The Effect of the Export Tax Rebate on China's Green Tea Market

by

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Abstract

The demand for tea internationally, especially green tea has increased dramatically in recent years. China is a major producer and exporter of green tea. To compete effectively in the world tea market, the Chinese government promulgated the Export Tax Rebate Policy in 1985 into practice. By fully refunding the tariff in the domestic production and distribution process, export retailers can export green tea at a no-tax price. This policy not only encourages green tea exports, but also protects the retailers' benefits and rewards their initiative.

In this paper, I use an Equilibrium Displacement Model with a series of elasticities to detect the effect of the export tax rebate on the China's green tea market. In order to analyze the impacts on the whole of China's green tea market, I set up a system of equations to combine the farm-level market and the retail-level market. I use three key exogenous variables, the input tax, the value added tax and the export tax rebate rate, to uncover the effects of the tax and rebate policies in the domestic and export markets.

Table of Contents

List of Tables

List of Figure

List of Abbreviations

AIDS	Almost Ideal Demand System
ART	After-Rebate Tax
EDM	Equilibrium Displacement Model
FAO	United Nation Food and Agriculture Organization
MOFCOM	Ministry of Commerce of the People's Republic of China
T^F	Input tax
USDA	United State Department of Agriculture
VAT	Value Added Tax
WTO	World Trade Orgnization

Section I. Introduction

Increasing numbers of people around the world are pursuing a healthy diet. As a result the demand for tea, as a healthy drink, is expanding, such as rooibos tea out of South Africa (cf. Wilson, 2005). In the report by Fujiki and Suganuma (2012), green tea is used as a cancer preventative in Japan. Based on the evidence that colorectal adenomas and prostate cancer in humans have been prevented, the combination of anticancer drugs with green tea could be a new cancer therapeutic strategy. China, as one of the biggest tea production and consumption countries, has a large effect on the global tea market. The United Nation Food and Agriculture Organization of United Nation (FAO, 2005-2010) shows that China was ranked first in world tea production from 2005 to 2010, with an average of 1,217,039 tons. Due to the tea culture in China, a large amount of tea is consumed domestically. In China's agricultural products import and export guidelines of 2006, almost six hundred thousand tons of tea, which is about 63 percent of total domestic tea production, was consumed domestically in 2005. Even with this, China is still one of the dominant tea exporters, especially of green tea, along with India, Kenya and Sri Lanka. According to the report by the Ministry of Commerce of the People's Republic of China (MOFCOM) in 2006, Chinese green tea production accounts for 70 percent of world production and 85 percent of world exports in the international green tea trade.

As one of the main exports, tea earns a huge amount of foreign exchange revenue. Historically, the Chinese government gave support to tea exports due to its important role on foreign trade. The export tax rebate is one of the policies implemented by the Chinese government to encourage and improve tea exports. In 1985, China established the export tax

rebate system, so that targeted export goods can enter the international market at their non-tax price. This not only enhances the competitiveness of export goods and stimulates export enterprises, but also contributes greatly to the development of China's foreign trade. In 1994, the Provisional Regulations on Value Added Tax (VAT) of the People's Republic of China were introduced. The policy reduced the VAT rate to be zero for exporting firms. In other words, the value added tax is applied to products for domestic consumption, while it is not applied to exported commodities. In addition, the other taxes from the production and distribution processes were returned to the exporting firms by the government. After that, the export tax rebate policy experienced seven substantial adjustments. However, with regard to all kinds of tea, the tax rebate rate was kept at 5 percent with no change. Due to the steady increase of revenue from the export of tea, it can be said that the implementation of the export tax rebate policy has had a positive impact on the tea export market. For participating export firms, the export tax rebate policy decreases the tax burden and lowers the cost of production indirectly. For the government, the export tax rebate encourages exports that generate foreign exchange revenue.

The contribution of this paper is to explore the effects of the export tax rebate policy on the green tea market. Questions about whether increased tax rebates can increase export revenues from China’s tea market or whether other tariffs can affect the green tea market will be discussed in this paper. I analyze this set of questions by using an Equilibrium Displacement Model and by identifying key parameters that have important effects on the green tea export market.

History of the Export Tax Rebate policy

The Export Tax Rebate is a tax rebate policy on export goods to refund the actual payment of the products tax, value added tax, business tax and special consumption tax in the domestic production and distribution process. It is an important part of a country's taxation system and is commonly practiced in international trade. By returning the indirect taxes that are already paid by exporting firms, export rebate balances the tax burden of domestic products. The goal of an export rebate policy is to export goods at their tax-free price in order to increase competition with foreign commodities and thereby benefit from more revenue as foreign currency. As far as the World Trade Organization (WTO) is concerned, the export tax rebate is not considered a subsidy as long as the rebate does not exceed the amount of tax paid to domestic tax authorities.

In China, the idea of export rebate policy began to emerge as early as the 1950's. Due to an imperfect export taxation system, the export tax rebate was in the position of confusing and was even suspended for several years. An export rebate policy was implemented officially in April, 1985. The first stage of China's export rebate policy was 1985 to 1993. Because the value added tax had not been set up perfectly, the rate of the export rebate was too low, at an average of 11.2 percent. Before 1988, export enterprises only got the return of the value added tax of the production process and the products tax of the final selling. In 1988, the "full refund" principle was established which stipulated that export enterprises can also get the tax rebate of other distribution processes. Then in 1994, the export tax rebate entered the second stage. The Chinese government implemented a widespread tax system reform. The industrial and commercial standard tax was abolished and a new value added tax (VAT) was introduced instead. The base

