The Economic Effects of Taiwan's Anti-dumping Duty on PC Prestress Steel

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Abstract

This study evaluates the overall economic effects of anti-dumping measures using the COMPAS model and the econometric model to study policy implications. This study shows that the imposition of an anti-dumping duty results in positive and substantive economic effects and suggests that an econometric analysis model be established to provide reference information to determine industry injury, economic factors and economic welfare effects. Our results support a legal ramification with the lesser duty rule in place and suggest that a comprehensive impact assessment of the trade-offs between national interest.

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1. Introduction

Following the foundation of World Trade Organization (WTO) on January 1, 1995, trade liberalization and internationalization have moved to the fore where with global markets opening up, the release of non-tariff trade barriers and subsidy slashing, etc., global trade has grown exponentially. World employment has increased and living standards have improved. However, in recent years, some developing and underdeveloped countries are coming to realize that opening up of the market does not lead to comparative trade benefits. As a result they have worked with environmental conservationists to indirectly boycott the opening of markets. This has resulted in limited progress at new rounds of WTO trade talks. In contrast, some developed countries have been using extensive import defenses such as antidumping and countervailing duty measures to an almost abusive extent. As shown in the WTO 2006 annual statistics, Taiwan stood in third place in terms of anti-dumping duty cases and serves to highlight the seriousness of the issue of abusive use of antidumping measures as a trade protection tool.

The manufacture of PC prestress steel in Taiwan requires a noteworthy high overhead cost of production. In addition, land costs along with the high investment cost, the newcomers appear as a threat to incumbent competitors in the PC prestress steel industry. Whenever a dumping activity occurs, the industry will suffer an immense loss. In this study, we shall use the PC prestress steel industry in Taiwan as a case study to investigate the potential impact of dumping activities.

The remaining of the paper is organized as follows, the next section briefly describes the theoretic basis of the Commercial Policy Analysis System (COMPAS) model under the framework of a perfectly

competitive market structure. Section three describes the dataset of the PC prestress steel industry in Taiwan and provides an analytical diagnosis using the COMPAS model. A summary and concluding remarks are presented in the last section.

2. Methodology

The methods used to evaluate the economic welfare effects in this study include: (1) The Commercial Policy Analysis System (COMPAS)[1] to measure an industry's degree of injury. The COMPAS dumping model is more like a comparative static analysis. Based on the econometric empirical analysis model depends on the objectives for which the model is constructed and the degree of explanation that is being sought. These equations will contain other variables in addition to the quantity and price of the commodity in question which developed according to current economic theory construction and in compliance with the conditions available in a domestic industry, the model is used to analyze the possible situations that a domestic industry might encounter if there is no case of anti-dumping, so as to estimate the degree of injury to a domestic industry caused by dumping in comparison to the variances between a hypothetic situation and real cases. (2) By utilizing Two-Stage Least Squares (TSLS) and partial equilibrium analysis to estimate the supply and demand curve and by calculating economic welfare effects of anti-dumping duty imposition on individual industries, the impact of dumping on the domestic industrial welfare level will be

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[1] Commercial Policy Analysis System (COMPAS) is a model specially designed to measure the effects of dumping. The model developed by United States International Trade Commission (USITC).   The model calculates the effects of dumping on the prices and production of like goods in the domestic market, as well as the resulting changes in industry revenues, market shares and capacity utilization.

investigated with regards to partial equilibrium theory using comparative static analysis.

The purpose of the study is to investigate the magnitude of injury on domestic industry and economic welfare effects after the imposition of an antidumping duty.   Limited by the difficulty in data collection and the application range of an empirical model, this study will focus mainly on the following two dimensions:

First, based on the study results compiled from the literature review, the empirical model uses the supply elasticity or the value of import substitute elasticity to establish the calculation basis.   The parameter values come from the data established prior to Taiwan's entry into WTO. Due to the huge amount and limited budget, for the time being, the data cannot be updated with an adjustment for industry structure or changes. As such, if there is any updated data in the future regarding industry elasticity value (i.e. supply elasticity and substitute elasticity), empirical analysis shall be reprocessed.

Second, this study is limited to an analysis of the injury caused to domestic industries and the impact on economic welfare effects after the imposition of an anti-dumping duty.   The data is acquired only from the subject cases of injury investigation on related products and industries.   Since the investigation has not yet been extended to upstream, midstream and downstream industries, the data from those industries are still not available.   In the future, should the economic effects on the related industries be required overall on the premise of taking "national interests" for the subject products into account, the relevant data regarding the injury made to upstream, midstream and downstream industries shall be further gleaned, so as to counter the situation.

After the foundation of the WTO, many countries have increasingly

used trade remedy measures (such as anti-dumping and countervailing duty, and safeguards).   Some advanced countries like the U.S. and the European Union (EU) have paid special attention to their industrys' competitiveness and their market share in the new international trade environment.   With Taiwan's accession to the WTO in 2002, new challenges stemming from liberalization, internationalization and opening markets have arisen. Domestic industries face possible dumping or protectionist subsidies and other unfairly competitive practices from other countries.   Other countries may also use their competitive advantages to aggressively launch their products into Taiwanese markets at a time when the global market is sluggish and international trade protectionism is on the rise.   As such, this study will investigate the degree of influence that trade relief measures have on a specific industry and the economy as a whole of the importing country.   It is a crucial reference for the policy-making of trade relief measures.   The study results are generally classified into four types as described below:

2.1 Empirical analysis of the change in production and sales

Focus has been placed on the influence of anti-dumping duty on production and sales, and on the change in financial status (Lin et al., 2002; Huang and Hsin, 1997).   Empirical studies have shown positive effects on a firm's output, sales and finance after the imposition of an anti-dumping duty.   Empirical study also indicates that the industry affected with dumped imports would not be seriously injured while it also brings a positive effect on the revenue change (as for cases in the steel industry under the hypothetic conditions).

2.2 Empirical analysis for the impact on the trade of upstream, midstream and downstream industries

The study suggests that there would be no adverse influence on an upstream industry after imposition of an anti-dumping duty.   For the upstream industry of nitrocellulose and steel bar and wire rod products, a significant positive effect is reflected after the duty imposition.   However, the imposition of an anti-dumping duty will cause serious injury to the downstream industry of high and low density polypropylene products.   On the other hand, some of the downstream chemical industries could easily transfer their cost or take other counter measures, so that the impact is not significant after the imposition of a duty.

2.3 Empirical analysis of macroeconomic effects

This study shows that if an anti-dumping duty order and countervailing duty could have been removed, the U.S. macroeconomics would have added US$1.59 billion worth of net economic welfare (USITC, 1995; Wu and Lai, 1996).   In addition, other empirical studies also indicate that, after the imposition of an anti-dumping duty, the overall economic effects are positive in the short term, while in the long-term, the overall economic data shows a decline.   This illustrates that the overall economic effects of imposing an anti-dumping duty vary with long or short periods of time (Shen, 1999).

2.4 The investigation of the theory and empirical study of economic welfare effects

In terms of economic theory (general equilibrium and partial equilibrium analyses), the influence of dumping on a domestic good's price, volume and welfare magnitude (redistribution effects, protection effects, finance effects, consumption effects, trade effects and balance of payment effect due to considerable increase of imports) has been probed

(Huang, 2000; Wong, 1999). The empirical study of tea and cement products illustrate that the different net welfare effects of imposing anti-dumping duty vary with import relief and safeguard systems (Huang 2006, 2008).

