

RESEARCH PAPER

China at the crossroads: the economics of tobacco and health

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Objective: To analyse economic aspects of tobacco control policy issues in China.

Methods: Published and collected survey data were used to analyse economic consequences of smoking. Economic analysis was used to address the role of tobacco farmers and the cigarette industry in the Chinese economy.

Results: In the agricultural sector, tobacco has the lowest economic rate of return of all cash crops. At the same time, the tobacco industry's tax contribution to the central government has been declining.

Conclusion: Economic gains become less important as the negative health impact of smoking on the population garners more awareness. China stands at a crossroads to implement the economic promises of the World Health Organization's Framework Convention on Tobacco Control and promote the health of its population.

China consumes and produces more cigarettes than any other country. An estimated > 4 million Chinese households rely on tobacco for their livelihood, either as tobacco farmers, cigarette industry employees, or cigarette retailers.¹ China's state-owned tobacco monopoly company produces over 1.7 trillion cigarettes annually, generating almost US\$2 billion profit and taxes in 2003, 7.4% of central government total revenue.¹

China has over 350 million smokers and about 460 million passive smokers.^{2,3} The negative health impact of smoking has contributed to about one million premature deaths.⁴ If this pattern of smoking continues, premature deaths attributable to smoking can be expected to exceed two million deaths annually by 2020.⁵ Therefore, the Chinese government has a policy conflict between the economic interests of the tobacco industry and the health concerns of its people.

In this paper, we will first review tobacco farming in China and then present an analysis of the country's tobacco industry. We will also analyse the potential impact of a cigarette tax on government revenue and conclude with a discussion of opportunities and challenges related to tobacco control in China. These findings will provide policymakers with an economic assessment of using a tobacco tax as one of their tobacco control options.

METHODS AND DATA SOURCES

Two separate surveys have been conducted by this project: 1003 farm households in Sichuan and Guizhou provinces were interviewed during 2002, and 586 farm households were interviewed in Yunnan province in 2004. The survey instruments collected information about the cost of producing each crop and the revenue received from each crop so that economic returns could be compared by crop. Most farmers do not have accounting records. To help farmers recall their costs and revenues, the survey developed a resource-accounting framework that asked farmers specific questions about each type of input (seeds, fertiliser, land use, days worked, etc), amount of inputs, and cost per unit of inputs. Costs included rent, expenditures, hired labour (full time or part time expenditures), cost of curing tobacco, and market transportation costs. Detailed questions were asked about the quantity and type of crop that each household sold to the market (or government) and the average unit price it

received. Based on these collected interview data, a cost accounting and revenue analysis was carried out to analyse the rate of return from each crop including grain, vegetable oil, bean, fruit, and tobacco leaf.

Aggregate national statistics reported by the Chinese National Tobacco Company and the Chinese National Development Research Center are used to describe and analyse the Chinese tobacco industry's structural profit and tax collected from cigarette sales, as well as the impact of China's membership in the World Trade Organization (WTO) on foreign cigarette products in the Chinese market.

Addressing the issues of the impact of taxation on cigarette consumption and on government revenue and tobacco leaf production requires an analysis of the relationship between price and consumption of cigarettes. This relationship is measured by price elasticity which is the percentage change in consumption in response to a percentage change in price.

Price elasticities are obtained statistically through the estimation of a demand function. A basic demand function usually includes the price of the item (cigarette), personal disposable income, and a time trend to reflect changes in consumer tastes and preferences.

To analyse the impact of additional tax on cigarettes, a statistical linear regression model was used to estimate the quantity and price relativity, with data from the 2000 national survey of smoking of 16 000 adult individuals.

In addition, about 3400 urban and rural households from 36 townships/districts in southwest China were interviewed in 2002. These data were used to analyse differences in smoking behaviour and smoking expenditures among low and high income households in China and the impact of smoking on standards of living of low income households in China.⁶ Cross-tabulations and regression analysis were used to examine the differences in major household expenditures, including food, housing, clothing, and education between households with smokers and those without smokers.

Abbreviations: CNTC, China National Tobacco Company; FCTC, Framework Convention on Tobacco Control; STMA, State Tobacco Monopoly Administration; WTO, World Trade Organization

ANALYSES AND DISCUSSION

Tobacco farming: costs and return

China is the largest grower of tobacco leaf in the world. In 2000, China produced 2.66 million tons of tobacco leaf, about one third of the world's production.⁷ To control the supply of tobacco leaf, a tobacco leaf production quota is determined by the State Tobacco Monopoly Administration (STMA). The Chinese Ministry of Agriculture does not have jurisdiction over the production, pricing, or marketing of tobacco leaf.