rate of the VAT was 17 percent for non-agricultural products, and 13 percent for agricultural products. However, for export products the VAT was zero. Generally speaking, a good sold by a retailer for domestic consumption should include a 17 percent value added tax (VAT) for non-agricultural products or a 13 percent VAT for agricultural products. If a good is exported by a retailer for international trade, then the retailer does not need to pay the value added tax. Also the retailers for international trade get the rebated tax, which is taxed in the production and distribution processes, while retailers for domestic consumption do not. By implementing the new taxation system, export firms expanded exports thus increased the amount of the export tax rebate. Cui (2003) argues that the export tax rebate increased to 45 billion Yuan in export trade in 1994, which was 150 per cent higher than in 1993. However, tax reformers also caused a problem in that the export tax rebate consisted of one-fifth and up to one-third of the central government's total expenditure from 1991 to 1997. Thus, in 1995 and 1996, the government adjusted the rate of the export rebate twice. And in 1998, to counter the impact of the Asian Financial Crisis, the export rebate rate was increased again by the government to encourage exports. The reform of 1998 continues to be the current policy (see Cui (2003) for a more detailed discussion of the policy)

Section II. Related research

i. EDM model

The Equilibrium Displacement Model (EDM) is an efficient method for applied policy analysis such as that conducted in this thesis. Piggott (1992) points out that markets are characterized by a set of demand and supply functions, which are affected by changes of exogenous variables. These kinds of disturbances can be approximated by linear elasticities in EDM functions. An EDM can be thought of as "comparative static analysis of general function models" (Piggott, 1992). It not only provides an easy and clear way to generate hypotheses, but also make the basic economic relationships easy to understand, such as supply and derived demand curves (Muth, 1964). Also, the EDM model provides an elegant framework for welfare analysis (Sun and Kinnucan, 2001).

In this paper, I try to connect two levels of markets, the farm-level market and the retail market. The export tax rebate policy and other taxation instruments will induce price transmissions and quantity changes in both markets. Thus, I will consider the Muth model (1964) as a reference. In Muth's research on derived demand, two factors of supply affected output. Between the factors A and B, the substitution effect exists to affect the price of factor A and B. By using the reduced form equations in an application on housing and urban land economics, Muth (1964) defined changed technology as an exogenous variable, which can affect output and also factors in the supply market. Muth (1964) generalized model to consider two or more industries. Each raw material market was treated as a different industry to aggregate demand of supply market.

Gardner (1975) develops simultaneous equation market equilibrium among three related markets: the retail market, farm market and marketing services. The impact of the farm market and marketing services determined the output of the retail market. And these factors were affected by a set of exogenous variables, such as weather and taxes. Depending on the movement arising from a shift in retail demand, farm supply or supply of marketing inputs, prices in the three related markets moved together, but in different ways.

Kinnucan et al. (2000) analyzed the effectiveness of USDA's non-price export promotion efforts. Three instruments were analyzed for their effectiveness on non-price promotions: consumer promotion, trade servicing and technical assistance. Based on the Muth model, Kinnucan et al. (2000) created equations to explain relationships between the farm and retail markets. The reduced form model showed that consumer promotion had a positive effect on derived demand, while trade servicing and technical assistance could be positive or negative depending on conditions.

ii. Research on the green tea market

To illustrate the export rebate policy on the Chinese green tea market, it is necessary to know the situation of the green tea market, both the domestic market and the export market. Through the analysis of the domestic tea market, Xu (2010) explains the structure of the domestic tea market of China. Xu (2010) finds that because China is a large tea-producing country, the domestic tea market is characterized by monopolistic competition. Sixty percent of tea products are consumed domestically. Thus, numerous tea dealers fill the domestic market with supply and offer more choices to consumers. In addition, a blocked information channel and unsymmetrical

information lead the domestic tea market to be a monopolistic competition market (Xu, 2010. pp: 3). This kind of market has a steeply sloping demand curve which can gain more revenue. In recent years, higher quality tea with higher prices and diverse categories appeared in the domestic market (Xu, 2010. pp: 2). However, there is still a large amount of tea produced by mechanization and mass production which is called undifferentiated bulk tea. Due to its unified low price and low cost of production, most export green tea is undifferentiated bulk green tea in the export market (Xu, 2010. pp: 2). Therefore, in our problem, the green tea for consumption and export is undifferentiated bulk green tea.

For the export market, increased world competition induced the Chinese government to implement a new tax policy. Wang and Pan (2004) mention that green tea export sales decreased continually from 1993 to 2000 (except in 1998) due to the growth in tea production in other countries. Wang and Pan (2004) used an econometric model to determine the effect of a price change on export sales. The low revenues of tea exporters are the result of the low price elasticity of tea exports, which is a value of 0.17 (Wang and Pan, 2004. pp: 5). In addition, the low price encourages increased world demand for exported tea. Therefore, the export rebate policy was implemented, which not only brings down the price of tea exports but also protects the revenues of exporters.

Fang (2003) argues that due to the relatively small amount of green tea consumed in foreign countries, the export elasticity of green tea is small. In addition, green tea for export is mainly undifferentiated bulk tea with strong competition among the exporters. Fang (2003) argues that the strong competition lowered the export price of green tea. A constant decrease in the world

price of green tea is from $1557 per ton in 1999 to $1188 per ton in 2002.

Section III. Methodological Model

In recent years, expanding demand of the green tea market induced the Chinese government to promote the export market continually. The average quantity of China's green tea exports is around 156,000 tons, which is about 83 percent of total world exports (FAO, 2000). The export tax rebate policy is one of the measures used to promote exports. In addition, when we talk promoting about the export market, the corresponding effect on the domestic market cannot be disregarded. Although the export tax rebate policy is only used for export commodities, the domestic price can be affected by a change in the export price, because the whole market is shared by both domestic and export markets, so changes in one market have to affect the other. In addition, the value added tax is applied to commodities for domestic consumption only. And the input tax is imposed on retailers when they buy green tea from farm producers, although they can get a refund as long as they export green tea. In conclusion, a domestically consumed good includes input tax and value added tax (VAT), while an exported good includes input tax and export tax rebate, but no VAT. That being the case, the VAT acts as an implicit export subsidy (see figure 1). Thus, it is necessary to investigate the relationship between the retail level market and the farm level market.

