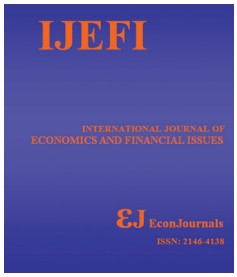

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The Effects of Antidumping Duties in a New Open Economy Macroeconomics Model

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ABSTRACT

This paper presents New Open Economy Macroeconomics as the analytical framework in attempt to integrate the characteristics of imperfect competition market and antidumping behavior into a two-country (home country and foreign country) model with micro-foundation. We analyze the long-term effect of implementing antidumping duty in home country on various microeconomic variables (i.e. consumption, output, price, exchange rate, and terms of trade [TOT]) when foreign country engage in dumping behaviors toward the home country. Theoretical inference and simulation analysis of this paper suggests a positive correlation between antidumping duty and domestic consumption, foreign consumption, world consumption, domestic price index, foreign price index, and exchange rate; whereas a negative correlation between antidumping duty and the domestic output, foreign output, and TOT. Moreover, the level of volatility in all macroeconomic variables rises when the ratio of export product price selling below its retail price in home country expands.

Keywords: Antidumping Duties, Micro-foundation, New Open Economy Macroeconomics
JEL Classifications: F12, F13, F41

1. INTRODUCTION

Economic liberalization and internationalization seem to have become the mainstream trends for international trade after the establishment of World Trade Organization (WTO) in 1995. Nonetheless after years of operation, developing and lesser-developed countries gradually realize that market opening does not bring relatively direct economic and trade benefits so they protest against market opening. On the other hand, developing countries and developed countries apply safeguarding policies for import to practice protectionism, such as antidumping policy. It is defined in Article 6 of General Agreement on Tariffs and Trade that dumping refers to the price of a product when sold in the importing country is less than the price of that product in the market of the exporting country. According to the "Antidumping Agreement" of WTO, when dumping competing countries of trade becomes a fact and the said dumping behavior has caused material injury to the home-country industries, the countries suffering from dumping may impose specific antidumping duty on the dumping suppliers. For the last 30 years, antidumping policy comes one of the primary trade policy tools for many countries.

In general, literature related to studies of the economic effect of antidumping policies can be summarized in three categories, as described below. The first category refers to the "empirical analysis on the effect of antidumping duty on upstream and downstream industries." Relevant research include the study conducted by Webb (1992), he suggested that the imposition of antidumping duty will reduce the amount of import to the importing countries and increase output and profits. Consequent, the domestic related upstream industries of importing countries will benefit from such policy, protecting the industries in home country but not necessarily in favor of the downstream industries and consumers' benefits in the importing countries. Kelly and Morkre (1998) discovered the response of import quantity of foreign products in importing country is related to the elasticity of substitution between foreign and domestic goods. The second category refers to the "analysis of effect of antidumping duty on welfare." Relevant research includes the study conducted by Prusa (1996), where he applied regression analysis and discovered that lower antidumping duty does not affect import after the imposition of antidumping duty while higher antidumping duty has significant and negative impact on import. Another study conducted by Prusa (1999) revealed substantial

impact of antidumping duty on import, and showed the increase in antidumping duty will reduce import quantity and rising import price. The study of Staiger and Wolak (1994) revealed the impact of US antidumping duty on the amount of transactions, and found that the investigation effect, termination effect and cancellation effect of antidumping duty imposition will affect (or constrain) trade amount. Anderson et al. (1995) discovered in their research that in the existence of actual trade barrier, antidumping policy will drive the social welfare of importing countries to rise on contrary. The last category refers to the "analysis of effect of antidumping on international trade." Relevant research includes the study conducted by Feinberg and Kaplan (1993), where they proposed forming industry protection through antidumping policy. The findings suggested that the compliant will have curbing effect on the import once filed, even if the outcome of antidumping investigation is overruled at the end. Krupp and Pollard (1996) explored into the case, where ruling outcome will have effect on the involving export and the import quantity of non-involving countries during the investigation period of all antidumping cases. In case the final verdict of antidumping case is affirmative at the time when the complaining country is conducting investigation on the dumping cases, the export quantity of the home country of involved supplier to the complaining country will face significant reduction during the investigation period and after the investigation. Prusa (1999; 2001) analyzed the frequent use of antidumping system by industrial countries to protect their industries while developing countries also adopt the same pace actively. Antidumping duty has tremendous impact on import and among the cases imposed with taxes, the export quantity were reduced by 70% while the import price rose by 30%. In terms of overruled antidumping cases, the manipulation of trade investigation alone can reduce the import quantity by 20%. Durling and Prusa (2006) discovered that antidumping duty will significantly reduce the export quantity of involving suppliers in the export to complaining country, namely antidumping will have significantly destructive effect on trade.

