A Study of Anti-Dumping Duty under Fair Trade Rule：An Application on the Case of China Towels in Taiwan

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Ⅰ、Introduction

The World Trade Organization (WTO), its main function is to ensure that trade flows as smoothly, predictably and freely as possible, such as agricultural agreement which is to promote fairness on agricultural trade and service. Other rules such as safeguard agreement, tariff estimation agreement and country of origin agreement are to help fair competition and to achieve efficient trading effects. Only in a few circumstances WTO allows limited competition to maintain the goal of fair trade, for examples, anti-dumping policy and balance taxation policy.

From the aspect of conventional economic theory, not only Ncoclassical approach nor Strategic approach considered anti-dumping policy as a protection cover to the development of domestic target industries. From the statistic data of WTO, there were about 20 to 30 cases per year for anti-dumping cases; however, this number increased rapidly up to 200 cases per year since 1995 which indicates that protecting domestic target industries has been an important policy notion for each country. Up to 2007, there were 3,220 cases under investigation for anti-dumping.

Unfortunately, loose applying anti-dumping measure causes certain damage to export enterprises, including replying complicate investigation process, losing orders and huge amount of money on lawsuit cases. Under a perfectly competitive market, threatened firms are insured for their profit but cause negative effects on other middle and downstream firms. Anderson(1993) analyzed 8 anti-dumping cases during 1989 to 1990 and found that each consumer has to carry cost up to 113,800 dollars and whole society has to carry cost at least 14,300 dollars for increasing one working opportunity of a protected industry.

In an aspect of law, it is not necessary to rule all dumping behaviors unless dumping behaviors damage domestic industries and raise prices to consumers.

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Hence, only those dumping which damage relevant industries to import countries should be forbidden (Qiu, 2005). Moreover, anti-dumping produces clockwise-competitive effect towards international trade and has been treated as a new trading barrier on free trade.

Up to this point, we conclude that collecting duty from anti-dumping benefits producers but could cause negative impacts on social welfare and violate the belief of WTO in the same time. Thus, our goal is to find out the optimal duty on anti-dumping.

We reviewed relevant references and found most of them have difficulties to apply empirical case studies (Webb, 1992; Chen, 2001). Other empirical references are to estimate the impact of anti-dumping duties by using simple statistics. (Hughes, 1997; Zuo, 200). As to the optimal duties, most studies are theoretical. (Schmitz and Seale. 2004; Zhou,2004)

In this paper, we are applying Commercial Policy Analysis System (COMPAS) developed by United States International Trade Commission (USITC) to analyze data empirically. Since mainland China and Taiwan have been members of WTO now, the reactions between mainland China and Taiwan are becoming frequent, especially under the pressure of low labor cost in mainland China. Assume towel market in Taiwan is perfect competition which satisfies the first condition of COMPAS model and we choose the mainland China towel case to be our objective because this is the first case that we switch on anti-dumping measure.

The framework of this paper is as following: the first section is introduction; the second section states the impact of anti-dumping taxation on import countries; section 3 introduces COMPAS model and section 4 provides empirical results and analysis. Section 5 concludes and suggests future works.

Ⅱ、The Impacts of Anti-Dumping Duty

In the international trade theories, so called optimal tariff, is the tariff which achieves maximum social welfare. According to the Act of Taiwan tariff no. 68, the importing prices of goods are far below the prices of analogous domestic goods and cause damage to domestic industry, then the imported goods need to be taxed not only import duty but also anti-dumping tax. Hence, in our paper we define the optimal taxation of anti-dumping is the tax level which achieves maximum social welfare.

Suppose we are small country scale and perfect competition and price taker for

international price, let importing price without dumping is P_w, the domestic production $\overline{OB}$, consumption $\overline{OE}$ and import $\overline{BE}$ are shown in Figure 1. Assume there is a dumping behavior happened and its price is below international price P_1 (suppose international price is the same as domestic price in export country), then the production of import country is $\overline{OA}$, consumption is $\overline{OF}$ and import is $\overline{AF}$. Now we add anti-dumping duty on goods, then the change of price is from P_1 to P_2, domestic supply increases from $\overline{OA}$ to $\overline{OC}$, but consumption decreases down to $\overline{OD}$ same as import shrinks down to $\overline{CD}$. We can see clearly that anti-dumping duty is able to help importing competition ,encourage domestic production and protect domestic industries.