In this section, I present an Equilibrium Displacement Model (EDM). In the EDM, I consider green tea as a homogeneous commodity. At the retail level of the model, the domestic consumption, supply quantity, export quantity and the domestic retail price, retail supply price (before VAT) and export price are endogenous variables. For the farm level market, farm supply, farm demand and both the price of supply and demand are endogenous variables. At both levels,

the export tax rebate, the value added tax (VAT) and the input tax are exogenous variables.

Additional assumptions include:

a) Open economic market (includes domestic market and export market)

b) Competitive market clearing (Price is determined by both sellers and buyers)

c) The law of One Price holds (identical goods should sell for the same price throughout the world if trade were free and frictionless)

d) Demand is downward sloping; supply is upward sloping

With these assumptions, we can set up the structural model.

Structural Model:

Retail Market:

1) $D^R=D^R(P_R^d)$ (Domestic demand at Retail market)

2) $S^R=S^R(P_R^s, P_F^s)$ (Domestic supply at Retail market)

3) $X^R=X^R(P_R^x)$ (Export demand at Retail market)

4) $P_R^d=P_R^s \cdot VAT$ (where $VAT=1+\tau^R$) (Domestic demand price at Retail market)

5) $P_R^x= P_R^s \cdot ART$ (where $ART=1-\delta$) (Export price at Retail market)

6) $P_R^s= P_F^d \cdot \Pi$ (where Π is a fixed profit rate earned by the retail firms)

7) $S^R=D^R+X^R$ (Retail market equilibrium)

Farm market:

8) $Q_D^F=D^F(P_F^d)$ (Demand at Farm market)

9) $Q_S^F=S^F(P_F^S)$ (Supply at Farm market)

10) $P_F^d= P_F^s \cdot T^F$ (where $T^F=1+\tau^F$) (Domestic supply price at Retail market)

11) $Q_D^F=Q_S^F=Q^F$ (Farm market equilibrium)

The tax rate of the export rebate is δ. Because the export tax rebate is a kind of subsidy in the way of a tax return, the ad valorem subsidy is represented as the After-Rebate Tax (ART) in this paper. The two other exogenous variables are the input tax (T^F) and the value added tax (VAT), which are levied on retailers. The input tax (T^F) is charged by the government when retailers buy green tea from farm producers. The value added tax (VAT) is only imposed when retailers sell green tea to the domestic market. There is no VAT for export commodities. The signs of τ^R and τ^F are positive. Thus, as the equations 4) and 5) show, the export price P_R^X is determined by the supply price of the retail market P_R^S and the ad valorem After-Rebate Tax (ART). The domestic price P_R^d is also related to the supply price of the retail market P_R^S, but with the VAT influence. Of course, the supply price at the retail market P_R^S should be higher than the farm demand price P_F^d so that the retail firms can make a profit. In this case, I assume profit to be a fixed rate Π. I do not discuss the effect of the profit rate Π in my paper. It is simply needed to distinguish the price of retail supply and farm demand. In the farm level market, the demand price P_F^d is determined by the supply price P_F^s and the input tax T^F.

Therefore, it is possible to set up an equilibrium relation for supply and demand in both the farm level market and the retail level market. The key variable that connects the two levels of markets is the supply price of the retail market (P_F^d). It is the taxed price of farm supply and the before-profit price of retail supply. When the tea farmers purchase the raw material, tools and labor forces for producing tea, they have already paid the input tax for those materials. Therefore, when the retailers buy the tea from tea farmers, the input tax charged to the retailers is an amount

of money used to compensate the famers for the cost of purchasing production materials. Thus, if the input tax increases, the cost of the production process in the farm level market will increase first, which causes the farm supply price (P_F^S) to increase first, then the farm demand price (P_F^d). For this reason, the retail supply market (S) is related to the farm supply price and retail supply price.

Finally, the quantity of green tea exported, X, and the domestic market, D, form the whole market, which should equal the quantity of green tea supplied to the market, S. For this paper, I want to find out the effect of the exogenous variables: value added tax (VAT), input tax (T^F) and After-Rebate Tax (ART). Therefore, I rewrite equations 1) through 11) in equilibrium displacement form as follows:

EDM-Equilibrium displacement model:

Retail market:

12) $D^R* = \eta_R^d \cdot P_R^d*$ $(\eta_R^d < 0)$

13) $S^R* = \varepsilon_R^s \cdot P_R^s* - \varepsilon_F^s \cdot P_F^s*$ $(\varepsilon_R^s \geq 0, \varepsilon_F^s > 0)$

14) $X^R* = \eta_R^x \cdot P_R^x*$ $(\eta_R^x < 0)$

15) $P_R^d* = P_R^s* + VAT*$

16) $P_R^x* = P_R^s* + ART*$

17) $P_R^s* = P_F^d* + \Pi*$

18) $S^R* = kd \cdot D^R* + kx \cdot X^R*$ $(kd+kx=1)$

Farm market:

19) $Q_D^F* = \eta_F^d \ P_F^d*$

20) $Q_S^F* = \varepsilon_F^s \ P_F^S*$

21) $P_F^d* = P_F^s* + T^F*$

22) $Q_D^F* = Q_S^F* = Q^F*$

where $D^R* = dD^R/D^R$ denotes a proportional change in the quantity demanded (D^R). This pattern is also applied to S^R* and X^R*, which indicates the proportional change in the quantity supplied (S^R) and the quantity exported (X^R). In this step, I get the equations 12) through 22) in proportional change form by totally differentiating equations 1) through 11). Thus, the coefficients on the P_i^j* terms are elasticities: η_R^d (<0) is the elasticity of domestic demand with respect to the price of domestic consumption. η_R^x (<0) is the demand elasticity of export with respect to the price of export. In addition, ε_R^s (≥0) is the elasticity of domestic supply with respect to the domestic supply price at the retail market. ε_F^s (>0) is the elasticity of supply with respect to the supply price at the farm level market. An increase in the farm price raises retailers' cost will cause their supply curve to shift to the left since they purchase less of the products. Also, η_F^d (<0) is the elasticity of demand with respect to the demand price at the farm level market. Specially, ART*, VAT* and T^F* are also represented as proportional changes in the after-rebate tax rate, the VAT rate and the input tax rate, respectively. kd= $\frac{D^R}{S^R}$ and kx= $\frac{X^R}{S^R}$ are the shares of total domestic supply held by domestic consumption and exports. All the equations from 12) to 22) implicitly define the ten endogenous variables as functions of the three exogenous variables, the value added tax rate (VAT), the after-rebate rate (ART) and the input tax rate (T^F).

By imposing the market-clearing conditions in equations 14) and 18), all the proportional change variables in the two levels of markets can be represented by the three exogenous variables for easy analysis. Thus, the systematic equations can be specified in reduced form as follows:

Reduced form

$D=\varepsilon_R^S+\varepsilon_F^S-k_d\ \eta_R^d-k_x\ \eta_R^x$ (Denominator function)

23) $P_R^s*=\frac{\varepsilon F^s}{D}\cdot T^F*+\frac{kd\cdot\eta R^d}{D}\cdot VAT*+\frac{kx\cdot\eta R^x}{D}\cdot ART*+\frac{\varepsilon F^s}{D}\cdot\Pi*$

24) $P_F^s*=\frac{kd\cdot\eta R^d+kx\cdot\eta R^x-\varepsilon R^s}{D}\cdot T^F*+\frac{kd\cdot\eta R^d}{D}\cdot VAT*+\frac{kx\cdot\eta R^x}{D}\cdot ART*$

$+\frac{kd\cdot\eta R^d+kx\cdot\eta R^x-\varepsilon R^s}{D}\cdot\Pi*$

25) $P_R^d*=\frac{\varepsilon F^s}{D}\cdot T^F*+\frac{\varepsilon R^s+\varepsilon F^s-kx\cdot\eta R^x}{D}\cdot VAT*+\frac{kx\cdot\eta R^x}{D}\cdot ART*+\frac{\varepsilon F^s}{D}\cdot\Pi*$

26) $P_R^x*=\frac{\varepsilon F^s}{D}\cdot T^F*+\frac{kd\cdot\eta R^d}{D}\cdot VAT*+\frac{\varepsilon R^s+\varepsilon F^s-kd\cdot\eta R^d}{D}\cdot ART*+\frac{\varepsilon F^s}{D}\cdot\Pi*$

27) $P_F^d*=\frac{\varepsilon F^s}{D}\cdot T^F*+\frac{kd\cdot\eta R^d}{D}\cdot VAT*+\frac{kx\cdot\eta R^x}{D}\cdot ART*+\frac{kd\cdot\eta R^d+kx\cdot\eta R^x-\varepsilon R^s}{D}\cdot\Pi*$

Because the profit rate (Π) is a fixed rate for retail firms and it is not affected by the other three exogenous variables, this part of the equations can be treated as constants, and they will not be discussed. Therefore, to simplify, all the parts involving profit can be rewritten as constants using variations of the symbol Ω.

23)' $P_R^s*=\frac{\varepsilon F^s}{D}\cdot T^F*+\frac{kd\cdot\eta R^d}{D}\cdot VAT*+\frac{kx\cdot\eta R^x}{D}\cdot ART*+\Omega$

24)' $P_F^s*=\frac{kd\cdot\eta R^d+kx\cdot\eta R^x-\varepsilon R^s}{D}\cdot T^F*+\frac{kd\cdot\eta R^d}{D}\cdot VAT*+\frac{kx\cdot\eta R^x}{D}\cdot ART*+\Omega'$

25)' $P_R^d* = \frac{\varepsilon F^S}{D} \cdot T^F* + \frac{\varepsilon R^S + \varepsilon F^S - kx \cdot \eta R^x}{D} \cdot VAT* + \frac{kx \cdot \eta R^x}{D} \cdot ART* + \Omega$

26)' $P_R^x* = \frac{\varepsilon F^S}{D} \cdot T^F* + \frac{kd \cdot \eta R^d}{D} \cdot VAT* + \frac{\varepsilon R^S + \varepsilon F^S - kd \cdot \eta R^d}{D} \cdot ART* + \Omega$

27)' $P_F^d* = \frac{\varepsilon F^S}{D} \cdot T^F* + \frac{kd \cdot \eta R^d}{D} \cdot VAT* + \frac{kx \cdot \eta R^x}{D} \cdot ART* + \Omega'$

Finally, the other endogenous variables, the demand and supply quantities, can be represented as follows:

28) $D^R* = \frac{\varepsilon F^S \cdot \eta R^d}{D} \cdot T^F* + \frac{(\varepsilon R^S + \varepsilon F^S - kx \cdot \eta R^x) \cdot \eta R^d}{D} \cdot VAT* + \frac{kx \cdot \eta R^x \cdot \eta R^d}{D} \cdot ART* + \Omega_R^D$