In sum of the aforementioned, literature regarding the analysis of the effect of antidumping duty in general applies the effect of imposing antidumping duty on upstream and downstream industries, international trade effect, and welfare effect as the key analysis issues, with less discussion on the effect of involvement with open economy macroeconomic effects. For this reason, the paper intends to broaden the New Open Economy Macroeconomics (hereinafter referred to NOEM) proposed by Obstfeld and Rogoff (1995) in attempt to discuss the effect of imposing antidumping duty on macroeconomic variables. The reason for NOEM related literature to quickly rise in the short run is primarily because the set of theoretical framework apply the structure of imperfect competition market as the analytical framework and features explicit micro-foundation. Hence NOEM has drawn favor from many scholars who re-examine the various macroeconomic issues from the perspective of NOEM and the analysis of trade policy (i.e. tariff shock) effect is one of the issues discussed in NOEM.

Based on the NOEM model proposed by Obstfeld and Rogoff (1995), Fender and Yip (2000) analyzed the effect of tariff policy on the welfare and output, the findings showed that the increase of temporary tariff during the short term will lead to reduction in the domestic output with uncertain effect on foreign output. In the long run, the tariff policy will reach the same conclusion as that in the short run. For the effects of welfare, the increase in tariff will drive domestic welfare to rise but negative impact on foreign welfare. As a result, the rise in domestic import tariff will have the "beggar-thy-neighbor effect." Nonetheless the paper draws attention to antidumping policy turning into considerably important trade policy tools for countries worldwide. We find that there are currently no literature that explicitly explain the role played by antidumping duty in open economy and hence paper attempts to apply the NOEM proposed by Obstfeld and Rogoff (1995) as theoretical framework to analyze the long-term effect of implementing antidumping duty in home country on various microeconomic variables (i.e. consumption, output, price, exchange rate, and terms of trade [TOT]) when foreign countries engage in dumping behaviors toward the home country.

The paper is divided into four sections of discussion, with the exception of introduction, containing the following sections: Section 2 comprises the building of theoretical model. Section 3 covers the simulation analysis for analyzing the long-term effects of antidumping duty on macroeconomic variables. Section 4 draws the conclusion and suggestion.

2. THEORETICAL MODEL

2.1. Model Setting

This paper follows the NOEM proposed by Obstfeld and Rogoff (1995) as theoretical foundation with the primary assumptions as follows:

1. Countries worldwide are classified as "home country" and "foreign country," the following foreign economic variables are marked with "*"
2. The world population is distributed between intervals of [0,1], where home-country individuals are distributed between intervals of [0,*n*] and foreign individuals distributed between internals of [*n*,1]
3. All individuals are both consumers and producers, in addition to operating a company of monopolistic competition and using labor to produce
4. Dumping behavior exists in the economic system, where export products of both countries are sold below the price of the products sold in domestic market, and both countries may impose specific antidumping duty against the dumping behaviors of the rival country.

2.1.1. Household

Assume all individuals have the same preferences, utility (U) and consumption (C) and real money balance (M/P) forming the positive proportionality, but forming an inverse proportionality with output level (y). The lifetime utility function is configured below:

$$U_t = \sum_{s=t}^{\infty} \beta^{s-t} \left[\log C_s + \frac{\chi}{1-\varepsilon} \left(\frac{M_s}{P_s} \right)^{1-\varepsilon} - \frac{\kappa}{2} y_s(z)^2 \right], \varepsilon > 0 \qquad (1)$$

Where, β is the discount factor ($0 < \beta < 1$), ε is the elasticity of marginal utility for real money balances, χ and κ represent the

significance degree of real money balances and output in utility function, and z refers to specific product.