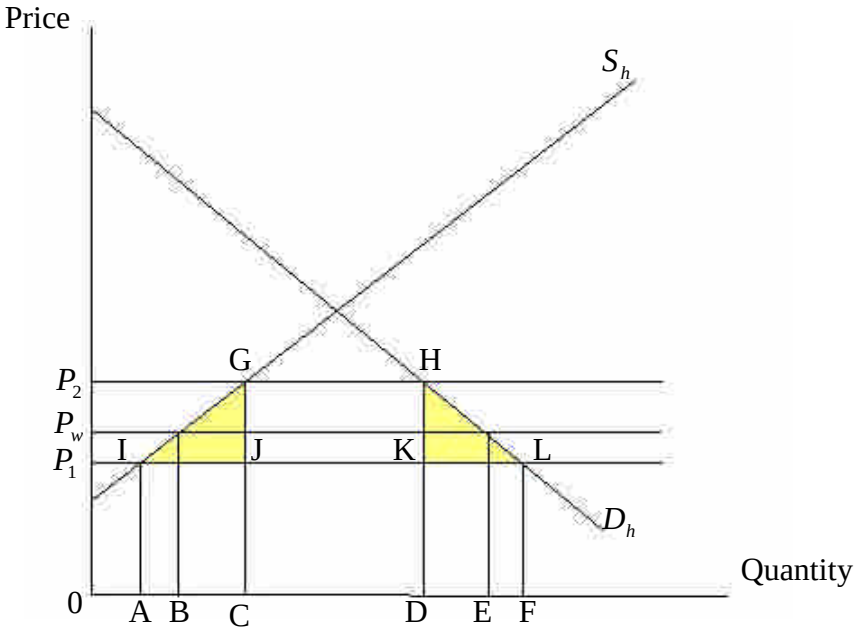

Figure 1. The impact of anti-dumping duty

From the point of view of social welfare, comparing before and after dumping, we found the domestic price of import country increases with collecting anti-dumping duty; total consumption decreases therefore consumption surplus decreases. But anti-dumping duty protects domestic production and then stimulates producer surplus; the total social welfare after adding consumer surplus and producer surplus produces ΔIGJ and ΔKHL net welfare loss which are trade quantity effect and trade condition effect respectively.

Reviewing relevant references regarding impacts of anti-dumping on development of domestic industries and social welfare issues, most of them, so called Neoclassical approach, under the assumption of constant return to scale, considered that anti-dumping policy protects domestic industries from competition but damage downstream industries and consumers. Devault(1996) found that

producer surplus increased at least I million dollars, tax revenues increase 0.149 billion and consumer total loss is 0.625 billion per year after collecting anti-dumping taxation. Total net loss of social welfare in U.S.A is 0.28 billion dollars per year. Wu and Lai (1997) found that there was a net social welfare revenue which is 1.59 billion brought by removing anti-dumping policy proceed in 1991. They concluded that the existence of anti-dumping policy and balance taxation raise cost 1.59 billion to U.S.A economy to induce higher price index and distortion of labor force and capital.

However, changing the assumption to increasing return to scale and to incomplete competition market, anti-dumping policy could either protect relative domestic industries or not hurt downstream industries and consumers. Webb(1992) argued the same point that proceeding anti-dumping policy could benefit domestic producers and consumers. He found that the increase of domestic supply could compensate the decrease of foreign supply under the assumption of incomplete market and decreasing production cost.

Chen (2001)argued the impact of trading transfer on anti-dumping policy and claimed that anti-dumping policy might cause positive social welfare if domestic producers have advantage cost. Hughes (1997) used return rate of stock to find a positive impact of anti-dumping policy to semiconductor industries.

From the above references, we confirmed a positive effect of anti-dumping policy towards domestic industry protection; however, it has different stories from the point of view of consumer and social welfare. Thus, it is worth finding the optimal taxation.

Zhou (2004) claimed that setting optimal anti-dumping duty could be based on evaluating maximum social welfare if substitution effects is the same or weaker between domestic and foreign goods.