29) $X^R* = \frac{\varepsilon F^S \cdot \eta R^X}{D} \cdot T^F* + \frac{kd \cdot \eta R^d \cdot \eta R^X}{D} \cdot VAT* + \frac{(\varepsilon R^S + \varepsilon F^S - kd \cdot \eta R^d) \cdot \eta R^X}{D} \cdot ART* + \Omega_R^X$

30) $S^R* = \frac{kd \cdot \eta R^d \cdot \varepsilon F^S + kx \cdot \eta R^x \cdot \varepsilon F^S}{D} \cdot T^F* + \frac{kd \cdot \eta R^d \cdot (\varepsilon R^S + \varepsilon F^S)}{D} \cdot VAT* + \frac{kx \cdot \eta R^x (\varepsilon R^S + \varepsilon F^S) \cdot}{D} \cdot ART* + \Omega_R^S$

31) $Q_F^d* = Q_F^s* = \frac{\varepsilon F^S \cdot (kd \cdot \eta R^d + kx \cdot \eta R^x - \varepsilon R^S)}{D} \cdot T^F* + \frac{\varepsilon F^S \cdot kd \cdot \eta R^d}{D} \cdot VAT* + \frac{\varepsilon F^S \cdot kx \cdot \eta R^x}{D} \cdot ART* + \Omega_F$

As can be seen from the reduced form equations, all ten endogenous variables are represented by the elasticities combined with three exogenous variables. The price and the quantity can increase or decrease due to the exogenous variables impacts according to the different signs of the elasticity terms. These changes are the result of implementation of the export tax rebate policy, the input tax and the value added tax. I will discuss these proportional changes with specific application to China's green tea market in section V.

Section IV: Data

Research on Elasticity of the Tea Market

In implanting the EDM, use the supply and demand elasticities at the farm level and retail level markets for both domestic and export markets. Taking Weerahewa's research as a reference, the estimated elasticities of green tea supplies for India, Kenya and Sri Lanka are 0.0791, 0.2268 and 0.2060 respectively, and the corresponding elasticities of demand are -0.4720, -0.1556 and -0.1237 (Weerahewa, 2003. pp: 1). In deriving those values, the author developed a partial equilibrium model that was econometrically estimated using the two-stage least square procedure. Because India, Kenya and Sri Lanka are the major exporting countries after China, these elasticity estimates are important factors in estimating an EDM for the Chinese green tea market. In addition, the analysis of the tea market by FAO shows that the demand elasticity of India green tea is close to unity (-0.98), and much less elastic than coffee, which is -1.78 (FAO Report, 2012. pp: 3). In Japan's green tea market, the demand elasticity is -0.69 (FAO Report, 2012. pp: 9). The demand elasticity in China is -0.909 (FAO Report, 2012. pp: 8).

Su and Tong (2001) use OLS regression to estimate the demand elasticity for the Chinese domestic tea market. When they consider income effect only in the model $\mathbf{Y_i=\alpha \cdot X_1^{\beta 1}\, e^m}$, where X_1 is income, it shows that the domestic demand elasticity of tea in the 1960s reaches as high as 5.073 then dramatically decreases to 0.813 in the 1980s. The dramatic change indicated that the consumption of tea increased as the income increased. While adding the price effect in the model, $\mathbf{Y_i=\alpha \cdot X_1^{\beta 1} \cdot X_2^{\beta 2}\, e^m}$, where X_2 is price, the coefficient on the price effect was insignificant during a period when income increased dramatically.

Also in Xu (2010), the demand elasticity in most western countries can be bigger than one due to substitution effects with coffee, soda or milk. In contrast, with the cultural effect in China, tea is considered a necessity such as rice, which is eaten every day, in which case, the demand elasticity will be a small value. We will discuss particular values of elasticity in Section IV.

Data Judgment

Based on econometric studies of the tea market, we calibrate the model using our best judgment of the correct values for the structural elasticities of supply and demand. In the model, all the equations and variables are represented by four elasticities, which are the supply elasticity of the retail level market (ε_R^S), the supply elasticity of the farm level market (ε_F^S), and the demand elasticities of the export and domestic markets (η_R^X, η_R^d). Thus, in this section, I introduce these four elasticities taken from previous studies.

In the 1980's, the value of the domestic demand elasticity of China's green tea (η_R^d) was -0.813 (Su and Tong, 2001). A recent report by FAO (2012) stated that the demand elasticities of the domestic green tea retail market were -0.985 for Indian and -0.909 for China. Therefore, I estimated the value of the domestic demand elasticity for China's green tea by taking the mean value of -0.813 (from Su and Tong's paper (2001)) and -0.909 (in the FAO report (2012)).

For the export demand elasticity (η_R^X), green tea is a major part of China's tea export market and it is still a regionally consumed commodity, although the amount of foreign consumption has grown in recent years. Thus, export demand will be more elastic than domestic demand. In the paper on optimum tariffs for differentiated products with application to Indian tea exports (Vishwasrao and Bosshardt, 1996), two-stage least squares regression was used to find key

effects on the differentiated qualities of Indian tea exports. This regression was also used to estimate the export elasticities to get the optimum tariffs on the exports. By separating tea exports between north India and south India, Vishwasrao and Bosshardt estimated the exported demand elasticities of high quality tea (produced in north India) and low quality tea (produced in south India). They got the tea export elasticities in values of -0.28 of high quality and -1.43 of low quality. Because China, as well as India, is one of the large export countries of tea, especially green tea, and the variety of Chinese green tea exports is undifferentiated bulk tea, we can use the export elasticity of low quality tea in India as our reference since it is more comparable to Chinese green tea than the high quality India tea. Thus, using these references, I estimate the absolute value of export demand elasticity of China's green tea to be as big as 1.25, which is between the 0.23 and 1.43 absolute values.