In Equation (1), the consumption index is defined as the function of constant elasticity of substitution:

$$C_t = \left[\int_0^n c_{h,t}(z)^{\frac{\delta-1}{\delta}} dz + \int_n^1 c_{f,t}(z)^{\frac{\delta-1}{\delta}} dz \right]^{\frac{\delta}{\delta-1}}, \delta > 1 \quad (2)$$

Where $c_h(z)$ is the consumption on the specific home-country product z by the home-country consumers, $c_f(z)$ is the consumption on the specific foreign product z by home-country consumers, and δ is the elasticity of substitution of products between two countries.

It is induced from the definition of consumption function (Equation 2) to yield the domestic price index (P) under expenditure minimization, as shown below:

$$P_t = \left[\int_0^n p_{h,t}(z)^{1-\delta} dz + \int_n^1 (1+\tau)(1-\lambda) p_{f,t}(z)^{1-\delta} dz \right]^{\frac{1}{1-\delta}}, \tau \le \lambda \quad (3)$$

Likewise, foreign price index (P^*) is yielded below:

$$P_t^* = \left[\int_0^n (1+\tau^*)(1-\lambda) p_{h,t}^*(z)^{1-\delta} dz + \int_n^1 p_{f,t}^*(z)^{1-\delta} dz \right]^{\frac{1}{1-\delta}}, \tau^* \le \lambda \quad (4)$$

In the above two equations, $p_h(z)$ represents the price of home-country product z denoted in home-country currency, $p_f(z)$ represents the price of foreign product z denoted in home-country currency, $p_h^*(z)$ represents the price of home-country product z denoted in foreign currency, and $p_f^*(z)$ represents the price of foreign product z denoted in foreign currency. Additionally, because dumping behavior exists in the economic system, we assume the ratio of price for export products sold by both countries lower than the price of the product sold in domestic market is λ, both countries will impose antidumping tax against the dumping behavior of the other rival country. The rate of antidumping duty for home country and foreign country are τ and τ^* respectively. The imposition of antidumping duty is important tools taken by government against the unfair trade behavior of selling below normal value in order to maintain fair trade and stabilize the domestic industry development. However, antidumping duty in general is assessed as equal to or less than the dumping margin, that is, $\tau \le \lambda$.

For any product, the law of one price is held below:

$$p_{h,t}(z) = E_t p_{h,t}^*(z) \quad (5)$$

$$p_{f,t}(z) = E_t p_{f,t}^*(z) \quad (6)$$

Where, E denotes the exchange rate.

From Equations (2) and (3), we can induce the consumption for specific home-country product and specific foreign products by representative home-country consumers as shown below:

$$c_{h,t}(z) = \left(\frac{p_{h,t}(z)}{P_t} \right)^{-\delta} C \quad (7)$$

$$c_{f,t}(z) = \left(\frac{(1+\tau)(1-\lambda) p_{f,t}(z)}{P_t} \right)^{-\delta} C \quad (8)$$

Likewise, the consumption for specific home-country product and specific foreign products by representative foreign consumer is shown below:

$$c_{h,t}^*(z) = \left(\frac{(1+\tau^*)(1-\lambda) p_{h,t}^*(z)}{P_t^*} \right)^{-\delta} C^* \quad (9)$$

$$c_{f,t}^*(z) = \left(\frac{p_{f,t}^*(z)}{P^*} \right)^{-\delta} C^* \quad (10)$$

In the above two equations, $c_h^*(z)$ denotes the consumption of specific home-country product z by foreign consumer and $c_f^*(z)$ denotes the consumption of specific foreign product z by foreign consumer.

2.1.2. Government

To emphasize on the analysis of antidumping duty effect, assume the government does not have consumption expenditure, the government returns seigniorage revenue and antidumping duty revenue to the agents in a lump-sum fashion. Hence the government budget constraint is shown below:

$$\frac{M_t - M_{t-1}}{P_t} + \frac{\tau(1-n) p_{f,t}(z)}{P_t} = T_t \quad (11)$$

Where the first item on the left of equation is the real seigniorage revenue, the second item on the left of equation is the real antidumping duty revenue, and the right side of equation is the real government transfer payments.