Continuing the above statement, we thought the main point is how to correct unfair trade, such as dumping behavior to fair trade; in other words, it should be used to check and balance unfair trade instead of counteracting competition from foreign goods. Our contribution differing from previous references is to apply empirical study by using COMPAS model and analyze the case of dumping behavior of mainland China towel.

Ⅲ、 The Theoretical Structure of the COMPAS Model

The partial equilibrium model plays an important role in the quantitative analysis of trade and trade policy, and its' relative simplicity and economy in terms of data requirements have made it the tool of choice for more narrowly focused trade issues.

In order to have an exact result, our study applies COMPAS model that was developed for the US International Trade Commission (USITC) by Francois and Hall (1993). It is a convenient model, require information on only a handful of key parameters and can be executed in standard spreadsheets. Because our towel market is the competitive market and it fits in with COMPAS model's assumption. Our paper applies this method to measure the effects after dumping.

3.1 The theoretical structure of the COMPAS model

The COMPAS model is based on the hypothesis of Armington (1996) and this hypothesis demonstrates the demand of a particular product which cannot substitute for other goods can poses the different prices in several regions. Assuming that (1) import demands are separable among import sources, (2) elasticity of substitution between all pairs of products within a group are constant, and (3) the size of the market does not affect each country's market share （Shu-Yuan Lee，2006）.

Further relates in detail the COMPAS model the basic assumptions[2]：

1. The demand of import goods is the function of import price and domestic price. And the supply elasticity of import can enlarge infinitely great.
2. Our country similar products demand also for imported price with itself market price function, but supplies only receives the itself market price the influence.
3. Our country similar products' market mechanism to compete completely, the equilibrium price and the output decide in the demand curve and place of the supply curve intersection.
4. The import and our country similar products for substitute not completely （imperfect substitution），Our country similar products demand's reduced scope is smaller than the import demand increases the scope.

[2] The assumptions of COMPAS model consults of Huang(1998).

Following Francois and Hall (2003), we describe the market that we want to analyze with a set of elasticity – i.e., elasticity of supply, aggregate elasticity of demand and elasticity of substitution. We concentrate on one market which has trade with two countries[3].

（1）Elasticity of substitution in the domestic market

$$\sigma_{ij} = \sigma_{ji} = -\frac{d\ln(Q_i / Q_j)}{d\ln(P_i / P_j)}(>0) \qquad (1)$$

σ_{ij} ：elasticity of substitution $(i \neq j)$

Q_i ：quantity of trade for goods made in country i

P_i ：price of goods made in country i

（2）Elasticity of supply to the domestic market

$$\varepsilon_{si} = \frac{d\ln Q_i^s}{d\ln P_i^s}(>0) \qquad (2)$$

ε_{si} ：elasticity of supply of goods made in country i.

Q_i^s ：quantity of trade for goods made in country i.（supply side）

P_i^s ：price of trade for goods made in country i.（supply side）

（3）Aggregate elasticity of demand in the domestic market

$$N_A = \frac{d\ln Q_A}{d\ln P_A}(<0) \qquad (3)$$

N_A ：aggregate elasticity of demand.

Q_A ：aggregate quantity of trade for goods.（demand side）

P_A ：aggregate price of trade for goods.（demand side）

（4）Own-price elasticity of demand in the domestic market

$$\eta_{ii} = \frac{\partial\ln Q_i}{\partial\ln P_i} = \theta_i N_A - \sum_{j\neq i}\theta_j\sigma_{ij} \ldots(<0) \qquad (4)$$

θ_i ：domestic market share (in quantity) of the good made in country i.

[3] The description of COMPAS model consults of Kinjo（2005）。

（5）Cross-price elasticity of demand in the domestic market

$$\eta_{ij} = \frac{\partial \ln Q_i}{\partial \ln P_j} = \theta_j \left(\sigma_{ij} + N_A\right) \ldots (> 0) \qquad (5)$$

Using (2) and (5), the change in demand for the good made in country i in response to a change in its price can be depicted as follows：

$$d \ln Q_i = \eta_{ii} d \ln P_i + \eta_{ii} d \ln P_j + \ldots = \sum_j \eta_{ij} d \ln P_j \qquad (6)$$

we also get the change in supply of goods made in country i as follows：

$$d \ln Q_i^s = \varepsilon_{si} d \ln P_i^s \qquad (7)$$

And then，the condition for market clearing can be written as follows：

$$d \ln Q_i = d \ln Q_i^s \qquad (8)$$

$$P_i^* = P_i^{s*} \qquad (9)$$

$$P_i = P_i^s \qquad (10)$$

Where i P is the equilibrium price for goods made in country I (demand side).