While the Chinese government is well aware of the negative health effects of smoking and is willing to consider tobacco control options, such as banning cigarette advertisements, teen smoking, and smoking in public places, the government has yet to use a tobacco tax to control tobacco smoking. The government is reluctant to use a tax because it fears that increasing the tobacco tax would reduce the livelihood of tobacco farmers and threaten the economic base of the cigarette industry. Recently, the government produced a publication documenting the importance of the tobacco economy in China and the negative health impact of cigarette smoking.¹ However, there has been no economic analysis of tobacco farming or the economic prospects of the Chinese cigarette industry in China.

The China National Tobacco Company (CNTC), a monopoly organisation under the STMA, controls all Chinese tobacco leaf production and cigarette marketing. Therefore, any discussion of tobacco control in China requires a good understanding of the impact of tobacco leaf production on the country's overall agricultural economy and on government revenue, as well as the government's role in tobacco production.

The contribution of tobacco leaf to the Chinese agricultural provincial economy is about 1–2%, except in the Yunnan, Guizhou, and Sichuan provinces.⁸ Yunnan alone collected 62% of all tax revenue from tobacco leaf production in 2003. Nationally, the overall contribution of tobacco leaf to the Chinese agricultural economy is less than 1%. However, tobacco leaf is also a major source of local government tax revenue. In 2005, China removed all tax on agricultural

products, except for tobacco leaf. Keeping a tax on tobacco leaf does not mean that the government discourages its production since leaf production is set by a government quota; rather, the tax is mainly for local government revenue. Also, tobacco leaf is the main input allowing the cigarette industry to generate high profit and tax revenue. Therefore, the Chinese government has played an important role in the production of tobacco leaf.

In spite of the alleged importance of tobacco leaf production to farmers, very little empirical research exists on farmers' costs and return for producing tobacco leaf. This project has carried out two surveys on the economic return on tobacco leaf production compared to other crops planted by tobacco farmers.^{9 10}

Table 1 provides a summary of total costs and revenue for each crop by farm size from 1003 farming households in Sichuan and Guizhou provinces. Results indicate that citrus is a specialty crop with high market value in these two provinces. Fruit produced the highest revenues, followed by tobacco. While tobacco was the second highest revenue producer, its revenue was equal to only about two thirds of fruit revenue for small farms, one half of fruit revenues for medium farms, and one third of fruit revenues for large farms. However, comparing the ratio between revenue and costs of each crop, grain production and tobacco had lower returns than vegetable oil, beans, or fruit. These ratios imply that for every Yuan farmers spent, they received on average 3.7 Yuan (US\$0.45) for fruit. Small farmers benefited even more, receiving 4.7 Yuan (US\$0.57) per Yuan spent for fruit. On the other hand, for every Yuan farmers spent on tobacco production, they received only 2.4–2.8 Yuan (US\$0.29–0.34), a smaller return than from other crops, such as beans or vegetable oil. Obviously, some farmers do not plant fruit for a variety of reasons: different land endowments, climates, marketing, assurance of government purchase of tobacco leaf, and government tobacco quotas assigned to some farmers.

Similarly, results of the 2004 survey in Yunnan province indicated that tobacco leaf had the lowest revenue-to-cost

Table 1 Total costs and revenue by major crops by size of farm, in Sichuan and Guizhou counties, 2002

	Small (≤0.5 hectare) (7.5 mou*) (n = 302)	Medium (0.5–1.0 hectare) (7.5–15 mou) (n = 361)	Large (>1.0 hectare) (>15 mou) (n = 340)	Total sample (n = 1003)
Total cost (Yuan)				
Grain	372	628	926	652
Tobacco	900	1244	1963	1413
Beans	43	28	95	44
Vegetable oil	55	79	173	122
Fruit	666	2196	4510	2937
Total revenue (Yuan)				
Grain	913	1455	2436	1624
Tobacco	2128	3216	5509	3741
Beans	131	165	277	189
Vegetable oil	170	319	637	452
Fruit	3146	7487	16859	10763
Revenue minus cost				
Grain	541	827	1510	972
Tobacco	1228	1882	3546	2328
Beans	88	137	182	145
Vegetable oil	115	240	464	330
Fruit	2480	5291	12349	7826
Revenue/cost ratio				
Grain	2.5	2.3	2.6	2.5
Tobacco	2.4	2.6	2.8	2.6
Beans	3	5.9	2.9	4.3
Vegetable oil	3.1	4	3.7	3.7
Fruit	4.7	3.4	3.7	3.7

*1 mou = hectare/15.

ratio per mou (a standard unit of land measurement in China, equivalent to 1/15 of a hectare), 0.99.¹⁰ The highest revenue-to-cost ratio was for mulberry and silkworm, 4.00; followed by fruit, 2.00; rice and wheat, 1.99; and vegetable oil, 1.70.