2.1.3. Asset market

Assume the international capital market is integrated and each individual can buy and sell real bond (B) in the international capital market, where the relationship between the real interest rate (r) and the nominal interest rate (i) for bond at maturity is shown in the Fisher equation below:

$$1 + i_t = \frac{P_{t+1}}{P_t}(1 + r_t) \quad (12)$$

The bonds holding reflects the borrowing relation of residents between the two countries, which thereby meet $nB_t + (1-n)B_t^* = 0$, or,

$$B_t^* = -\frac{n}{1-n} B_t \quad (13)$$

Where, B refers to the bond quantity held by representative individual of the home country and B^* refers to the bond quantity held by the representative individual of foreign country.

2.1.4. Budget constraint

The budget constraint for representative individual is configured below:

$$M_t + P_t C_t + P_t B_t = M_{t-1} + P_t(1 + r_{t-1})B_{t-1} + p_{h,t}(z)y_{h,t}(z) + P_t T_t \quad (14)$$

In the equation, the source of income for representative individual in period t, includes: Money balances for period $t-1$ (M_{t-1}), principal and interest of bond from period $t-1$ ($P_t(1 + r_{t-1})B_{t-1}$), output revenue ($p_{h,t}(z)y_{h,t}(z)$) and government transfer revenue ($P_t T_t$). Consumers can use such income during period t for money holding (M_t), consumption ($P_t C_t$) and bond purchases ($P_t B_t$).

2.1.5. Aggregate demand

From the consumption on specific home-country product by home-country representative consumer (Equation 7) and consumption on specific home-country products by foreign representative consumer (Equation 9) yield to the product demand faced by home-country firm as below:

$$y_{h,t}(z) = nc_{h,t}(z) + (1-n)c^*_{h,t}(z) = n\left(\frac{p_{h,t}(z)}{P}\right)^{-\delta} C + (1-n)\left(\frac{(1+\tau^*)(1-\lambda)p^*_{h,t}(z)}{P^*_t}\right)^{-\delta} C^* \quad (15)$$

Likewise, from Equations (8) and (10), we have:

$$y^*_{f,t}(z) = nc_{f,t}(z) + (1-n)c^*_{f,t}(z) = n\left(\frac{(1+\tau)(1-\lambda)p_{f,t}(z)}{P_t}\right)^{-\delta} C + (1-n)\left(\frac{p^*_{f,t}(z)}{P^*_t}\right)^{-\delta} C^* \quad (16)$$

2.1.6. First order conditions

The first order conditions of consumer for maximizing utility (Equation 1) under budget restraints (Equation 14) is:

$$C_{t+1} = \beta(1 + r_t)C_t \quad (17)$$

$$\frac{M_t}{P_t} = \left(\frac{(1+i_t)\chi}{i_t} C_t\right)^{\frac{1}{\varepsilon}} \quad (18)$$

$$[y_t(z)]^{\frac{\delta+1}{\delta}} = \left(\frac{\delta-1}{k\delta}\right) C_t^{-1} (C_t^W)^{\frac{1}{\delta}} \quad (19)$$

Where Equation (17) is Euler equation that depicts the intertemporal consumption behavior, Equation (18) is the money demand equation that explains the substitution relation between real money demand and consumption, Equation (19) is the labor supply equation that specifies the substitution relationship between labor supply and consumption. In the equation, C^W denotes world consumption, and $C_t^W \equiv nC_t + (1-n)C_t^*$.

2.2. Derivation of Steady-state

We now discuss the effect of antidumping duty on the various macroeconomic variables. First, we assume the economic system in the absence of antidumping behavior and antidumping duty is given as initial state (namely 0 steady state) and as the basis of comparison, and then to derive the long-term steady state for the economic system. Among the following symbols, the lower case "t" denotes the economic variables under long-term steady state and the lower case "0" denotes the economic variables under initial state. For example, C_t and C_0 each represents the consumption level under long-term steady state and initial state, respectively.