If our study wants to apply COMPAS model to measure the effects of dumping, we must measure the dumping margin that is the difference between the price before dumping and after it.

$$DM = \frac{FV - P}{P}$$

DM ：dumping margin

FV ：the fair price

P ： the price of dumping

In order to identify each country, we use 1 = domestic country, 2 = exporting country A, and 3 = exporting country B. If we assume the tariff (or dumping) is

applied to the goods made in country 2, the equation can be：

$$\begin{cases} \eta_{11}\ln\left(\frac{P_1^*}{P_1}\right)+\eta_{12}\ln\left(\frac{P_2^*}{P_2}\right)+\eta_{13}\ln\left(\frac{P_3^*}{P_3}\right)=\varepsilon_{S1}\ln\left(\frac{P_1^*}{P_1}\right) \\ \eta_{21}\ln\left(\frac{P_1^*}{P_1}\right)+\eta_{22}\ln\left(\frac{P_2^*}{P_2}\right)+\eta_{23}\ln\left(\frac{P_3^*}{P_3}\right)=\varepsilon_{S2}\ln\left(\frac{P_2^*}{P_2^{S\#}}\right) \\ \eta_{31}\ln\left(\frac{P_1^*}{P_1}\right)+\eta_{32}\ln\left(\frac{P_2^*}{P_2}\right)+\eta_{33}\ln\left(\frac{P_3^*}{P_3}\right)=\varepsilon_{S3}\ln\left(\frac{P_3^*}{P_3}\right) \end{cases} \quad (11)$$

If we assume $\varepsilon_{si}-\eta_{ii}\neq 0$, we obtain the solution as follows：

$$\begin{bmatrix} \ln\left(\frac{P_1^*}{P_1}\right) \\ \ln\left(\frac{P_2^*}{P_2}\right) \\ \ln\left(\frac{P_3^*}{P_3}\right) \end{bmatrix} = \begin{bmatrix} -1 & \frac{\eta_{12}}{\varepsilon_{S1}-\eta_{11}} & \frac{\eta_{13}}{\varepsilon_{S1}-\eta_{11}} \\ \frac{\eta_{21}}{\varepsilon_{S2}-\eta_{22}} & -1 & \frac{\eta_{23}}{\varepsilon_{S2}-\eta_{22}} \\ \frac{\eta_{31}}{\varepsilon_{S3}-\eta_{33}} & \frac{\eta_{32}}{\varepsilon_{S3}-\eta_{33}} & -1 \end{bmatrix}^{-1} \begin{bmatrix} 0 \\ \frac{-\varepsilon_{S2}}{\varepsilon_{S2}-\eta_{22}}\ln\left(\frac{P_2^{S\#}}{P_2}\right) \\ 0 \end{bmatrix} \quad (12)$$

Where $\det A = \begin{vmatrix} -1 & \frac{\eta_{12}}{\varepsilon_{S1}-\eta_{11}} & \frac{\eta_{13}}{\varepsilon_{S1}-\eta_{11}} \\ \frac{\eta_{21}}{\varepsilon_{S2}-\eta_{22}} & -1 & \frac{\eta_{23}}{\varepsilon_{S2}-\eta_{22}} \\ \frac{\eta_{31}}{\varepsilon_{S3}-\eta_{33}} & \frac{\eta_{32}}{\varepsilon_{S3}-\eta_{33}} & -1 \end{vmatrix} \neq 0$ (13)

The possibility that either $\varepsilon_{si}-\eta_{ii}\neq 0$ or that det A = 0 cannot be excluded although these are unlikely outcomes. In the event that these values did obtain, some modifications to the above analysis would be necessary. The $P_2^{S\#}$ is the price after tariff or dumping.