For the retail supply elasticity (ε_R^S), we can also get some values from Weerahewa (2003). The estimated values of the retail supply elasticity of all kinds of tea are 0.0791, 0.2268 and 0.2060 for India, Kenya and Sri Lanka. However in the Chinese green tea market, as a result of the increased domestic price and the increased export quantity, the green tea producers' enthusiasm was activated by Xu's research (2010). Therefore, as the estimated method of domestic demand elasticity (η_R^d), I estimate a relatively large value of the farm supply elasticity of China green tea market. This value can be 0.78.

The final elasticity we need to know is the supply elasticity of the farm level market (ε_F^S). Because the elasticity at the farm level can be estimated from the elasticity at the retail level (Tomek and Robinson, 2003), we can get conjectural value of the supply elasticity (ε_F^S) at the

farm level by using equation 32) $E_d=E_r\ (P_d/P_r)$,

where d= derived (farm) level,

r=primary (retail) level and,

P=price, and E=elasticity.

Therefore the calculation process for the farm level supply elasticity (ε_F^S) is :

$$E_d=E_r\ (P_d/P_r)= E_r\ (P_F^d/P_R^d)= E_r \frac{P^S R/(1+\Pi)}{P^S R\cdot(1+VAT)} = \frac{1}{(1+VAT)\cdot(1+\Pi)} E_r$$

By assuming the rate of VAT is 13% and the rate of profit earned Π is 20%, then the value of China's green tea supply elasticity at farm level is 0.56.

In addition, about two third percent of tea was consumed domestically (Xu, 2010). Thus, I assumed that the domestic share of green tea (k_d) is 66% and the export share of green tea (k_x) is 34%. Using all these assumptions, the estimated values of the four elasticities are shown in Table-4.2

Table 4-2: The estimated elasticity value

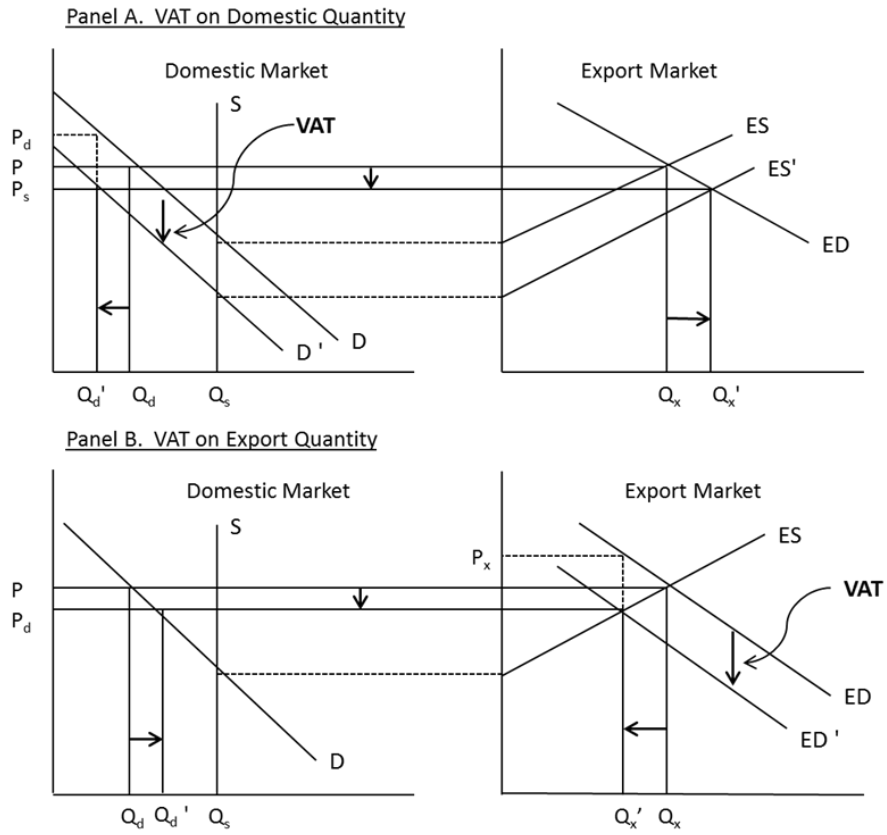
ε_R^s	0.78
ε_F^s	-0.58
η_R^x	-1.25
η_R^d	-0.86
k_d	66%
k_x	34%
VAT *	13%
Export tax rebate rate*	5%
Profit rate (Π)	20%

* is the tax rate for agricultural products.

Section V: Analysis and Discussion

In this section, I use specific data to analyze and discuss the effect of the export tax rebate policy on China's green tea market. The export tax rebate can be thought of as a kind of subsidy by the central government. To encourage the exports, the government tries to lower the export price of green tea without diminishing the revenue of exporters. Thus, the export tax rebate policy was implemented on the green tea market. The government returns the tax from the production and distribution processes to the export retailers. In this way, China can export green tea to the international trade for a price that excludes taxes. The government brings the export price down through this method and protects the green tea retailers' revenues simultaneously. Along with the green tea export price decreases, the export supply is boosted and a large amount of green tea is exported to foreign counties. At the same time, it also affects the domestic market. A larger amount of green tea is exported, which can lead to a decrease in the domestic supply. The domestic price of green tea goes up correspondingly. The effect of an export rebate policy on the domestic and export markets is illustrated in Figure 1.