Steady state refers to the economic system is in the state of convergence after exogenous shock in the long run. Under long-term steady state, all variables are constant, and $B_t = B_{t+1} = 0$. Therefore substitute the government budget constraint (Equation 11) into the private budget constraint (Equation 14) to yield:

$$C_t = \frac{p_{h,t}(z)y_{h,t}(z) + \tau(1-n)p_{f,t}(z)}{P_t} \quad (20)$$

Likewise, the equation for foreign country as below:

$$C^*_t = \frac{p^*_{f,t}(z)y^*_{f,t}(z) + \tau^* np^*_{f,t}(z)}{P^*_t} \quad (21)$$

2.3. Log-linearization

The paper applies the practice proposed by Uhlig (1995) in order to yield the closed-form solution. First, log-linearization is applied to the model before giving the parameters of the model for simulation analysis[1]. Next, the variables undergo log-linearization near the initial state of each variable to yield the level of volatility of variables in the steady state. In the text, upper case "^" indicates the variables undergoing log-linearization.

For example, if $\hat{X}_t$ is the result of variable X_t carrying out log-linearization near X_0, then:

$$\hat{X}_t \equiv \ln\frac{X_t}{X_0} \cong \frac{X_t - X_0}{X_0} \cong \frac{dX_t}{X_0}$$

2.3.1. Log-linearized versions of price index

Substitute Equations (5) and (6) to Equations (3) and (4), and log-linearize the two equation yield:

$$\hat{P}_t = n\hat{p}_{h,t}(z) + (1-n)(1-\lambda)(\hat{E}_t + \hat{p}^*_{f,t}(z) + \hat{\tau}) \quad (22)$$

$$\hat{P}^*_t = n(1-\lambda)(\hat{p}_{h,t}(z) - \hat{E}_t + \hat{\tau}^*) + (1-n)\hat{p}^*_{f,t}(z) \quad (23)$$

Subtract Equation (23) from Equation (22) to yield the difference of variation in the price index between two countries as:

$$\hat{P}_t - \hat{P}^*_t = n\lambda p_{h,t}(z) + (1-\lambda)\hat{E}_t - (1-n)\lambda\hat{p}^*_{f,t} + (1-n)(1-\lambda)\hat{\tau} - n(1-\lambda)\hat{\tau}^* \quad (24)$$

2.3.2. Log-linearized versions of the law of one price

Apply log-linearization to Equations (5) and (6) to yield:

1 Due to the complexity in model configuration and to yield the closed-form solution between exogenous variable and endogenous variables, the two methods more commonly used in literature are log-linearization and numerical simulations. The paper adopts log-linearization incorporated with numerical simulation analysis.

$$\hat{p}_{h,t}(z) = \hat{E}_t + \hat{p}^*_{h,t}(z) \tag{25}$$

$$\hat{p}_{f,t}(z) = \hat{E}_t + \hat{p}^*_{f,t}(z) \tag{26}$$

2.3.3. Log-linearized versions of world budget constraint

Use Equations (20) and (21) to yield the budget constraint of the world:

$$C_t^W = nC_t + (1-n)C_t^* = n\frac{p_{h,t}(z)y_{h,t}(z) + \tau(1-n)p_{f,t}(z)}{P_t} + (1-n)\frac{p^*_{f,t}(z)y^*_{f,t}(z) + \tau^* np^*_{f,t}(z)}{P_t} \tag{27}$$

Apply log-initialization to Equation (27) and utilize Equations (25) and (26) to yield:

$$\hat{C}_t^W = n(\hat{p}_{h,t}(z) + \hat{y}_{h,t}(z) - \hat{P}_t + (1-n)(\hat{p}^*_{f,t}(z) - \hat{P}^*_t) + \hat{\tau}) + (1-n)(\hat{p}^*_{f,t}(z) + \hat{y}^*_{f,t}(z) - \hat{P}^*_t + n(\hat{p}_{h,t}(z) - \hat{P}_t) + \hat{\tau}^*) \tag{28}$$