3.2 The Applications of COMPAS Model

COMPAS is a package of spreadsheets used to analyze trade-related gain or injure in specific domestic industries as a trade policy change. COMPAS Model is

applied in this research to estimate the influence in USA, Canada and others, because it is easy to work. Huang and Shin (1997) applied it to estimate the effects in steel industry that was caused to antidumping in Taiwan. USITC(1999) use this model to analyze the impacts in Pakistan with export quota of 14 industry productions in U.S.A. Huang(2006) also applied it to measure the damages of tea industry in Taiwan. Lee (2006) added a variable that describes market structure ranging from perfect competition to oligopoly, and applied it on H-beam industry in Taiwan. Jung(2004) applied COMPAS model in U.S.A. tomato industry

According this study, to calculate the parameters of COMPAS model is very import. The Perfect competition is also assumed in the COMPAS model. This assumption, however, may not be appropriate in many cases under investigations. Huang and Shin(1997) pointed out that imperfect market structure of many industries in actually, the Perfect competition assumption will effect the output in measure.

Hence, our research is to amend the COMPAS model that the USITC uses to analyze the impact of unfair trade to a specific domestic industry. This research is different research of literature with above. We apply it to measure the effects of anti-dumping duty with different duty. To find the optimal duty which can make less to our social welfare loss or more advantage to the industry. So the research path is like figure 2.