The National Bureau of Economic Research (NBER) studies special economic welfare effect analysis.   Prusa (1999) researched that while industrial countries apply anti-dumping measures to protect its national industries, developing countries tend to follow suit. An anti-dumping duty has a huge impact upon imports, as Knetter and Prusa (2000) researched the interrelations of anti-dumping cases and macroeconomic factors, it was discovered that the fluctuation of exchange rate and the growth rate of GDP play key roles in the recognition of anti-dumping cases.   Eichengreen and der Ven (1983) also researched dumping from foreign producers (mainly from Japan) and their influences in the steel and iron market in the USA. The governmental decision to impose anti-dumping policies has an enormous impact upon economic activities.   Prusa (1996), after applying a regression analysis, discovered that an anti-dumping duty causes three times of trade barriers which are simply generated by the investigation. While lower anti-dumping duties have little influence upon imports, a higher anti-dumping duty results in significant negative influence toward imports. Staiger and Wolak (1994) studied the influence of anti-dumping upon future trade. They also researched the imposition of an anti-dumping duty which results in three effects that might affect or restrict trade: the investigation, suspension, and withdrawal effects. International trades maximize the effect of an anti-dumping mechanism, and bigger trade restriction relies on the first two effects.

3. Theoretical Framework

3.1 COMPAS Model

The most used method for measuring the effects of dumping resulting in domestic injury is the COMPAS model developed by the United States International Trade Commission (USITC). In order to measure the effects of trade relief on industrial injury and domestic economics, this paper has used the COMPAS model to calculate the effects of anti-dumping duties on industrial economic benefits.

The COMPAS dumping model is a comparative statical analysis. Based on economic theory, it may construct an empirical model which depicts real domestic industrial status.   Then, the model is applied to simulate and analyze possible results on a domestic industry, assuming there are non-subject imports, followed by making comparisons between a simulated situation and a real situation for the variances.   The results are used to analyze the injury level to a domestic industry caused by dumped imports and as the determining foundation for the causality between dumping and domestic industrial injury.   COMPAS is used mainly to evaluate the influence of dumped imports on domestic like goods.   As to the impact of dumped imports on other industries or overall domestic economy, another economic model shall be used for the investigation (Chiu, 1997; Huang, 2001).

Following is a description of the basic assumptions of the COMPAS model, model structure and formula establishment, and an elaboration on the inference of supply and demand elasticity, followed by the interpretation of the practical operation procedures of the COMPAS model (Granger, 1969; Brander and Krugman, 1983).

(1) The influence factors of currency exchange rate, interest rate,

economic growth, etc., remain unchanged.

(2) The market is in perfect competition.

(3) The domestic like goods and imports are an imperfect substitution.

(4) The supply of domestic like goods is influenced only by its market price.

(5) The demand of domestic like goods is a function of the domestic market price of the imports and their market price.

(6) The domestic demand for the imports is the function of the domestic market price of the imports and the price of domestic like goods.

Summing up the above assumptions for the COMPAS dumping model, the influence level of dumped imports on a domestic industry is determined mainly by the supply and demand elasticity domestic like goods and the degree of leftward movement in the demand curve affected by the dumping (dumping margin and substitute elasticity, … etc.).

The COMPAS dumping model assumes that the demand function of domestic like goods, dumped import, and non-subject imports is in log-linear functional form.   The demand equations are written as:

$$\ln(q_i) = \ln(a_i) + \eta_{ii} \ln(p_i) + \sum_{j \neq i} \eta_{ij} \ln(p_j), \quad i, j = 1, ..., n, \tag{1}$$

where q_i is the quantity demanded of the ith product (e.g., domestic like good, subject country imports, or non-subject country imports); a_i is the intercept term of the ith product demand equation; p_i is the price of the ith product; η_{ii} is the own-price elasticity of demand for the ith product; η_{ij} is the price elasticity of the demand for the jth good with respect to the price of a product.

The COMPAS dumping model assumes that the supply function for the domestic like goods and non-subject imports is in log-linear functional form, the supply equations for the domestic like goods and

imports are expressed as:

$$\ln(q_i) = \varepsilon_i \ln(p_i), \quad i = 1, \dots n , \tag{2}$$

where ε_i is the price elasticity of supply.

When the domestic market has come to equilibrium, the domestic market equilibrium for the domestic like goods and non-subject imports is defined as the intersection of supply and demand:

$$\varepsilon_i \ln(p_i) = \ln(a_i) + \eta_{ii} \ln(p_i) + \sum_{\substack{i=1 \\ j \neq i}}^{n} \eta_{ij} \ln(p_j), \quad i, j = 1, \dots, n . \tag{3}$$

Re-arranging equation (3) to solve for the price yields:

$$\varepsilon_i \ln(p_i) = \ln(a_i) + \eta_{ii} \ln(p_i) + \sum_{\substack{i=1 \\ j \neq i}}^{n} \eta_{ij} \ln(p_j), \quad i, j = 1, \dots, n . \tag{4}$$

Equation (4) includes *n* equations which may be deduced into *n* equilibrium product prices. Entering the equilibrium prices into equation (1) and (2), we have come up with the equilibrium demand and supply volume of the domestic like goods and imports.

To simplify the analysis, the COMPAS model has further classified the area of imports into two types: dumped imports and non-subject imports. Hereafter, suffix D represents dumped imports while suffix N means non-subject imports and suffix T for the domestic like goods. Equation (4) is expressed in log-linear form, so if we assume that $\hat{p}_i$ represents the pre and post dumping price level ratios for the ith product, equation (4) may be written as:

$$\ln(\hat{p}_i) = \sum_{\substack{j=1 \\ j \neq i}}^{n} \left(\frac{\eta_{ij}}{\varepsilon_i - \eta_{ii}} \right) \ln(\hat{p}_j), \quad i, j = T, D, N . \tag{5}$$

In addition, when the influence of dumped imports on the domestic market is to be simulated, the price shock of dumped imports will be an exogenous variable in the COMPAS model.   As a result, equation (4) may be further simplified as:

$$\ln(\hat{p}_T) = \frac{\eta_{TD}}{\varepsilon_T - \eta_{TT}} \ln(\hat{p}_D) + \frac{\eta_{TN}}{\varepsilon_T - \eta_{TT}} \ln(\hat{p}_N),$$

$$\ln(\hat{p}_N) = \frac{\eta_{ND}}{\varepsilon_N - \eta_{NN}} \ln(\hat{p}_D) + \frac{\eta_{NT}}{\varepsilon_N - \eta_{NN}} \ln(\hat{p}_T), \tag{6}$$

where $\hat{p}_T$, $\hat{p}_D$, $\hat{p}_N$ respectively represent the pre and post dumping price level ratios for the domestic like goods, dumped imports and non-subject imports.   Combining with equation (6), we have come up with:

$$\ln(\hat{p}_T) = \ln(\hat{p}_D) \left(\frac{A_{TD} + A_{ND} A_{TN}}{1 + A_{TN} A_{NT}} \right),$$

$$\ln(\hat{p}_N) = \ln(\hat{p}_D) \left(\frac{A_{ND} + A_{TD} A_{NT}}{1 + A_{NT} A_{TN}} \right), \tag{7}$$

where $A_{TD} = \eta_{TD} / (\varepsilon_T - \eta_{TT})$, $A_{TN} = \eta_{TN} / (\varepsilon_T - \eta_{TT})$, $A_{ND} = \eta_{ND} /$ $(\varepsilon_N - \eta_{NN})$, $A_{NT} = \eta_{NT} / (\varepsilon_N - \eta_{NN})$.

Also, in the simulation of the effects of dumped imports on the domestic market, the COMPAS model takes the pre and post dumping price level ratios (the price shock) of the dumped imports as an exogenous variable, so that in the solution process, COMPAS will first infer the dumping margin, which is the difference between the dumped and pre-dumped prices for the dumped imports.   The calculation of the dumping margin is based on the difference between the FOB price and

the domestic market price of the export country, or between the FOB price and the unit cost of the export country (all the costs incurred in the production process are all to be taken into account) plus margin rate. The purpose of measuring is to probe the effects of dumping on a domestic industry, and in order to use the dumping margin to accurately reflect the effects of dumping on price of domestic like goods; the dumping margin has to be appropriately adjusted. The COMPAS model adjusts the dumping margin by:

$$M' = M/(1+f),\tag{8}$$

where M' is the adjusted margin of dumping, M is the dumping margin, f is the specific tariff and/ or shipping and handling costs as a proportion of the CIF price.