2.3.4. Log-linearized versions of demand function

Apply log-linearization to Equations (15) and (16) to yield:

$$\hat{y}_{h,t}(z) = -\delta(n(\hat{p}_{h,t} - \hat{P}_t) + (1-n)(1-\lambda)(\hat{p}^*_{h,t}(z) - \hat{P}^*_t + \hat{\tau}^*) + \hat{C}_t^W \tag{29}$$

$$\hat{y}^*_{f,t}(z) = -\delta(n(1-\lambda)(\hat{p}_{f,t}(z) - \hat{P}_t) + (1-n)(\hat{p}^*_{f,t}(z) - \hat{P}^*_t + \hat{\tau})) + \hat{C}_t^W \tag{30}$$

2.3.5. Log-linearized versions of labor supply function

Apply log-linearization to home-country labor supply function (Equation 19) to yield:

$$(1+\delta)\hat{y}_{h,t}(z) = -\delta\hat{C}_t + \hat{C}_t^W \tag{31}$$

Likewise, for the foreign country, we have:

$$(1+\delta)\hat{y}^*_{f,t}(z) = -\delta\hat{C}^*_t + \hat{C}_t^W \tag{32}$$

2.3.6. Log-linearized versions of money demand function

Apply log-linearization to the money demand function (Equation 18) to yield:

$$\hat{M}_t - \hat{P}_t = \frac{1}{\varepsilon}\hat{C}_t \tag{33}$$

Likewise, for foreign country, we have:

$$\hat{M}^*_t - \hat{P}^*_t = \frac{1}{\varepsilon}\hat{C}^*_t \tag{34}$$

Subtract Equation (34) from Equation (33), and use Equation (24) to yield the following relation equation:

$$(1-\lambda)\hat{E}_t = \hat{M}_t - \hat{M}^*_t - \frac{1}{\varepsilon}(\hat{C}_t - \hat{C}^*_t) - n\lambda p_{h,t}(z) + (1-n)\lambda\hat{p}^*_{f,t} - (1-n)(1-\lambda)\hat{\tau} + n(1-\lambda)\hat{\tau}^* \tag{35}$$

2.3.7. Log-linearized versions of TOT

Define TOT as the ratio between export product prices relative to import product prices, namely:

$$TOT = \frac{p_{h,t}(z)}{E_t p^*_{f,t}(z)} \tag{36}$$

Apply log-linearization to Equation (36) to yield:

$$\hat{TOT} = \hat{p}_{h,t}(z) - \hat{E}_t - \hat{p}^*_{f,t}(z) \tag{37}$$

2.4. Steady-state Solution

Apply log-linearization to Equations (20) and (21) to yield:

$$\hat{C}_t = \hat{p}_{h,t}(z) + \hat{y}_{h,t}(z) - \hat{P}_t + (1-n)(\hat{p}^*_{f,t}(z) - \hat{P}^*_t + \hat{\tau}) \tag{38}$$

$$\hat{C}^*_t = \hat{p}^*_{f,t}(z) + \hat{y}^*_{f,t}(z) - \hat{P}^*_t + n(\hat{p}_{h,t}(z) - \hat{P}_t + \hat{\tau}^*) \tag{39}$$

We now can take thirteen equations with log-linearization, including price index (Equations 22 and 23), law of one price (Equations 25 and 26), world consumption equation (Equation 28), demand function (Equations 29 and 30), labor supply function (Equations 31 and 32), home-country and foreign money demand function substations (Equation 35, TOT equation [Equation 37]), and private budget constraint (Equations 38 and 39) to solve sets of equations. The equations are solved to yield the relation equation for thirteen endogenous variables and exogenous variable, the thirteen endogenous variables including domestic consumption ($\hat{C}_t$), foreign consumption ($\hat{C}^*_t$), world consumption ($\hat{C}^W_t$), domestic output ($\hat{y}_{h,t}(z)$), foreign output ($\hat{y}^*_{f,t}(z)$), price of specific home-country product in home country ($\hat{p}_{h,t}(z)$), price of specific home-country product in foreign country ($\hat{p}^*_{h,t}(z)$), price of specific foreign product in foreign country ($\hat{p}^*_{f,t}(z)$), price of specific foreign product in home country ($\hat{p}_{f,t}(z)$), exchange rate ($\hat{E}_t$), domestic price index ($\hat{P}_t$), foreign price index ($\hat{P}^*_t$), and terms of trade ($\hat{TOT}_t$).