The finding that tobacco may not always produce the best economic return is not unique to China.¹¹ A study from India indicated the following revenue-to-cost ratios: 4.01 for safflower, 1.33 for mustard, and 1.2 for flue-cured tobacco leaf.¹² Tobacco farming is often labour-intensive and requires equipment to cure the leaf, which reduces the net return to land. Therefore, alternative crops sometimes yield greater revenue-to-cost ratios than tobacco leaf.

As indicated by STMA, the relatively low return from tobacco leaf production could be due to an oversupply of tobacco leaf on the market, which could be reflected by the government's relatively low purchase price.¹³ The government does not have a price subsidy policy for tobacco leaf. In fact, the overall farm product price index in China did not increase during the last decade although the general consumer price index increased over the same time period.¹⁴ If production of tobacco leaf does not provide a better economic return than other crops, why do farmers continue to plant it? One reason is that local government collects local tax revenues from tobacco leaf by assigning a quota to farmers to produce tobacco leaf for revenue. Second, the ongoing agreement with STMA assures farmers of revenue from tobacco leaf without having to worry about storage or marketing problems. Under the agreement, STMA provides technical assistance and guaranteed purchase. Third, the soil and weather in China are ideal for tobacco plantations. Finally, some farmers may not be aware of the alternative crop options.

This is a prime time for the Chinese government to encourage less profitable tobacco farmers to produce other crops. The Chinese Ministry of Agriculture should collaborate with the STMA to provide technical assistance and economic incentives to aid the transition from tobacco leaf production to other crops. The survey results of this study indicate that tobacco leaf production is not a way for farmers to escape poverty or become wealthier.

Cigarette industry: monopoly and WTO

CNTC, a government-run monopoly company, is the world's largest tobacco company, producing 1722 billion cigarettes in 2002 and generating 140 billion Yuan (US\$17 billion), or about 7.4% of government revenue.¹ Since CNTC is a government-owned monopoly company, its contribution to the central government includes both profit and tax revenue. As shown in table 2, while the nominal amount of tax and profit revenue from tobacco has been increasing over time, the percentage of total government revenue has decreased

from a high of 11.2% in 1996 to 7.38% in 2003; the lowest share was 7.02% in 2001. The decline in the relative tax/profit contribution to the central government is due to recent rapid Chinese economic development in the automobile, petroleum, textile, and high tech industries.

The government levies two taxes on tobacco producers: a producer value-added tax, about 17% of the producer price, and a consumption tax, an additional 50% of the wholesale price. From the producers' point of view, the tax paid to the government is 67% of the producer price, but the effective tax rate is 38% if the amount of tax paid by the producer is compared to the retail price of cigarettes.¹⁵ To promote their own local product, provincial tobacco companies sometimes set trade barriers for out-of-province cigarettes. The most profitable companies are in Yunnan, Shanghai, and Henan provinces, where companies have invested in cigarette manufacturing. However, unprofitable companies still exist because the local government is willing to subsidise them for the sake of employment and tax revenue.

The government's concern over the employment of tobacco industry workers and farmers has been a barrier to enacting tobacco control. CNTC employs more than half a million people, about 0.4% of total employment in the economy. Approximately half a million individuals are employed in the tobacco manufacturing industry (excluding farmers), which translates to 0.51% of total employment in the manufacturing industry.

China entered the WTO in 2001. As a member, China had to agree to (1) reduce the tobacco leaf import tariff, (2) reduce the cigarette tariff, (3) eliminate the export rebate for flue-cured tobacco leaf and cigarettes, and (4) eliminate the export bounty, a reward for exporting cigarettes. All these agreements have made foreign cigarettes more competitive in the Chinese market and China's tobacco leaf less competitive in the world market.

Even with the WTO removing China's longstanding restrictions on tobacco imports and the numerous domestic companies within the state monopoly, the largest Chinese tobacco company cannot yet directly compete with the transnational tobacco companies. From 1995–2000, total official cigarette imports and exports comprised only 0.8% of the domestic market. By early 2000, foreign imported products represented about 3% of the Chinese market. CNTC anticipates that before the end of the decade, foreign products may reach 8–10% of the Chinese tobacco market.¹⁶