The result shows that the price shock rate of the imported country is equal to the adjusted margin of dumping:

$$\hat{P}_D - 1 = M'.\tag{9}$$

Therefore, the price rate $\hat{P}_D$ of the imported country in pre and post dumping periods is:

$$\hat{P}_D = M' + 1.\tag{10}$$

By entering equation (10) into equation (7), we have come up with the price ratio for the domestic like goods and non-subject imports in pre and post dumping periods, and based on that the price shock will be calculated. Since equation (1) and (2) are log-linear equations, they can be rewritten as a relationship between the percentage change in aggregate demand, supply and price shock. As in this case, by entering the price shock rate into supply and demand equations, the supply and demand volume variance rates of the domestic like goods and imports in

the local market in the pre and post dumping periods will be deducted. Equation (7) reveals that the influence level of dumping on the local industry is determined mainly by the factors of supply elasticity, demand elasticity, and dumping margin … etc.   Please refer to Table 1 for their relationship.

Table 1   The effects in the level of model parameters and dumping on domestic like goods

Model: parameter	Equilibrium price	Equilibrium production	Injury level
Price elasticity of supply for domestic like goods	−	+	?
Own-price elasticity of demand for domestic like goods	−	+	?
Percentage change in dumped imports	+	+	+
Own-price elasticity of dumped imports	+	+	+
Elasticity of substitution between dumped imports and domestic like goods	+	+	+
Own-price elasticity of aggregate demand	−	−	−
Market share of dumped imports in the domestic market	−	−	−
Dumped imports and non-subject imports	−	−	−

Note: "−" means negative influence, "+" means positive influence and "?" means uncertainty in the influence direction.

To summarize the above description, it requires estimates of elasticity in the COMPAS model and in the data of supply elasticity, demand elasticity, elasticity import substitution, dumping margin, market share, and average tariff, … etc. to solve the COMPAS dumping model.   The study uses parameter values in proceeding with the empirical analysis.   The parameter values have been deduced from the investigative reports of industry injury in the anti-dumping cases

released by the International Trade Commission (ITC), as well as from commissioned study projects and predecessors' literature documents or case studies.   The possible value range has also been calculated.

3.2 The Establishment of Industry Supply and Demand Functions

First of all, the product demand function, the supply function of domestic suppliers and the product's import supply function shall all be estimated and based on the comparative static analysis model.   The petition filed by the industry shall act as the forecast.   In the regression analysis, product supply and demand volume are deemed as non-independent variables in the estimation function, and the product price, cost, and substitute product price, … etc., are to be set as the independent variables which will influence supply and demand.[2]

Following are the equations for the product demand function, the supply function of domestic suppliers, and supply function of similar imports.

(1) The regression equation for product demand function:

$$Q^d = \alpha + \beta P_h + \gamma P_f + \varepsilon, \tag{11}$$

where Q^d is the demand for domestic like goods and imports, P_h is the price of domestic like goods, P_f is the price of imports, and ε is the residual term.

    (2) The regression equation for the supply function of domestic like goods – Due to the difficulty in accessing some of the firms' data, a simplified method is used for the following formula where cost is assumed to be the dominant factor.

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[2]   See Shiells, 1986; Kelley and Morkre, 1998; Kaplan, 1991; Reinert and Shiells, 1992.

$$Q_h^s = \alpha + \beta C_h + \varepsilon \ , \tag{12}$$

where Q_h^s is the supply quantity of domestic like goods, C_h is the unit cost of domestic like goods, and ε is the residual term.

(3) The regression equation for the supply function of imports is to be determined by the selling price of imports.

$$Q_f^s = \alpha + \beta P_f + \varepsilon \ , \tag{13}$$

where Q_f^s is the supply quantity of imports, P_f is the price of imports, and ε is the residual term.

(4) Comparative static analysis model

Huang (2000) stated that the dumping influence level on a domestic industry was determined mainly by the supply elasticity and demand elasticity of domestic like goods, and the leftward movement (increase) of the demand curve as a result of dumping.   The bigger the supply elasticity is, the more sensitive the domestic producers will be aware of price variation.   When the like goods show a decline due to the dumping, the decrease of supply volume from domestic producers becomes more significant.   When there is a larger degree of decline in supply, the level of drop in market equilibrium price caused by dumping becomes smaller.   Also, the leftward movement level of the demand curve for the domestic like goods has a positive influence on market equilibrium price and the quantity decline level.   As a result, there is also a positive influence on the injury level of a domestic industry. Affected by dumping, the bigger the leftward movement of the demand curve for domestic like goods, the greater the injury level of a domestic industry will be.

In other words, the greater the decline of import price as caused by

dumping, the greater the level of increase in the quantity of imports and the stronger substitution effect of the domestic like goods will be, and it results in a greater leftward movement of the demand curve for the domestic like goods.　On the contrary, the leftward movement will be smaller.　Its relationship has been elaborated in Table 2 shown below:

(a) When the demand elasticity of an import's price in the domestic market is bigger, it serves as a representation that the domestic market's demand level induced by the price decline of imports will be greater and the substitution effect for the demand of the domestic like goods will also be stronger.　This will result in a greater leftward movement of the demand curve.　Otherwise, the leftward movement will be smaller.

(b) When there is a high substitutability for imports and domestic like goods, it represents that, as caused by dumping, the greater the presence in demand of imports, the bigger the decline level on the demand of the domestic like goods will be, and it results in a greater leftward movement of the demand curve.　Otherwise, the leftward movement will be smaller.

(c) When there is a smaller price elasticity for aggregate demand (of the domestic like goods and imports), it serves as a representation that a smaller level of demand increase will be induced by the decline of the price of imports.　It also illustrates that the increase of the demand for domestic like goods induced by the declined import price is smaller, thus resulting in a weaker strength of substitution effect to counter the increase of import volume. The leftward movement of the demand curve is also greater.

(d) The higher the market share of imports, the greater the increase of total demand of the like imports induced by a certain level of

price decline will be.   For domestic like goods, increased level of induced demand means greater strength of the substitution effect to counter the increase of import volume.   The leftward movement of the demand curve will be smaller.

Table 2   The influence of import price on aggregate demand

Items	Variance level	Substitution degree of domestic like goods	Movement of aggregate demand curve
(1) Decline level of dumped imports	Big	Strong	Big
(2) Own-price elasticity of dumped imports in the domestic market	Big	Strong	Big
(3) Substitution between imports and domestic like goods	High	Big	Big
(4) Own-price elasticity of aggregate demand	Small	Small	Big
(5) Market share of imports in the domestic market	High	Strong	Small
(6) Substitution between non-subject like imports and dumped imports	High	High	Small

Source: Huang (2000).

(e) When the domestic market has non-subject like imports from other countries, the leftward movement of the demand curve for the domestic like goods will be affected by the substitution of other non-subject like imports and dumped imports.   The stronger the substitution, as caused by the dumping, the higher ratio it will have for the transfer of the substitution effect from the demand of domestic products to the other non-subject like imports.   The leftward movement of the demand curve for the domestic like goods will be smaller.

3.3 Empirical Studies

In order to analyze the influence of anti-dumping duty imposition on a domestic industry and also the overall economic effects, the COMPAS model has been used as a comparative static simulation of the situation in practice with the case of PC prestress steel. At the same time, through the investigation of the industry injury resulting from the anti-dumping cases, the influence on price, production, revenue, market share, and capacity utilization of the domestic subject products will be estimated. The results are used as the basis to establish the price shock rate of domestic like goods when macroeconomic effects are to be estimated.