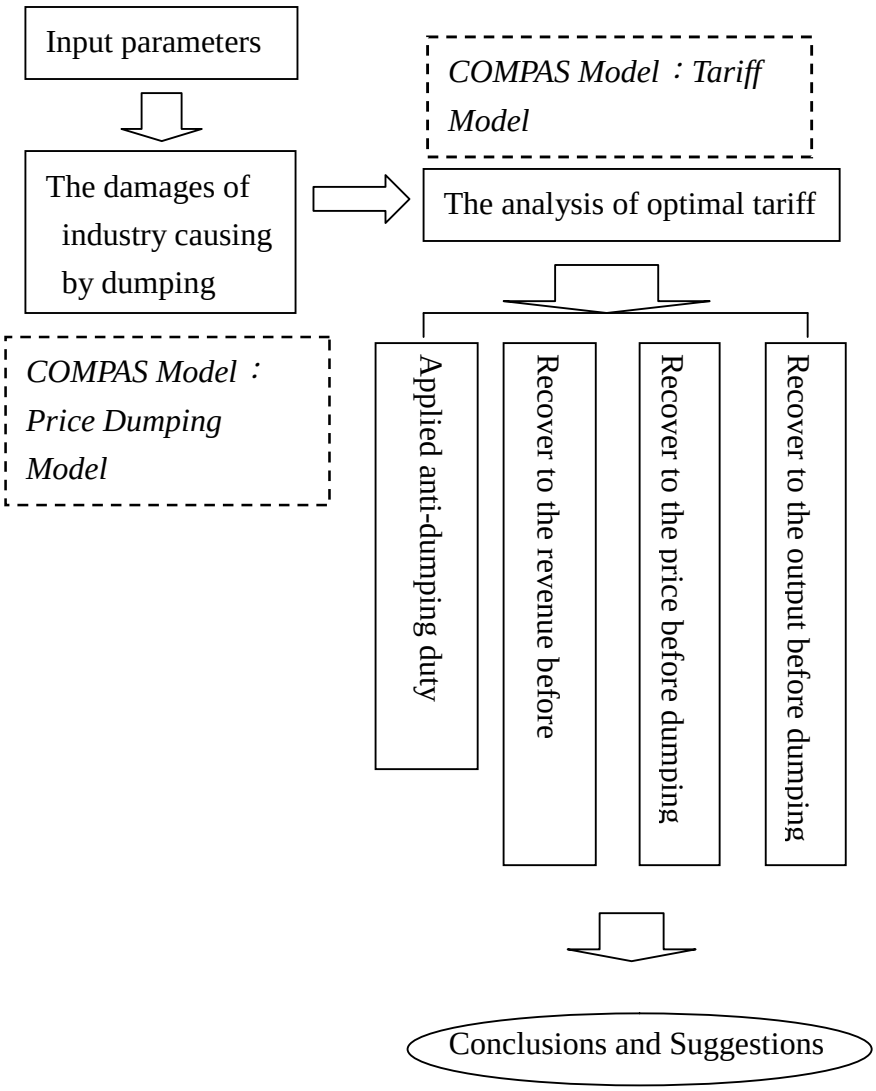

Figure 2、The structure of our paper and study path

Ⅳ. The Empirical Analysis of Optimal Antidumping Duties

4.1 The Study Case

The towel industry is the labor-intensive industry. Many firms invest to other countries which cause of the high labor cost and the land cost in Taiwan. To compare the value of product, the firms' production reduces year by year. The product value only has 2.22 hundred million in 2007 and less than 1992. After trade liberalizing, the product cost in China is lower than in Taiwan, so towel industry in Taiwan can't compete with China towel firms, more serious fall in output decline.

Thus the hypothesis of based on models and industrial properties, select case study on the continent as a towel. The suspect and product HS code and the export-import goods classification column and tariffs is 63026000 and 63029100. The survey period is from January 1 2001 to 30 September 2005. The survey findings identify suspects, the product is indeed in mainland China on Taiwan-related industries of damage caused, resulting in real terms since June 2006 to its imposition of anti-dumping duties 204.1 %.

4.2 To Calculate the Input Parameters

Above all, we must calculate many input parameters to measure the injures of a industry in COMPAS model. Here, we explain how to calculate that parameters.

1. Elasticity of supply and demand: We use the data that gets from Burea of Foreign Trade and Department of Statistics Ministry of Economics Affairs to measure the elasticity of supply, the elasticity of demand, and the substitute elasticity between import goods and domestic goods. The period of data is from January on 2001 to September on 2005. Our study assumes the functions i estimate each elasticity function is log-linear.

2. This research uses 2001-2005 as each parameter's calculation base, and the formulation of elasticity was using information from: import data from Customs' statistical information; export country's production amount and market price from ITC's Industry Injury Investigation Report; Department of Statistics' (MOEA) Industry Production Database's sales and production related information, assuming each functions are log-linear functions using loop formulation, in order to arrive at the value of each elasticity. Due to the fact that the focus of this research is the formulation and comparison of industry injury, the actual procedure of formulation

of each parameter will not be described in detail. Only the output of the formulation is presented in Table 1 as below:

Table 1、 The Input parameters in COMPAS Model

Input Parameter	Value of Parameter	Input Parameter Name	From (Low)	To (High)
Unadjusted Margin	204	Substitutability of specific Domestic Product and unfair Import Products	1.42	2.42
Domestic Market Share of specific Domestic Products	10.33	Substitutability of specific Domestic Product and fair Import Products	1.42	2.42
Domestic Market Share of unfair Products	61.75	Substitutability of Dumping and fair Import Products	1.42	2.42
Average Tariff*	10.5	Elasticity of Aggregate Demand	-0.2	-1.2
Transportation Cost's Ratio to c.i.f. Price of unfair Import Products	18.13	Elasticity of specific Domestic Product Supply	0.6	1.6
Domestic Equipment Utilization Rate	24.75	Elasticity of unfair Products Supply	0.99	1.99
Domestic Content	15	Substitutability of specific Domestic Product and unfair Import Products	0.99	1.99

4.3 The Effects of Dumping

Based on the above assumptions, and combining other assumptions regarding each product's price elasticity of aggregate demand; price elasticity of like-kind domestic product and non-dumping imported products, this section would go through the actual empirical analysis. However, before performing the simulation, we must understand the 8 scenarios set by the COMPAS model, and the design of these scenarios is shown in Table 2.

Due to the uncertainty of the variables in the COMPAS model, an interval of input parameters is used (e.g. elasticity of aggregate demand is "from" 5 to "10", so on so forth). Assume there are 8 scenarios in this empirical study and the variables are identical.