The WTO's import tariff reductions on tobacco leaf and cigarettes are increasing the competitiveness of foreign tobacco products. The tariff on tobacco leaf has gradually been reduced from 64% in 1999 to 25% in 2003 to 10% in 2004.¹⁶ This tariff reduction has made foreign tobacco leaf as competitive as Chinese domestic tobacco leaf, and China's tobacco farmers already face a tobacco leaf surplus. The tariff on cigarette products dropped from 49% in 2001 to 25% in 2003. China's cigarette imports have increased by 37%, from 68.51 million packs in 2002 to 93.92 million packs in 2003. Before 2003, foreign brands, such as Marlboro or 555, cost about 20 Yuan (US\$2.50) per pack. The current market price is now 12 Yuan (US\$1.50) per pack, similar to popular domestic brands, such as "Hong-Ta-Shan", which costs about 10 Yuan. As the Chinese economy is growing and personal incomes are rising, the demand for foreign brands is increasing, particularly among urban young adult male and female smokers. Special retail permits for foreign tobacco products used to be issued by CNTC to control foreign cigarette retail sales. Since 2003, with the elimination of this special retail permit under the WTO agreement, any retailer with a CNTC general retail permit to sell domestic cigarettes can sell foreign cigarettes.

Table 2 Tobacco tax and profit contribution to Chinese central government revenue

Year	Tax and profit contribution (in billion Yuan)	Total government revenue (in billion Yuan)	% of total revenue
1996	83	74.08	11.2
1997	90	865.1	10.4
1998	95	987.6	9.62
1999	99	1144.40	8.64
2000	105	1339.50	7.84
2001	115	1638.60	7.02
2002	140	1893.60	7.41
2003	160	2168.10	7.38

8.2 yuan = US\$1.

Sources: Liu T, and Xiong B. *Tobacco Economy and Tobacco Control* (in Chinese), Beijing, China: Economic Science Press, 2004:169.

Facing these economic challenges, CNTC has tried to reduce the number of domestic cigarette brands and close inefficient and small cigarette factories. The number of brands dropped drastically from 1049 brands in 2001 to 423 in December 2004. The number of regional companies decreased from 185 in 2001 to 57 in December 2004. Whereas provincial governments previously could have a local regional monopoly, CNTC has forced regional companies to compete against each other. Through mergers and integration, CNTC hopes to achieve economic efficiency in cigarette production, pricing, and marketing. In spite of China's entry into the WTO, the central government has not permitted foreign companies to either establish factories or have joint ventures with local cigarette companies.

Product improvement has been a priority in anticipation of competing with foreign brands. Chinese cigarettes used to have a high tar content, but beginning in July 2004, China prohibited the sale of cigarettes with more than 15 mg. Manufacturers are now required to use new technology to reduce the tar content to meet the international standard of 11.2 mg. Other "quality improvements" include importing tobacco leaves, for example, from Zimbabwe with its high quality leaf, and changing the packaging of cigarette products, the paper quality, and printing.

As China's economy changes, tobacco control efforts may benefit from the decline in the tobacco industry's relative contribution to employment or government tax revenue. The industrial manufacturing sector (for example, textiles, electronics, and automobile products) is developing rapidly. The value of Chinese cigarette production increased from 8 billion Yuan (about US\$1 billion) in 1981 to 130 billion Yuan (US\$15.8 billion) in 1997 to 169 billion Yuan (US\$20.6 billion) in 2002; however, its relative share of the total value of national industrial production fell from 1.57% in 1980 to 1.14% by 1997 to less than 1% in 2002. With these reductions in the government's dependence on the tobacco economy and tobacco tax revenue, along with the reduction in demand for domestic cigarette leaf, the importance of the tobacco sector in China is declining.

Understanding these changing economic priorities and the tobacco industry situation within China can help identify new solutions for tobacco control. The impact of additional tobacco taxes will have smaller negative effects on China's tobacco industry as the number of regional tobacco companies is reduced. Instead, the central government could remove its special tobacco leaf tax, as demand for domestic cigarette leaf is reduced, and instead impose an additional cigarette product tax. The central government and local governments could share the revenue income, resolving the concern over replacing lost government revenue. At the same time, this strategy would free tobacco farmers to plant any product they desire and help resolve the domestic tobacco leaf surplus problem resulting from increased imports of higher quality foreign leaf.