3. THE EFFECTS OF ANTIDUMPING DUTY ON MACROECONOMIC VARIABLES

This section presents the outcome of simulation analysis to analyze the effect of antidumping duty on macroeconomic variables.

3.1. Parameterization

First, to simplify analysis in this paper, we set up two economic systems with equivalent scales as objects of analysis. Hence the selection of parameters is possibly introduced with empirical data targeting at the United States and countries with similar scale (i.e., OECD countries and EU) to analyze the effect of antidumping duty between the United States and countries with similar scale. First we follow the configuration approach proposed by Bergin et al. (2007) to set up the elasticity of substitution of products between countries (δ) as 5, and additionally applies the approach proposed by Mankiw and Summers (1986) and Schmidt (2006) in relevant literature to set the elasticity of marginal utility for real money balances (ε) as 1. According to the outcome of antidumping case verdict for relevant solar energy products recently sold to China, as announced by United States Department

of Commerce, and taking the antidumping duty case imposed with 26.33-58.87% of tax, the paper simulates the ratio of export products selling below the retail price in home country (λ) and the variation rate of home country antidumping duty ($\hat{\tau}$) as 25% and 60% respectively. As for the other policy variables, such as domestic money supply ($\hat{M}$), foreign money supply ($\hat{M}^*$) and foreign antidumping duty ($\hat{\tau}^*$) are temporarily assumed with variable rate of 0 since they are not the key discussion of the paper. The configuration values of parameter (variable) are summarized in Table 1.

3.2. Simulation Analysis

This section applies the parameter (variable) values configured from previous section to conduct simulation analysis and analyze the effect of antidumping duty on exchange rate, price, consumption, output, and TOT, the simulation outcome as shown in Table 2.

It is shown from Table 2a-m that over the long run, an increase in antidumping duty will drive domestic consumption, foreign consumption, world consumption, domestic price index, foreign price index, price of domestic product selling in home country, price of domestic product selling in foreign country, price of foreign product selling in home country, price of foreign product selling in foreign country, and the exchange rate to go up. Nonetheless, antidumping duty will cause the domestic output and foreign output to drop and TOT to deteriorate. The degree of effect of antidumping duty on macroeconomic variables are determined the ratio of price of export product to the price of the product selling in home country. As the ratio of export product price selling below its retail price in home country rises, the effect resulted from antidumping duty on macroeconomic variables will become more intense.

The economic intuition behind the aforementioned conclusion can be explained below. Under an open economy system with imperfect competition, the government will transfer all revenue to the agent, hence the rise in antidumping duty represents more lump-sum transfer the household will receive, the consumption also increases accordingly. And, the increase in consumption will on one hand drive the price to go up while on the other hand improve demand for import, stimulating demand for foreign currency, exchange rate to rise, domestic currency to depreciate, and TOT to deteriorate. Moreover following the increase in dumping price differentiation, the rise in antidumping duty will have greater impact on the macroeconomic variables.

Table 1: Parameters (variables) selected values

Symbol	Meaning	Value
n	Country size	0.5
δ	Elasticity of substitution for cross-border products	5
ε	Elasticity of marginal utility for real money balances	1
λ	Ratio of export product price selling below its retail price	25%; 60%
$\hat{\tau}$	Rate of antidumping duty	25%; 60%

Table 2: Long-term effect of domestic antidumping duty on macroeconomic variables