Table 2、The scenarios of COMPAS Model

scenarios	scenario1	scenario2	scenario3	scenario4	scenario5	scenario6	scenario7	scenario8
Elasticities of substitution								
Dom/Unfair Imports:	1.42	1.42	1.42	1.42	2.42	2.42	2.42	2.42
Dom/Fair Imports:	1.42	1.42	1.42	1.42	2.42	2.42	2.42	2.42
Unfair/Fair Imports:	1.42	1.42	1.42	1.42	2.42	2.42	2.42	2.42
Domestic Supply Elast:	0.6	1.6	0.6	1.6	0.6	1.6	0.6	1.6
Fair Import Supply Elast:	0.99	1.99	0.99	1.99	0.99	1.99	0.99	1.99
Unfair Import Supply Elast:	0.99	1.99	0.99	1.99	0.99	1.99	0.99	1.99
Aggregate Demand Elast:	-0.2	-0.2	-1.2	-1.2	-0.2	-0.2	-1.2	-1.2

Table 3　Estimated Impact of Dumping by COMPAS Mode

Estimated Impact of Dumping on Taiwan Market								
Item＼scenario	scenario1	scenario2	scenario3	scenario4	scenario5	scenario6	scenario7	scenario8
Domestic Price	-24.4%	-18.3%	-2.7%	-2.5%	-29.0%	-24.2%	-9.6%	-9.9%
Domestic Output	-15.5%	-27.6%	-1.6%	-3.9%	-18.6%	-35.8%	-5.8%	-15.3%
Domestic Revenue	-36.1%	-40.8%	-4.2%	-6.3%	-42.2%	-51.3%	-14.8%	-23.6%
Domestic Share	-0.73%	-1.23%	-0.93%	-1.33%	-1.73%	-3.03%	-2.03%	-3.23%
Unfair Import Share	3.45%	4.95%	3.55%	4.95%	7.85%	12.05%	8.05%	12.15%
Fair Share	-2.62%	-3.62%	-2.62%	-3.62%	-6.12%	-9.02%	-6.02%	-8.92%
Capacity Utilization	-3.85%	-6.85%	-0.35%	-0.95%	-4.55%	-8.85%	-1.45%	-3.75%
Estimated Impact of Dumping on Imports								
Fair Import Price	-20.9%	-16.4%	-2.2%	-2.2%	-26.2%	-22.3%	-8.5%	-9.0%
Fair Import Output	-20.7%	-29.9%	-2.2%	-4.3%	-25.9%	-39.5%	-8.4%	-17.2%
Fair Import Revenue	-37.3%	-41.4%	-4.4%	-6.4%	-45.3%	-53.0%	-16.2%	-24.6%

Based on the above assumptions, the simulation results of the analysis are listed in table 1, and table 2. It is obvious from that chart that: dumping does have a negative impact on the domestic industry. The impact in perfectly competition market is greater to quantity than price, because the firms in perfectly competition market are the price takers. It would cause the domestic market price to drop between 2.5% to 29%, and lower production by –1.6% to –36.6%, for a total impact to the industry of between –4.2% to –51.3%.

Under the 8 simulated scenarios, the changes in parameters in the charts show that simulated results from the COMPAS model are more easily influenced by the price elasticity of aggregate demand. Assuming everything else stays the same (meaning other input parameters are identical), when price elasticity of aggregate demand is changed from 0.2% to 1.2%, its impact to domestic industry profits is -36.1% and 4.2%, respectively (details are in scenarios 1 and 3). Therefore the greater the price elasticity of aggregate demand, the more the customers demand for towel industry (including both domestic and imported products) will be impacted, and the more effectively it can nullify imported products' threat to replace domestic like-kind products.

4.4 Discussion of the Optimal Anti-dumping Duty

According to our results(table 4), under present anti-dumping duty rate, collecting anti-dumping duty attained the goal of protection for towel firms, thus the price of output will increase 52.6%, the quantities will increase 28.9%, and the revenue of industry will increase 96.7%. The total welfare loss attains 9,900 million NT dollars which is 1.15 times of producer gain. In other words, dumping behavior caused 1.15 NT dollars loss to the towel producers.

However, present duty rate is either optimal for its excessive duty rate, thus the inappropriate duty rate damage more to consumer surplus and social welfare. We try to recover their price level, output level, and revenue level before dumping activities. When the duty rate is 86.2%, 96.5%, and 75.3%, we can make it. And the social welfare loss will be 2,600 million NT dollars, 3,100 million NT dollars, and 2,100 million NT dollars.