Table 3 shows the production, price, and market share and product price differences in the domestic market as well as in non-subject countries during the case investigation period.　Based on this data, four years of mean values are calculated as the model parameter value.　The establishment of other parameter values (for instance, transportation cost, capacity utilization, demand elasticity, supply elasticity and import substitute elasticity, etc.,) have been deduced from the study projects commissioned by the ITC as well as from the relevant literature or case studies.　The possible value range will also be established, please see Table 3.

With regards to the parameter values of the COMPAS model, the dumping margin, market share of domestic like imports, market share of dumped imports, and the percentage of transportation cost of dumped imports in CIF price shall be obtained from Table 3 directly. The substitute elasticity, aggregate demand elasticity, supply elasticity are estimated by our study (Table 4). The period of statistical data from 1994–1997 shall be obtained from the Directorate General of Customs and ITC.

Table 3   PC prestress steel from Spain, India and S. Korea

Items	1994	1995	1996	1997	Jan.- Mar., 1997	Jan.-Mar., 1998
1. Imports (metric ton) from						
Spain (metric ton)	0	0	144	314	314	0
India (metric ton)	623	2,177	602	2,992	1,073	0
S. Korea (metric ton)	6,653	3,632	1,917	1,400	400	0
Subject countries (metric ton)	7,276	5,809	2,663	4,706	1,787	0
Non-subject countries (metric ton)	2,959	0	0	0	0	0
Total imports (metric ton)	10,235	5,809	2,663	4,706	1,787	0
2. Domestic shipments (metric ton)	15,658	20,237	26,054	20,193	4,771	5,344
3. Apparent consumption (metric ton^2)	25,893	26,046	28,717	24,899	6,558	5,344
4. Market share (%)of domestic goods (%)						
Spain (%)	60.5	77.7	90.7	81.1	72.8	0.0
India (%)	0.0	0.0	0.5	1.3	4.8	0.0
S. Korea (%)	2.4	8.4	2.1	12.0	16.4	0.0
Subject countries (%)	25.7	13.9	6.7	5.6	6.1	0.0
Non-subject countries (%)	28.1	22.3	9.3	18.9	27.2	0.0
Subject countries (%)	11.4	0.0	0.0	0.0	0.0	0.0
	39.5	22.3	9.3	18.9	27.2	0.0
5. Imports relative to domestic production					5,690	6,541
Domestic production (metric ton)	16,898	21,599	27,193	21,421		
Spain (%)	0.0	0.0	0.5	1.5	5.5	0.0
India (%)	3.7	10.1	2.2	14.0	18.9	0.0
S. Korea (%)	39.4	16.8	7.0	6.5	7.0	0.0
Subject countries (%)	43.1	26.9	9.8	22.0	31.4	0.0
Non-subject countries (%)	17.5	0.0	0.0	0.0	0.0	0.0
6. Export price (US$/ton)						
Average export price (US$/ton)	16.4	18.6	18.3	17.5	18.2	19.1
7. Import price including tariff and other relevant costs						
S. Korea (US$/ton)	17.8	18.4	18.9	18.0	17.8	-
India (US$/ton)	16.9	7.9	18.1	16.8	16.6	-
Spain (US$/ton)	-	-	17.8	17.4	17.4	-
8. Price undercutting by imported product from						
S. Korea (US$/ton)	0.6	0.6	0.0	0.4	0.5	-
(%)	3.6	3.0	0.2	2.3	2.7	-
India (US$/ton)	1.5	1.1	0.8	1.6	1.6	-
(%)	8.7	6.0	4.3	9.5	9.9	-
Spain (US$/ton)	-	-	1.1	1.0	0.9	-
(%)	-	-	6.1	5.7	5.2	-

Source: http://www.moeaitc.gov.tw.
Notes: 1. The increase/decrease rate was initiated from the year where data has been made available.
    2. Sale cost includes raw material, direct employment and manufacture cost.
    3. Apparent consumption (metric ton) = domestic shipments + total imports.
    4. Domestic shipments = domestic producer production + internal shipments – external shipment (include import and purchase from other producer).
    5. Price undercutting = domestic price – import price (CIF).

Table 4   Parameter establishment of COMPAS model

Name of parameters	Parameter values	
Dumping margin	39.38	
Market share of domestic like goods in the domestic market	77.50	
Market share of dumped imports in the domestic market	19.65	
The percentage of transportation cost of dumped imports in CIF price	5.50	
The capacity utilization rate of domestic like goods	66.95	
	From	To
The substitute elasticity between domestic like goods and dumped imports	3.21	4.21
The substitute elasticity between domestic like goods and non-subject imports	3.21	4.21
The substitute elasticity between dumped imports and non-subject imports	3.21	4.21
Aggregate demand elasticity	-0.71	-0.71
Supply elasticity of domestic like goods	5.29	6.29
Supply elasticity of non-subject imports	11.29	12.29
Supply elasticity of dumped imports	11.29	12.29

Source: by author's estimate.

According to the estimates made by the Chung Hua Institution for Economic Research, the substitute elasticity value for import goods being replaced by domestic goods is 1.779.   Assuming that there is a perfect substitution with imports, the substitute elasticity value shall be established between 3.21 and 4.21 for domestic goods over dumped imports and non-subject imports, and the demand elasticity is to be estimated at about -0.71.   According to the data of imports/exports and domestic production volume/value during the case investigation period (1994–1997), the supply elasticity of domestic goods was between 5.29, while it was about 11.29 for non-subject imports and dumped imports.

The parameter values of supply, demand and substitute elasticity established in Table 4 are in the possible value range, so the simulation results will facilitate the policy connotation analysis.   According to the suggestions from the COMPAS model analysis made by USITC, there are eight conditions which may simulate the maximum and minimum values of anti-dumping economic effects.   By focusing on the eight conditions, this study proceeds with the simulation and analyzes the policy connotations (see Appendix 1).

Table 5   Simulation results (1)

8 Scenarios	1	2	3	4	5	6	7	8
Percentage change in price of domestic like goods (%)	-1.61	-1.41	-0.84	-0.76	-2.07	-1.84	-1.30	-1.17
Percentage change in production of domestic like goods (%)	-8.21	-8.56	-4.39	-4.66	-10.49	-11.01	-6.68	-7.13
Percentage change in revenue of domestic like goods (%)	-8.21	-8.56	-4.39	-4.66	-10.49	-11.01	-6.68	-8.22
Percentage change in market share of domestic like goods (%)	69.95	69.74	69.80	69.62	66.96	66.57	66.74	66.40
Percentage change in market share of dumped imports (%)	27.51	27.73	27.65	27.84	30.64	31.03	30.84	31.20
Percentage change in market share of non-subject imports (%)	2.53	2.53	2.55	2.54	2.40	2.40	2.41	2.41
Percentage change in capacity utilization of domestic like goods (%)	69.95	69.74	69.80	69.62	66.96	66.57	66.74	66.40
Percentage change in revenue of domestic like goods (%)	-9.68	-9.85	-5.19	-5.38	-12.35	-12.64	-7.89	-8.22

Source: by author's estimate.

Table 6   Simulation results (2)

8 Scenarios	1	2	3	4	5	6	7	8
Percentage change in price of dumped imports (%)	-19.33	-19.57	-18.97	-19.24	-18.53	-18.80	-18.14	-18.45
Percentage change in dumped imports (%)	73.68	75.77	82.76	84.80	94.20	97.78	105.08	108.55
Percentage change in revenue of dumped imports (%)	40.10	41.37	48.10	49.24	58.21	60.60	67.89	70.08
Percentage change in price of non-subject imports (%)	-0.94	-0.87	-0.50	-0.46	-1.28	-1.17	-0.80	-0.75
Percentage change in non-subject imports (%)	-10.16	-10.17	-5.46	-5.55	-13.50	-13.50	-8.65	-8.79
Percentage change in revenue of non-subject imports (%)	-11.01	-10.95	-5.92	-5.99	-14.60	-14.51	-9.38	-9.47

Source: by author's estimate.