Cigarette consumption and taxation

Using data from the 1990s, several price elasticities were estimated from Chinese aggregate data and cross-sectional household data; they ranged from -0.35 short-run elasticity to -0.66 long-run elasticity. Using national time series data from 1990–2002 on per capita cigarette consumption and cigarette price, the estimated price elasticity is -0.144 .¹⁷ Using the 2000 survey of 16 000 individuals found a price elasticity of -0.154 .¹⁸ Both of these more recent price elasticities are lower than using 1990s data. The household consumption survey reveals that each household on average spent 25–125 Yuan per month on cigarettes—5% to 7% of household expenditures. With a price elasticity of -0.15 and a 10% price increase, cigarette consumption would be

What this paper adds

In China, the government's tobacco control policy is influenced more by issues of economics than by public health. This paper provides an in-depth economic analysis of tobacco production in China in both the agricultural and industrial sectors. It shows that additional tax on cigarettes in China would not have a serious negative economic impact; at the same time, the government would receive additional tax revenue and cigarette consumption would be reduced.

reduced by 1.5%, equivalent to 1.02 packs per capita or a total of 1017 million packs.

The reduction in consumption of 1017 million packs would result in a reduction in use of 16 900 metric tons of tobacco leaf, according to the cigarette/tobacco leaf production technical ratio.¹⁹ This reduction of 16 900 metric tons is very insignificant compared to national production of 2.66 million metric tons, especially given the surplus of tobacco leaf in China.

Cross-sectional data can be used to compare income groups. The data show that lower income groups are more responsive to price. The price elasticity for the poor was -0.59 , for low income -0.23 , for middle-high income -0.02 , and the high income group had a positive price elasticity of 0.25. The 2005 study showed that a tax increase of 10% would increase the net tax revenue by 30 billion Yuan (US\$3.6 billion).¹⁷ Since the low income group has a higher price elasticity (in absolute value) and will cut their consumption more when prices increase, a tax increase on cigarettes is not regressive for low income smokers.

The 3400 urban and rural household surveys showed that lower income households with smokers paid less per pack and smoked fewer cigarettes than higher income households with smokers.⁶ Poor urban households spent an average of 6.6% of their total expenditures on cigarettes; poor rural households spent 11.3% of their total expenditures on cigarettes.

As noted, China currently levies a fixed 67% tax at the producer level, equivalent to a 38% tax at the retail level, a relatively low rate compared to cigarette tax rates around the world, the median of which is about 60%.⁷ Analysis of these survey data suggests that raising cigarette tax rates in China would reduce consumption more among low income households than among high income households, increasing available household funds for other major household items, such as food, housing, clothing, and education.²⁰ Furthermore, an ad valorem (a percentage of the price) tax instead of a specific (a fixed amount per pack) tax would lower the financial burden of a higher cigarette tax on low income households (who tend to smoke cheaper cigarettes), and in this respect would be "pro-poor."

CONCLUSION

Tobacco control in China is facing an economic and public health crossroads. China is the world's largest tobacco consumer and producer and has a state-owned tobacco monopoly. However, tobacco leaf's contribution to the agricultural economy is declining. The cigarette industry's contribution to government tax revenue is also declining. As a result of China's entry into the WTO in 2001, transnational tobacco companies are expected to gain increased market access and compete with China's tobacco monopoly. China recently ratified the World Health Organization's Framework Convention on Tobacco Control (FCTC). The FCTC will bring new incentives for the Chinese government to implement tobacco control provisions: price and non-price options. The

Chinese government's competing priorities between its tobacco industry interests and protecting its population's health may be shifting toward better public health. It is hoped that levying an additional tax as a tobacco control policy will be a message to Chinese smokers.

Despite the challenges discussed, numerous opportunities exist to implement measures to reduce tobacco demand. China's experience in planning and implementing tobacco control activities in seven major cities under the World Bank "Health VII Project" could be drawn on to develop and enforce effective local tobacco control regulations, train for and expand FCTC surveillance programmes nationally and locally, and help mobilise private sector organisations. Secondhand smoking should receive emphasis as a crucial component of tobacco control; a first step toward realising this goal can be achieved through smoke-free workplace programmes for health professionals. Spreading knowledge is the next step toward reducing tobacco demand in China.

A Chinese government official statement issued upon their ratification of the FCTC (Chinese National Development and Reform Commission, State Council announced on 11 October 2005), indicated that the government will first implement non-price tobacco control options, such as banning smoking in public places, refusing to sell cigarettes to minors, and banning smoking advertisements. Many potential future projects could be conducted to monitor these programmes' influence and effects—for example, examining secondhand smoke exposure in public places, surveying smoke-free regulation enforcement and government official smoking behaviour, and evaluating the effects of FCTC-related activities.

Tobacco control in China is crucial to global efforts to reduce the burden of tobacco-related illnesses. China has not only the largest number of active and passive smokers in the world, but also the largest amount of tobacco production. Hence, reductions in Chinese tobacco use will significantly decrease the global burden of tobacco-related illnesses and deaths. In addition, studies of tobacco control in China will be of great importance to other developing countries because China shares many of the social and economic challenges facing other developing nations.

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