Our study found out a lower anti-dumping duty rate by simulating various duty rates to result firms to attain the original price, production and profit which shows that there exists overestimation on duty rate if depending on the net of

dumping. Limited to the elasticity of supply and demand of towel industries, the lowest anti-dumping duty rate appears when industries recovered their original profit level and the highest duty rate appears when industries recovered their original production level.

From the above, we concluded that setting anti-dumping duty rate must evaluates the depth of damage of domestic firms primarily and depends on the range of loss from dumping behavior instead of depending the net of dumping merely. The decision of anti-dumping duty rate should examine consumers' preferences (elasticity of demand) and production cost of domestic industries (elasticity of supply) simultaneously.

Table 4. The Effect of welfare and output under different anti-dumping duty

Item/anti-dumping duty	Applied rate 204.1%	Tariff rate 75.3%（return to original revenue level）	Tariff rate 86.2%（return to original price level）	Tariff rate 96.5%（return to original output level）
Estimated impact on domestic industry				
Price（%）	52.60%	21.3%	24.4%	27.2%
Quantity（%）	28.90%	12.3%	14.0%	15.5%
Revenue（%）	96.70%	36.1%	41.7%	46.9%
Taiwan Production	243356	103316	117726	130772
Taiwan Consumption	-1604529	-794100	-889917	-973933
Employment	29	12	14	16
Domestic Market Share	29.80%	28.2%	28.4%	28.5%
Import Market Share	70.20%	71.8%	71.6%	71.5%
Change in Value of Taiwan Production	$244,183,360	$91,214,788	$105,354,135	$118,464,839
Estimated impact on imports				
Price（%）	116.0%	42.1%	48.7%	55.0%
Quantity（%）	-21.30%	-10.3%	-11.6%	-12.7%
Revenue（%）	70.00%	27.4%	31.5%	35.2%
Change in Quantity of Imports（%）	-1847884	-897417	-1007643	-1104706
Change in Value of Imports（NT$）	$481,188,273	$188,110,307	$216,235,447	$242,100,917
Overall impact on Taiwan economy				
Change in National Income（NT$）	-$99,862,946	-$21,019,156	-$26,389,015	-$31,779,192
Gain to Producers（NT$）	$87,122,272	$30,761,209	$35,760,265	$40,440,854
Tariff Revenue（NT$）	$616,919,620	$254,027,614	$290,249,147	$323,244,081
Total Cost to Consumers（NT$）	$803,904,839	$305,807,979	$352,398,426	$395,464,127

Ⅴ. Conclusion

Comparing with relative studies which mostly focus on the impact of dumping behavior towards domestic industries, including up-stream and down-stream firms and the effect of protection of processing anti-dumping measures, our study not only analyzed the impact of anti-dumping policy from the aspect of social welfare but also estimate the optimal tax rate from the aspect of margin of anti-dumping duty to allow for the benefit of domestic industries and of consumers in order to achieve the maximized social welfare. In this paper, we applied COMPAS model to analyze the impact of dumping behavior towards towel market in Taiwan and further simulate the optimal tax rate under the above circumstance.

According to our results, under present anti-dumping tax rate, collecting anti-dumping duty attained the goal of protection for towel firms, thus dumping behavior indeed brought negative effects to Taiwan towel industries. The total welfare loss attains 9,900 million NT dollars which is 1.15 times of producer gain. In other words, dumping behavior caused 1.15 NT dollars loss to the towel producers.

However, present duty rate is either optimal for its excessive duty rate, thus the inappropriate tax rate damage more to consumer surplus and social welfare. Our study found out a lower anti-dumping duty rate by simulating various duty rates to result firms to attain the original price, production and profit which shows that there exists overestimation on duty rate if depending on the net of dumping. Limited to the elasticity of supply and demand of towel industries, the lowest anti-dumping duty rate appears when industries recovered their original profit level and the highest duty rate appears when industries recovered their original production level.

From the above, we concluded that setting anti-dumping duty rate must evaluates the depth of damage of domestic firms primarily and depends on the range of loss from dumping behavior instead of depending the net of dumping merely. The decision of anti-dumping duty rate should examine consumers' preferences (elasticity of demand) and production cost of domestic industries (elasticity of supply) simultaneously.

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