To sum up the empirical study from the cases of PC prestress steel from Spain, India and S. Korea, we have come up with the following comparative analysis.

(1) Under the condition that if the trade of PC prestress steel is imposed with anti-dumping cases, the price of like goods will be reduced from -0.84% to -2.07%, where production will decline from -4.39% to -11.01%, with revenue sliding from -5.19% to -12.64% and market share will slump from 66.4% to 69.95%. This indicates that under such circumstances, the domestic PC prestress steel industry will be injured.

(2) When the supply elasticity and import substitute elasticity become greater, the degree of domestic industry injury is lesser. As in the anti-dumping case of PC prestress steel, the empirical study shows that when domestic like goods, import substitute elasticity and supply elasticity are all increased from -0.84% to -1.84%, the price of like goods will drop from 0.8% to -2.3%, the production

will decline from -4.39% to -11.01%, earning rate will reduce from -5.19% to -12.64% and the market share will drop from 69.80% to 66.96%.   This indicates that the domestic PC prestress steel industry will be injured.

(3) By providing industry with anti-dumping measures according to different industry characteristics (i.e. supply elasticity and import elasticity), the empirical study shows that different magnitude of protection effects are incurred.   Supply elasticity is used to measure the sensitivity of price shock rates caused by the supply of domestic goods.   Greater supply elasticity represents the greater sensitivity that the producers feel about price shock rates.   This indicates that when the product price drops due to dumping, the supply from domestic producers will also decline accordingly.   As the empirical study shows from the anti-dumping cases of PC prestress steel and the supply elasticity value of domestically produced Portland Cement and Clinker, the value was between (2) and (3), greater (1) than between 5.29 and 6.29 for PC prestress steel (Huang, 2008). This illustrates that anti-dumping activities may provide better injury protection effects to the domestic cement industry.

(4) A domestic industry with a smaller absolute value of aggregate demand elasticity will inevitably lead to greater injury.   In the event where the aggregate demand elasticity is smaller, the additional demand required by consumers due to the price drop led by dumping will be modest.   For producers, all the induced sales cannot make up for their losses caused by the price drops. Take the simulation results from this paper as an example.   The absolute value of the demand elasticity for the domestic cement is 0.01, smaller than 0.71 of the aggregate demand elasticity for PC prestrand.   The domestic cement industry thus lands a greater

impact (Huang, 2008).

In the anti-dumping cases of PC prestress steel from Spain, India, and S. Korea, the empirical study shows that there is a positive influential effect on the reduction of domestic industry injury when imposing anti-dumping duty.

Targeting the anti-dumping cases of prestress steel from Spain, India and S. Korea, the ITC processed the investigation to determine the industry injury in 1994 and 1997. Based on the industry injury data collected during the investigation period, the comparative static analysis of industry supply and demand is made with the focus placed on the economic welfare effects of dumped imports on the domestic industry.

In the industry injury data in the anti-dumping cases of prestress steel from Spain, India and S. Korea investigated by the ITC in 1994 and 1997, the relevant data provided by the subject firms and the monthly exports/imports released by the Customs Office Administration of the R.O.C. was used to estimate the relevant variables required being used in the functions.

3.4 Results of Empirical Studies

Under quote frequency in economic modeling, the process or processes under study can be best represented by a series of simultaneous interdependent equations. The most common examples are supply and demand models, in which the behavior of the variables is jointly determined. The ordinary least-squares estimation of individual equations in a simultaneous-equation model will lead to biased and inconsistent parameter estimators. Traditional OLS will not be able to dispose them, so TSLS is to be used in estimation (see Appendix 2).

The economic welfare changes and industry supply and demand functions resulting from the anti-dumping cases are estimated based on

the empirical study of the foregoing COMPAS model.　By entering the estimates into the comparative statistic analysis model the economic welfare changes results from the anti-dumping cases of PC prestress steel from Spain, India, and S. Korea are analyzed as below.

As per the empirical study of the COMPAS model, after the imposition of anti-dumping duty in the case of "prestress steel from Spain, India and S. Korea" to be filed, the price shock rate of domestic like goods would be between -0.84% and -2.07%.　In other words, when the government takes an anti-dumping measure, a new equilibrium price (post-dumping price) is formed and returns to the range of -0.84% and -2.07%.

Table 7　The economic effects of the anti-dumping case on PC prestress steel from Spain, India, and S. Korea

unit：US$ (27.01 NT$/US$)

	Based on -0.8% of price shock rate on domestic like goods	Based on 2.3% of price shock rate on domestic like goods
Redistribution effect	103,656	304,620
Finance effect	47,552	83,041
Trade effect	-4,978	-41,146
Protection effect	-1,227	-10,142
Consumption effect	-3,751	-31,004
Balance of payment effect	1,244,497	3,577,864

Table 7 shows the economic effects resulting from the price return after the imposition of an anti-dumping duty.　Those producers with a higher production cost may gain more "economic rent" after the imposition of an anti-dumping duty.　It illustrates that the real income is to be transferred to producers from consumers, thus termed as the

"redistribution effect" of an antidumping duty.   Alternatively, it is also called "supplemental effects".   According to the estimated supply and demand functions, this redistribution effect is between US$103,656 and US$304,620.   After the imposition of an anti-dumping duty, the protection effect incurred from the replacement of imports by domestic goods is between US$47,552 and US$83,041.   The financial revenue that the government received from the imposition of an anti-dumping duty equals to the import quantity being multiplied by the anti-dumping duty.   This works out to between -US$4,978 and -US$41,146.   The so-called consumption effect refers to the consumption reduction resulting from a price hike which arrived at between -US$3,751 and -US$31,004. The "trade effect" is the aggregation of the consumption and protection effects, with the amount being between -US$1,227 and -US$10,142. The balance and payment effect means that the economic effect resulted from the improvement of trade earning due to imposition of anti-dumping duty.   The economic effect (balance of payment effect) is between US$1,244,497 and US$3,577,864.

Summing up the above economic effects of the anti-dumping cases of PC strand from Spain, India and S. Korea, we have come up with the following empirical study.

The imposition of anti-dumping duty may result in positive substantive economic effect (protection effect) on the individual industry of PC prestress steel from Spain, India and S. Korea. However, the macroeconomic benefit may vary as per the attributes of different industries.   Take the anti-dumping case of PC prestress steel from Spain, India and S. Korea as an example.   When the supply elasticity is 3, the overall industry economic effects is positive, but when it is 3, the overall industry economic effects becomes negative.   It illustrates that when the industry supply elasticity is smaller, "positive" effect will be

shown for the overall industry economic welfare after the imposition of anti-dumping duty.   Alternately, when the industry supply elasticity is greater, it will show a "negative effect".

The empirical study of the redistribution effect on an economic system after the imposition of anti-dumping duty shows that the redistribution effect of the anti-dumping cases of PC prestress steel from Spain, India and S. Korea, after the imposition of anti-dumping duty is only second to that of the balance of payment.   It means that due to the imposition of an anti-dumping duty, producers may gain greater benefits from consumer welfare, and the redistribution effect may be more significant as per the increase in the supply elasticity.   For the welfare effect of the PC prestress steel from Spain, India and S. Korea antidumping case, its redistribution effect is between US$103,656 and US$304,620, which is only second to the balance of payment effect at the range of US$1,244,497 and US$3,577,864.