Figure 1. Price and Quantity Effects of a VAT for a Large Exporter

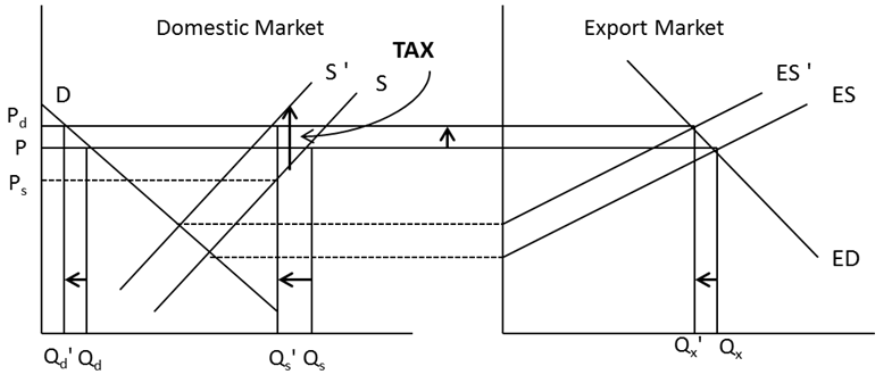


A VAT on domestic consumption places a wedge between the price that domestic consumers pay for green tea and the price that domestic producers receive. It also lowers the export price and thus acts as an implicit export subsidy. Specifically, referring to panel A, an increase in the VAT on domestic consumption causes the equilibrium quantity of exports to increase and the equilibrium net farm price to decrease. A VAT on exports, on the other hand, places a wedge between the price that foreign buyers pay for Chinese green tea and the price that domestic producers receive. It also lowers the price of green tea in the domestic market, which benefits domestic consumers at the expense of domestic producers. Referring to panel B, a decrease in

the VAT on exports (which is analytically equivalent to an increase in the ART) causes the equilibrium quantity of exports and the net farm price both to increase. These results are shown in figure 1, in which, to keep the diagrams simple, I have assumed that domestic supply is fixed.

Turning to the input tax, a tax on green tea purchased by domestic retailers places a wedge between the price paid by domestic consumers and the price received by domestic producers. It also raises the export price of green tea shipped from China, and thus acts as an implicit export tax (see figure 2).

Figure 2. Effects of a Per Unit Tax on Domestic Production for a Large Exporter



Referring to figure 2, an increase in the input tax causes the equilibrium quantity of exports and the equilibrium net farm price both to decrease. Thus, it works in opposition to the export tax rebate as an implicit export tax. Although the government tries to encourage the export, they do not want to lose more revenue from the domestic market, which is much larger than the export market. The government gets the revenue from the retailers by charging the input tax and balances the benefits with the export tax rebate. In conclusion, the consequence is that Chinese green tea farmers are harmed by an increase in the VAT and input tax, and are benefited by an

increase in the ART.

The following is an explanation of how the exogenous variables, which are the value added tax, input tax and after-rebate tax, affect price and quantity at the farm level market and retail level market. By substituting the data from Table 4-2 into the reduced form equations 24') to 31), we can get the specific values of each elasticity term. These numbers represent the percentage change caused by the exogenous variables. Table 5-1 shows the specific value of each term.

Table 5-1: The calculated value of coefficients (elasticity terms) of each exogenous variable

	T^F*	VAT*	ART*	Π*
P_R^S*	0.247	-0.241	-0.181	Ω
P_R^d*	0.247	0.759	-0.181	Ω
P_R^x*	0.247	-0.241	0.819	Ω
P_F^d*	0.247	-0.241	-0.181	Ω′
P_F^s*	-0.753	-0.241	-0.181	Ω′
D^R*	-0.212	-0.653	0.156	Ω_R^D
X^R*	-0.309	0.301	-1.024	Ω_R^X
S^R*	-0.244	-0.329	-0.246	Ω_R^S
Q^F*(Q_F^D*,Q_F^S*)	-0.437	-0.140	-0.105	Ω_F

Because Π* is the profit change obtained by the retailers and it is used only to transmit the price of farm demand (P_F^d) to retail supply (P_R^S), we will not discuss the effect of the profit rate. We can consider Ω as a fixed value that represents the firm's profit. An increased value for the

after-rebate tax (ART*), which is equal to 1- δ , implies that the export tax rebate rate was decreased. On the other hand, if the export tax rebate rate increases, then it indicates a decreased value of after-rebate tax (ART*).

Farm Level Market

From the empirical result shown in Table 5-1, we can get the following results. Firstly, at the farm level market, an increase in any one of the instruments reduces the net price (P_F^S) received by farmers, as expected based on figure 1 and 2. If the input tax increases 1 percent, the supply price of green tea will decrease 0.753 percent. If the value added tax increases 1 percent, the supply price of green tea will decrease 0.241 percent. If the after-rebate tax increases 1 percent, the rate of tax rebate on the green tea market is decreased, then the price of farm supply will decrease 0.181 percent. These changes are proportional for farm demand price except for the effect of the input tax. When the input tax increases one percent, the price of farm demand will increase 0.247 percent. Between the different changes of supply price and demand price at the farm level market, we can conclude that the input tax has more effect on green tea's farm level market than the other two exogenous variables. Because green tea's farm level market is affected by the retail market, the purchasing price by the retailers decides the price of green tea's production. Due to a higher rate of input tax imposed on retailers, they strive to decrease the farm demand price, which is the purchasing price, to protect their revenues. In this case, the green tea producers should bring down the farm supply price to gain more profit.

The value added tax and export tax rebate have the effects on the retail market. Then the changes of retail supply and demand price will affect the farm level market. Correspondingly, the

quantity of green tea at the farm level market is negatively affected by these three exogenous variables. When the input tax, value added tax and after-rebate tax increase 1 percent separately, the quantity of green tea's supply will decrease 0.437 percent, 0.140 percent and 0.105 percent respectively. It is clearly seen that the quantity of farm supply decreases very little with an increase in the after-rebate tax. This is because the export market has a relatively small share of the whole green tea market.

