effective smoking cessation education. Zhang, Hu, and Shao (2016) studied the news of "tobacco control" in China from 2010 to 2012 and compared with the policy of "China Tobacco Control Program (2012-2015)", using Spearman rank correlation analysis, descriptive Statistical analysis, emphasis on tobacco control issues such as the importance of media advocacy and other means.

The existing literature on the Chinese tobacco control to take effective measures in the study, also stressed the improvement of tobacco tax policy feasibility and effectiveness. Chen Bin, Yang Tingzhong, Wang Hongmei and Dai Di (2007) argue that levying tobacco taxes is one of the most effective means of tobacco control. They analyzed the necessity of levying tobacco taxes and learned from California's research on tobacco taxes. Emphasizing the implementation of cigarette taxes will improve the public Health status. Gao Song, Liu Hong and Meng Xiangyi (2010) use the Chinese health and nutrition survey data to estimate the tobacco demand equation, the use of short-sighted addiction model and rational addiction model to estimate the demand elasticity of tobacco in China, that China's tobacco control needs to distinguish between key groups to develop relevant policies, The study affirmed the increase in tobacco tax and cigarette retail prices can effectively reduce the consumption of cigarettes at the same time, you can also improve the national revenue, to achieve better tobacco control and economic results.

In the study of tobacco control measures, Li Tianfei (2004) analyzed the taxation policy, the administrative measures and the content of harmful substances in three tobacco control measures from the perspective of economic effect and social welfare. It is considered that the limit of harmful substances is the long-term future of tobacco industry in China Strategy.

Other research on tobacco control effects, Zhu Yanhong and Xiang Lunhui (2011) using stratified multi-stage cluster sampling method to investigate and track, to assess the behavior of people after tobacco control,

changes in the environment and found that public places improved, but catering and entertainment Smoking is still serious. Yang stressed that China should actively take effective measures to improve the status of tobacco control, emphasizing the importance of legislation at the level of tobacco control. Chen Hao, Chen Xiaowen, Cai Yuyang and Shi Lili (2014) using literature analysis concluded that Chinese community tobacco control research focused on the status quo research, the policy and effect evaluation of the less, community tobacco control is still mainly publicity and education, but smoking Behavior has not had a significant impact on the effective method of community tobacco control urgent need for further study. Zheng Rong (2009) analyzed the implementation effect of China's tobacco tax policy in 2009, summed up the use of tobacco tax in global tobacco control, and suggested that China should raise the amount of tax and raise the price of low-priced cigarettes. The taxation link shifted from the production To the wholesale and retail links; to promote the tobacco special tax and its use in public health and tobacco control (Zheng Rong, Wang Yang and Hu Xiao (2016); Zheng Rong, Gao Song and Hu Dewei (2013)).

Modeling and Scenario Designing for Urbanization

To evaluate the likely effects of tobacco control on the Chinese economy, sectors, and households, we utilized a CGE model of the Chinese economy developed by the Development Research Center of the State Council of China (DRC-CGE 2012 Model) to project outcomes of different urbanization scenarios. This model uses the most current data available, calibrated to a social accounting matrix based on national input/output tables for 2012. All data reflect the 2010 revision of Chinese economic statistics. A pre-experiment was conducted to stimulate growth from the 2012 base year data up to 2017. The model includes 34 production sectors; 2 representative households by area; and 5 primary production factors: land, capital, agricultural labor, productive workers, and professionals. The 34 production sectors include 1 agricultural sector, 24 industrial sectors, and 9 services sectors.

Effects of tobacco control on the industrial and tobacco planting and processing

Effects of tobacco control on economic growth, economic structure and household welfare

Effects of tobacco control on Health and fiscal

Conclusion

The main purpose of this study was to analyze the effect of tobacco control in china on the economy and the health by using a dynamic recursive CGE model. Based on the results from this model, it is evident that the tobacco control will increase government tax revenue by *** billion at the cost of reduce of tobacco planting and processing.

According to the simulation, tobacco control will lead to a decline of cigarette consumption by *** billion package. Meanwhile the tobacco control will result in *** lives being saved.

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