Table 8   Comparison table of this study and the relevant literature study results

Items	This study	Huang's (Tea, Cement)	USITC	Other studies
Redistribution effect	V	V	X	X
Protection effect	V	V	X	X
Finance effect	V	V	X	X
Consumption effect	V	V	X	X
Trade effect	V	V	X	X
Balance of payment effect	V	V	X	X
Macroeconomic benefit effect	V	V	V	X
Influential effect on upstream and downstream industries	X	X	V	V
Industry injury effect	V	X	V	V
Consumer satisfaction	V	X	X	X

Sources: 1. Huang (2006, 2008).
       2. The data of other studies were excerpted from Zuo (1998).

Summarizing the above analyses of the anti-dumping cases of PC prestress steel from Spain, India and S. Korea, anti-dumping duty may result in positive economic effects to individual industries.   As for the economic effects of anti-dumping duty on upstream and downstream industries, further analyses will be made in this study.   In a project study by the Taiwan Institute of Economic Research for the analysis of the influence of an anti-dumping duty on the upstream and downstream industries of steel rods and wire ropes, through questionnaire surveys, it was found that it benefited the upstream industry to impose an anti-dumping duty on PC prestress steel from Spain, India and S. Korea, but for the downstream industry, there was no significant change in the selling price and market share of imports.   At the same time, the downstream industry trade also produced the subject goods of steel rods and wire ropes.   The survey results also showed that a majority of the downstream industry held a positive attitude toward the imposition of an anti-dumping duty.   The results of this study have echoed the conclusion made by Wu and Lai (1996) in their study and that is the influential effect of imposing anti-dumping duty to the bearing industry which is not significant to its upstream and downstream industries. The results of that study suggested that after the imposition of anti-dumping duty to the bearing industry, its upstream industry (high class bearing steel) would be positively influenced in a small scale while its downstream industry (motorcycles and related industries) would be very slightly impacted.   Through the anti-dumping study case used for this empirical study, it is illustrated that the influential effect of anti-dumping duty is limited for upstream and downstream industries.

3.5 Policy Implication of Anti-dumping Duty

3.5.1 Comparison Steel Wires with Steel Strands

As for the above economic welfare effect analysis of the imposition of anti-dumping duty, the overall economic effects vary as do the attributes of different industry structures.   94% of an industry's trade is likely to be affected by dumping, and among them, the overall satisfaction was over 90% according to satisfaction survey conducted by the associations of steel, papermaking, silk fabric products, petrochemical, electrics and electronic, semiconductor, plastic products, steel wire and wire rope.

Retrospective to Taiwan's anti-dumping case, after the establishment of International Trade Commission, Ministry of Economic Affairs (MOEA) since 1994, there have been four cases in the steel industry filed by the complainant, the Taiwan Association of Steel Wires and Cables, which represents one major segment of the downstream steel industry.   Only one case resulted in a positive determination, the other three cases were rejected.   The successful case was filed in August 1998 against the imports of uncoated stress-relieved steel wires for pre-stressed concrete from Spain, India and S. Korea.   Both S. Korea and India were assessed with anti-dumping duties, but Spain escaped with a de-minimis amount of imports.   The three unsuccessful cases all involved a similar, yet distinctive product involving uncoated stress-relieved steel strands for pre-stressed concrete.   Three cases were filed against Brazil, India and Argentina on the same occasion, against S. Korea, Thailand and Malaysia on another occasion, and finally against Indonesia.   All ended with the same negative decision. Apparently, the country from which the imports are obtained is not the

issue.   Rather, the product is the issue.

However, what causes steel wires to differ from steel strands? Prestress-relieved steel wires are used in the construction of pre-cast concrete piles, posts, poles, or pipes, and the like.   Stress-relieved steel strands are used in spanned bridges or tunnels.   The main outlet for both products is the same, public construction projects.   However, steel wires have wider applications in smaller projects; hence their users are situated in a competitive market.   By contrast, steel strands are restricted to specialized applications in larger projects, thus their sales are virtually limited to public procurement projects.   It should be obvious that the quality requirement of steel strands is higher than that of steel wires. Domestically, both steel wires and strands have been produced by the same group of companies.   The International Trade Commission MOEA was willing to extend a level of protection to steel wires but not to steel strands, partly out of concern for the quality of public projects, and partly because of the nature of the transactions. Because the predominant mode of transactions involving steel strands is tender competition for public projects, dumping that could occur is at most a sporadic rather than recurring practice.   The fact that different importers were accused in the three cases filed at different times suggests that sporadic dumping was taking place.   If an anti-dumping duty is to be levied on the accused importers, it will prevent the importers from participating in the tender competition for public projects in the following five years.   The domestic competition mechanism will thus be greatly impaired.   If the cases are to be subject to an administrative review as circumstances change, as is mandated by law, what would be the appropriate time for such a review?   Is the time following the project bidding the appropriate time? These considerations have made giving an affirmative decision regarding the steel strands

cases difficult.

3.5.2 National Interest Considerations

WTO has no direct regulations on public interest in the anti-dumping agreement.   The only provision similar or close to the concept of public interest is Article 9.1, the lesser duty principle.[3]   In general, however, consideration of public interest is often based on an anti-dumping rate or no anti-dumping duty at all.   The lesser duty principle is to impose an anti-dumping levy at the rate lower than the dumping difference.   The two are not entirely the same.[4]   Also, the preceding Article 9.1 is only suggestive without compulsion. Currently, the WTO Doha Round Trade Regulations only discuss whether the lesser duty should be changed to compulsory use.   No public interest issues have been addressed.   Therefore, one may infer the attitudes of countries on public interest provisions from their attitudes on lesser duty; it is difficult to draw conclusions directly based on the WTO.   Instead, we need to observe the practice of the members.

As for the domestic regulations of members on public interest, the U.S. does not have such provisions.   That is, when an anti-dumping rate is established after an investigation, and injury and causal relation are identified; the anti-dumping rate shall then be imposed.   The

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[3]   Article 9.1: The decision whether or not to impose an anti-dumping duty in cases where all requirements for the imposition have been fulfilled, and the decision whether the amount of the anti-dumping duty to be imposed shall be the full margin of dumping rate or less, are decisions to be made by the authorities of the importing member.   It is desirable that the imposition is permissive in the territory of all members, and that the duty is less than the margin if such lesser duty would be adequate to remove the injury to the domestic industry.

[4]   In practice, the two can be combined into one in Canada. Results of consideration of public interest can be reduced anti-dumping rate.

investigation authorities do not have discretionary power which happens to be the same situation in Australia.   In other words, the anti-dumping system in the U.S. and Australia focus on protection of domestic industries from injurous dumping.   The possible negative impacts of anti-dumping on users, consumers or the overall economic interests of the country are not of concern.

The EU and Canada, things are different.   Their domestic regulations have public interest provisions.   EU refers to public interest as "community interest", and the main standard is specified in Article 21 of Basic Act of Anti-dumping.[5]   Consideration of community interest is also mentioned in the definition of domestic industries, temporary measures, termination of measures, … etc.[6] However, the article does not specify the measuring standard of community interest.   Based on the preceding cases, the main consideration principles of EU on community interest are: [7] (1) compliance with international trade rules, (2) extent of the impact on the concerned community industry, (3) importance of the sector affected by the alleged obstacles to trade, (4) state of the effected industry, (5) policy consideration, and (6) adverse impact of the measures on other community industries.

Public interest concern in Canada is defined in Article 45 of

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[5]   Article 21.1: … In such an examination, the need to eliminate the trade distorting effects of injurious dumping to restore effective competition shall be given special consideration.   Measures, as determined, on the basis of the dumping and injury found, may not be applied where the authorities, on the basis of all the information submitted, can clearly conclude that it is not in the Community interest to apply such measures.