Retail Level Market

The value added tax and export rebate have more effect on the retail market than on the farm level market. As equation 17) shows, the only difference between the retail supply price and farm demand price is the profit gained by the retailers. Thus, compared to the price of farm demand, the three exogenous variables have the same effects on the retail supply price. Therefore one percent increase in the input tax will increase the price of retail supply by 0.247 percent. If the value added tax increases one percent, the retail supply price of green tea will decrease 0.241 percent. And if the rate of the export tax rebate decreases one percent, (i.e. the value of the after-rebate tax increases one percent), then the price of retail supply will decrease 0.181 percent.

In the retail demand market, the results come from the price of domestic consumption (P_R^d) and the export price (P_R^x). Because the value added tax is a major tax on the retail green tea market, the percentage increase of the value added tax will have a relatively large and positive effect on the domestic consumption price. When the value added tax increases by one percent, the domestic price at the retail level will increase by 0.759 percent. The export tax rebate also affects the domestic retail price even though it is only directly applied to export commodities. If

the rate of the export tax rebate increases one percent, the value of the after-rebate tax will decrease by one percent, and the domestic price will increase by 0.181 percent. For the export price (P_R^x), the export tax rebate has a dominant effect. Given the way the ART is modeled, as figure 1 shows, an increase in ART is equivalent to an increase in the VAT on exports. An increase in input tax T^F and ART reduces exports, while an increase in VAT increases exports. If the rate of export tax rebate increases one percent, then the export price of green tea will decrease 0.819 percent. Relatively, the quantities of green tea in the retail market are affected most by the value added tax and the export tax rebate. Compared to the farm level market, the supply of the retail market is affected more but negatively. There will be a 0.329 percent decrease in green tea supply if the value added tax increases by one percent. The subsidy of the export tax rebate will bring a 0.246 percent decrease if the value of the after-rebate tax increases by one percent. Because domestic consumption has a larger share of the whole market, these changes caused by the export tax rebate policy seem proportionally smaller. Besides, the retail supply is also affected by the input tax. When the input tax increases by one percent, the amount of retail supply will decrease by 0.244 percent due to the higher purchasing price from the farm level market.

Lastly, the retail demand market for green tea is separated into two markets, which are the domestic market and the export market. Relatively speaking, the domestic market is more affected by the value added tax, while the export market is more affected by the export tax rebate. In the domestic market, the amount of green tea will decrease by 0.212 percent when the input tax increases by one percent. If the value added tax increases by one percent, then domestic

consumption of green tea will decrease by 0.653 percent due to the higher demand price. And if the rate of the export tax rebate decreases, more green tea will enter the domestic market and the amount of domestic demand will increase by 0.156 percent due to the one percent increase in the after-rebate tax. In the export market, the amount of green tea will decrease by 0.309 percent when the input tax increases by one percent. If the value added tax increases by one percent, then the amount of exported green tea will increase by 0.301percent. The increased value added tax will lead to a higher price and lower quantity of green tea in the domestic consumption market, and the amount of green tea demand will increase in the export market. The export tax rebate policy has the biggest effect on the export market. If the export tax rate decreases by one percent, resulting in a one percent increase of after-rebate tax, then the amount of exported green tea will decrease by 1.024 percent. Overall, it appears that exports are most sensitive to ART and least sensitive to T^F while the net farm price is most sensitive to T^F and least sensitive to ART, and for the domestic consumption market, the VAT plays a more important role.

Section VI. Conclusion

In this paper, I used an Equilibrium Displacement Model to detect the effects of the export tax rebate policy on China's green tea market. While the policy is only implemented on export commodities, we cannot ignore the effects in the domestic green tea market and also in the interrelated farm level market. Therefore, I set up the EDM model with the two markets, and I introduce two other exogenous variables, the input tax and value added tax. The analysis is based on the reduced form equations, which display the effects of the three exogenous variables on the price and quantity in both supply and demand markets at the two levels of markets.

As the results show, the small elasticities of supply at both market levels mean that the percentage changes in quantity supplied are less than the percentage changes in price. These inelastic values in the supply market are due to the strong cultural effect among the Chinese people. A large amount of green tea is consumed by China's domestic market. The changes in the domestic green tea market will affect the whole green tea market. The farm level price is more affected by the input tax imposed on the retailers. It has a negative effect on the price of farm supply and the quantity of the whole retail market, but has a positive effect on the price of the farm demand, because the increased input tax rate will increase the retailers' purchasing price.

Another exogenous variable is the value added tax. Because the value added tax is only imposed on the domestically consumed green tea, it has a strong effect on the price and quantity of domestic green tea consumption. An increased value added tax will increase the domestic consumption price and then reduce the amount of domestic consumption. At the same time, the share of exports will increase and lead to a lower price of exported green tea.

In conclusion, the main effect on the green tea market is the export tax rebate policy. As the result of the tax return, a decreased after-rebate tax means an increased export tax rebate rate. In order to encourage the exports, the decreased after-rebate tax can lead to a lower export price of green tea. Correspondingly, the lower export price and the increased export quantity will decrease the domestic consumption and increase the domestic price of green tea. However, this effect will be smaller due to the larger share of domestic market in the whole green tea market. Therefore, the export tax rebate is an effective policy to boost the green tea export market of China. However, to protect the domestic market, the government should not increase the rate of the export tax rebate blindly. Too low a price in the export market will reduce government revenues, although the quantity is increased due to the higher competitiveness in the world market caused by the low price in the export market. In addition, too high a rate for the export tax rebate will lead to a higher price of domestic consumption. In that way, the government may lose its main profitable market, which is the domestic market. For the green tea producers at the farm level, a boost in the export market price will stimulate green tea production. As long as the input tax is fixed at a reasonable rate, the implementation of the export tax rebate policy will not hurt the producers' revenues unduly.

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