[6]   Article 9.1: Where the complaint is withdrawn, the proceeding may be terminated unless such termination would not be in the Community interest.

[7]   See Van Bael and Bellis (2004).

Special Import Measures Act, SIMA.[8]   Other considerations for public interest are in Special Import Measures Regulations (SIMR) specifying Court of International Trade Tribunal (CITT) to consider:[9] (1) whether the goods of the same description are readily available from countries or exporters to which the order of finding does not apply, (2) whether imposition of an anti-dumping or countervailing duty in the full amount (a) has been eliminated or substantially lessened, or is likely to eliminate or substantially lessen competition in the domestic market in respect of goods, (b) has caused or is likely to cause significant damages to products in Canada that use the goods as inputs in the production of other goods, and in the provision of services, (c) has significantly impaired or is likely to significantly impair competitiveness by (i) limiting access to goods that are used as inputs in the production of other goods and in the provision of services, or (ii) limiting access to technology, or (d) has significantly restricted or is likely to significantly restrict the choice or availability of goods at competitive prices for consumers or has otherwise caused or is otherwise likely to cause them significant harms; (3) whether non-imposition of such a duty in the full amount provided for in Sections 3 to 6 of the Act is likely to cause significant damages to domestic producers of inputs, including primary commodities, used in the domestic manufacturing or production of like goods; and (4) any other factors that are relevant in the circumstances.

　　Public interest concern in Taiwan is specified in Article 16 of The

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[8]   CITT shall actively or upon request of the interest parties, initiate trade relief measures of investigation on potential negative influences on public interest. In the event should the result be noncompliance or is possibly noncompliance, CITT shall immediately report to Department of Finance for disclosure in communiqué.   Reduction of tax or price measures will be proposed.

[9]   Article 40.1: In addition, the Article has further regulations on whether factors have to be stated in written application for investigation.

Regulations Governing the Implementation of the Imposition of Countervailing and Anti-dumping Duties.[10]   Although it is made compulsory, since the establishment of the article, in practice, the investigation authorities have provided interested parties with opportunities to give comments and taken them into consideration with regard to the imposition of an anti-dumping duty.   When considering the public interest, the investigative authorities have taken the following into consideration: (1) future development and competitiveness of domestic industries, (2) impact of imposition on upstream industry cost, profits and employment, (3) impact of imposition on cost, profits and employment of channels, (4) impact of imposition on price of end products and choices of consumers and (5) impact of imposition on trade and competition environments.

Overall, the forms of consideration are not entirely the same; yet, there seems to be no great differences in details and practice. In general, imposition of an anti-dumping duty is good for the domestic industries but bad for the overall economic welfare of the country. Following five recommendations we can obtain balance in between.

(a) Public interest provisions need established legal procedures in accordance with WTO regulations

The concept that imposition of anti-dumping duty is good for the domestic industries but bad for the overall economic welfare of the country is derived from principles of economics, lower-end industry and consumers' perceptions.   Comments of interested parties have to be

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[10]   In deliberating the imposition of a countervailing duty or anti-dumping duty as referred to in the preceding paragraph, the Commission shall take the existence of a subsidy or dumping and the injury as its primary consideration, and may also consider the influence of the case on the overall economic interests of the country.

specific and concrete in legal procedures with evidence to be accepted by investigative authorities in order to be taken into consideration. General conceptual ideas without any concrete evidence will not be considered by investigative authorities.   In practice, it is impossible for investigative authorities to consider factors of many pieces of actual evidence that are not reflected or proposed.   Thus, there are deviations from true public interest.   In other words, when considering public interest, investigative authorities can obtain balance if provided sufficient evidence of domestic industry interests, as well as partially proposed and considered public interest.

(b) Anti-dumping system is to protect domestic industries from injury

The purpose of anti-dumping system is to protect the domestic industries from injury by dumping.   The investigative authorities have spent a great amount of manpower and legal investigation procedures for a certain period of time.   They have reached conclusions after careful deliberation.   So it is difficult to claim that imposition of an anti-dumping duty does not meet public interest due to seriously confront the investigation authorities with the issue of balance between domestic industries and overall interests of the country.   This also explains why only few anti-dumping duty cases under consideration of public interest from members of EU or Canada, even though it is believed that anti-dumping duty is against overall interests of the country.[11]

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[11]   In the EU, compared with interests of industries, that of consumers, users and importers is not that important.   Often with conclusions such as "no comments from consumers or consumer groups, meaning that anti-dumping impacts are not respected," "users not coordinating aggressively, meaning imposition is not affecting cost significantly," and "import of goods is diverse; imposition will not endanger importers," European Commission still decided to impose anti-dumping.

(c) Investigative authorities need to prove significant impact

The final determination for investigative authorities still lies in whether the factors from the interested parties contribute to significant impact.　In practice, such factors include: Canada decided to reduce its anti-dumping rate as such rate would affect the choices of medicine in hospitals and basic rights of patients in receiving treatment. The EU decided not to impose an anti-dumping duty as it would result in higher profits for manufacturers or exporters from countries not under anti-dumping duty, as compared to industries in EU.　If EU industries could not meet Stock Keeping Unit (SKU) products that consumers needed in a short time; consumers might turn to other suppliers; and injury of EU industries would not disappear immediately.[12]

(d) Compromise between the interests of different member states

There is something special about public interest provisions in EU. EU community interest is the inclusion of that of member states.　Such interest of each country is often in conflict (e.g. countries with like products support anti-dumping while those without do not).　Therefore, consideration of public interest is often the compromise between different member states.　This is because of the special background of EU states.　The latest anti-dumping case is to continue imposing an anti-dumping duty on lamps imported from China (instead of no imposition or imposition for five years).　This is the result of compromise between the interests of "the European company having outsourcing production" (Phillips from the Netherlands) and "the European company keeping production" in Europe (Osram from

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[12]　For a survey see Lin (2004).

Germany).[13]

(e) Evaluation of imposition of anti-dumping after a period of time

There is also something special about public interest provisions in Canada.   Investigation on whether imposition of anti-dumping tax is in conflict with public interest is conducted after a period of time after the imposition.   This manner offers data of a period of time as concrete evidence on the evaluation of public interest, and seems to be more convincing than conjecture prior to imposition.   Yet, the disadvantage is the extra cost of investigation.

4. Conclusions

With Taiwan's accession into the WTO, we have been obliged to open up our domestic market, promote the policies of liberalization and internationalization and aggressively participate in the operation of multiple and bilateral international trade affairs as committed in Taiwan's entry into the WTO.   On the other hand, we shall provide our domestic industry with the temporary defensive tools to deal with fair (import remedies) and unfair (dumping or subsidy) trade affairs. The ITC, Ministry of Economic Affairs has been recognized and supported by trade (including trade in upstream, midstream and downstream industries), and based on the empirical study of this research, conclusions in the following three dimensions have been made.

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[13]   EU is working hard on improving the current trade relief instrument of anti-dumping.   One main aspect is redefinition of Community interest, especially on consideration on importers, consumers and trade groups and avoiding inappropriate injury of interests of EU industries of manufacture to other countries.

4.1 Influence on Individual Industries

After the imposition of an anti-dumping duty, for the statutory industry injury investigation factors covering domestic selling price, production, supplier's earnings, market share, and capacity utilization rate, the anti-dumping duty may provide the messages on any value and volume irregularities of overall and individual products, so that the COMPAS model could be used as a positive pre-warning notice function. With this system, producers may be provided with rapid and expedient market statistics. In addition with these statistics, producers may diversify their market or adjust their operation policy, thus evolving a protection effect.

4.2 Overall Economic Welfare Effects

The overall economic effects of an anti-dumping duty vary with the different attributes of individual industries. Taking PC prestress steel from Spain, India and S. Korea was between 5.29 and 6.29 greater than the elasticity of domestically produced Portland Cement and Clinker which was between 2 and 3. This illustrates that anti-dumping rates may provide better injury protection effects to the domestic cement industry. The industry supply elasticity 1, with an overall economic welfare effect of anti-dumping duty reflected as positive.

4.3 The Fittest Allocation of Social Resources

The empirical anti-dumping cases of PC prestress steel from Spain, India and S. Korea illustrated that after the imposition of anti-dumping duty, the balance of payment effect was of the most significant, seconded by redistribution effect, and followed in order by the finance, protection, trade, consumption and redistribution effect. This empirical

study may be offered to the ITC for their review to justify if an anti-dumping duty shall be imposed, and the results can also be used as the reference indicator when "national economic interest" is considered.

Table 9   Summary for the policy connotation on overall industry welfare effects of anti-dumping duty

Policy objectives	Benefited industries	Priority reference for the welfare indicator
1. Protecting the development of the subject industry	Upstream and midstream industries (industries imposed with an antidumping duty)	Protection effect
2. Finance revenue is the major policy consideration	Midstream industry (an industry imposed with an antidumping duty)	Finance effect
3. Saving foreign exchange	Midstream industry	Balance of Payment effect
4. Protecting the development of the downstream industry (consumption dimension)	Downstream industry	Consumption effect
5. Overall national economic welfare	Downstream industry	Trade effect

(1) When protection is considered necessary by the government for the development of the subject industry, the protection effect shall be the primary reference indicator.

(2) When the protection of the downstream industry is considered, the consumption effect shall be the crucial reference indicator.

(3) When the government takes finance revenue into major account, international revenue and expenditure shall be the priority reference indicator.

(4) When the government takes overall national social welfare into priority account, the trade effect shall be the indicator to offer good resolution.

(5) When the government takes the saving of foreign exchange into account, international revenue and expenditure effect shall be the important reference indicator.

As for Taiwan, there is still no instance of not imposing an anti-dumping duty due to consideration of public interest.   Further legislative activity is needed to improve the implementation of public interest clause of our anti-dumping regulation, and the following points could be taken into consideration to balance interest of various sectors to obtain the utmost interest of the whole country: (1) public interest provisions need established legal procedures in accordance with WTO regulations, (2) an anti-dumping system is to protect domestic industries leading to injury caused by dumping, (3) investigative authorities need to prove significant impact, (4) compromise between the interests of different member states, and (5) evaluation of imposition of anti-dumping after a period of time.

Appendix 1   Sensitivity Analysis of COMPAS Model

The COMPAS model should be carefully applied since the selection of value of elasticity of substitution affects the results of the COMPAS analysis. In our study, we have divided the sensitivity analysis with elasticity into 3 groups (substitute, supply, and demand elasticity) to have 8 scenarios.

Table A1   Scenarios of the COMPAS model

Scenarios	1	2	3	4	5	6	7	8
Dom/Unfair imports substitution elast.	3.21	3.21	3.21	3.21	4.21	4.21	4.21	4.21
Dom/Fair imports substitution elast.	3.21	3.21	3.21	3.21	4.21	4.21	4.21	4.21
Unfair/Fair imports substitution elast.	3.21	3.21	3.21	3.21	4.21	4.21	4.21	4.21
Domestic supply elast.	5.29	6.29	5.29	6.29	5.29	6.29	5.29	6.29
Fair import supply elast.	11.29	12.29	11.29	12.29	11.29	12.29	11.29	12.29
Unfair import supply elast.	11.29	12.29	11.29	12.29	11.29	12.29	11.29	12.29
Aggregate demand elast.	-0.71	-0.71	-1.71	-1.71	-0.71	-0.71	-1.71	-1.71

Source: by author's estimate.

The above Table A1 and Tables 5 and 6 in the text illustrate the changes in the domestic industry under the eight conditions of simulation. The price shock rate of domestic like goods are between -0.84% and -2.07%, whereas the production variance rate is between -4.39% and -11.01% and the revenue variance rate is the aggregate of price shock rate and production variance and is between -5.19% and -12.64%. Market share is between 66.57% and 69.95%, capacity utilization is 66.40% and 69.95%, price of dumped imports is between -18.14% and -19.57%, and import volume is between 73.68% and 108.55%. In addition, the

empirical study shows that the larger the import substitute elasticity is, the more the domestic industry is influenced by the dumping.

Taking the example of the anti-dumping case of PC prestress steel from Spain, India and S. Korea, and analyzing the domestic injury factors covering domestic sales price, production, supplier's earnings, market share and capacity utilization rate affected by anti-dumping duty imposition, and value irregularities of PC prestress steel, helps reduce injury to the domestic PC prestress steel industry.

To compare the 8 scenarios, we can find that the substitution elasticity of the parameters have more effects in our results than others. For example: the different effects of domestic price between scenario 1 and scenario 5 (with diversity of substitution elasticity only) is 0.8% more than 0.32% (difference between scenario 3 and scenario 4 – with diversity of supply elasticity only), 0.4% (difference between scenario 1 and scenario 3 – with diversity of supply elasticity only).

Appendix 2   TSLS Estimates the Elasticity of PC Prestress Steel

　　TSLS estimation uses the information available from the specification of an equation system to obtain a unique estimate for each structural parameter.　The first stage of our study involves the creation of an instrument; the second stage involves a variant of instrumental-variables estimation.　In our paper, the endogenous variable in the data will estimate the formula. Following is the empirical study deduced from the cases of PC prestress steel.

1. TSLS estimates of demand function of PC prestress steel:

$$Q^d = \alpha + \beta P_h + \gamma P_f + \varepsilon \,,$$

where Q^d is the demand for domestic like goods and imports, P_h is the price of domestic like goods, P_f is the price of imports, and ε is the residual term.

Table A2　The demand function of PC prestress steel

	Coefficient	t value
Constant term	204,731***	0.49
P_h	-0.89***	-1.93
P_f	-8.74***	-0.39
R_2 =0.999		

Note: *** is 95% confidence interval.

2. TSLS estimates of domestic supplier's supply function of PC prestress steel:

$$Q_h^s = \alpha + \beta C_h + \gamma P_h + \varepsilon \,,$$

where Q_h^s is the supply quantity of domestic like goods, P_h is the price of domestic like goods, C_h is the unit cost of domestic like goods, and ε is the residual term.

Table A3 The supply function of PC prestress steel in domestic

	Coefficient	t value
Constant term	111,517.80***	12.43
C_h	-8.83***	-1.40
P_h	3.15***	0.45
R_2 =0.79		

Note: *** is 95% confidence interval.

3. TSLS estimates of supply function of PC prestress steel imports:

$$Q_f^s = \alpha + \beta P_f + \varepsilon,$$

where Q_f^s is the supply quantity of imports, P_f is the price of imports, and ε is the residual term.

Table A4 The supply function of PC prestress steel from import

	Coefficient	t value
Constant term	102,905***	1.67
P_f	5.80***	1.74
R_2 =0.75		

Note: *** is 95% confidence interval.

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台灣預力鋼線反傾銷稅經濟效益分析

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摘　要

　　本研究採用 COMPAS 模型衡量反傾銷制度對整體經濟的影響，並從計量經濟探討課徵反傾銷稅對整體產業及預力鋼線產業經濟福利之影響，實證研究結果顯示反傾銷稅的課徵對預力鋼線有實質的正面影響。根據 WTO 規範採行較少課徵原則，在傾銷差額及損害差額間擇一較低稅率課徵，在不同利害關係人間採行利益折衷，以保護受傾銷進口損害之國內產業。

關鍵詞：世界貿易組織，反傾銷稅，COMPAS 模型，經濟效果，
　　　　國家利益，較小課徵原則
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