a. Long-term effect of domestic antidumping duty on domestic consumption

$\hat{C}_t$

		$\hat{\tau}$ = 0.25	$\hat{\tau}$ = 0.6
λ	0.25	0.896	-
	0.6	11.994	28.785

b. Long-term effect of domestic antidumping duty on foreign consumption

$\hat{C}_t^*$

		$\hat{\tau}$ = 0.25	$\hat{\tau}$ = 0.6
λ	0.25	0.979	-
	0.6	15.869	38.085

c. Long-term effect of domestic antidumping duty on world consumption

$\hat{C}_t^W$

		$\hat{\tau}$ = 0.25	$\hat{\tau}$ = 0.6
λ	0.25	0.938	-
	0.6	13.931	33.435

d. Long-term effect of domestic antidumping duty on domestic output

$y_{h,t}(z)$

		$\hat{\tau}$ = 0.25	$\hat{\tau}$ = 0.6
λ	0.25	−0.590	-
	0.6	−7.673	−18.415

e. Long-term effect of domestic antidumping duty on foreign output

$y_{f,t}^*(z)$

		$\hat{\tau}$ = 0.25	$\hat{\tau}$ = 0.6
λ	0.25	−0.660	-
	0.6	−10.902	−26.165

f. Long-term effect of domestic antidumping duty on domestic price index

$\hat{P}_t$

(*Contd...*)

Table 2: Continued

			$\hat{\tau}$	
			0.25	0.6
g. Long-term effect of domestic antidumping duty on foreign price index	λ	0.25	7.417	-
		0.6	38.042	91.3
			$\hat{P}_t^*$	
			$\hat{\tau}$	
			0.25	0.6
h. Long-term effect of domestic antidumping duty on the price of domestic product *z* denoted in domestic currency	λ	0.25	7.333	-
		0.6	34.167	82.0
			$\hat{p}_{h,t}(z)$	
			$\hat{\tau}$	
			0.25	0.6
i. Long-term effect of domestic antidumping duty on the price of domestic product *z* denoted in foreign currency	λ	0.25	8.139	-
		0.6	46.25	111.0
			$\hat{p}_{h,t}^*(z)$	
			$\hat{\tau}$	
			0.25	0.6
j. Long-term effect of domestic antidumping duty on the price of foreign product *z* denoted in domestic currency	λ	0.25	8.074	-
		0.6	28.75	69.0
			$\hat{p}_{f,t}(z)$	
			$\hat{\tau}$	
			0.25	0.6
k. Long-term effect of domestic antidumping duty on the price of foreign product *z* denoted in foreign currency	λ	0.25	8.675	-
		0.6	74.333	178.4

(*Contd...*)

Table 2: Continued

			$\hat{p}_{f,t}^*(z)$	
			$\hat{\tau}$	
			0.25	0.6
l. Long-term effect of domestic antidumping duty on exchange rate	λ	0.25	8.611	-
		0.6	56.833	136.4
			$\hat{E}_t$	
			$\hat{\tau}$	
			0.25	0.6
m. Long-term effect of domestic antidumping duty on TOT	λ	0.25	0.065	-
		0.6	17.5	42.0
			$\hat{TOT}_t$	
			$\hat{\tau}$	
			0.25	0.6
Antidumping tax should not exceed the margin of dumping	λ	0.25	−0.537	-
		0.6	−28.083	−67.4

4. CONCLUSION AND SUGGESTIONS

According to the definition in the "Antidumping Agreement" developed by the WTO, the price of export product falling below the domestic sale price constitutes the suspicion of "dumping." In case a specific product is suspected of dumping and causing the industries of importing countries to suffer damage while there is casualty between dumping and damage, the importing countries can apply for conducting antidumping investigation on the specific product of specific country. Once verified by the investigation conducted by importing country with evidence showing the low price indeed damaging the industries of the importing country, "antidumping duty" will immediately be imposed to the importing products through low-price dumping. In consideration of antidumping policy becoming one of the considerably popular trade policy means in practice, this paper analyzes the effect of antidumping duty on macro economy in attempt to provide reference for relevant government sectors in the adoption of trade remedies.

Moreover, NOEM has been for more than 20 years today but is relatively deficient in terms of research related to trade policy effects (i.e. antidumping duty) compared with the prevalence of studies on the effects of monetary and fiscal policy. Based on the above reason and under the theoretical framework of NOEM, this paper analyses the effect of antidumping duty on the macro economy. Theoretical inference and simulation analysis of the

paper shows the antidumping duty and domestic consumption, foreign consumption, world consumption, domestic price index, foreign price index, and exchange rate have a positive correlation, the antidumping duty and domestic output, foreign output, and TOT present a negative correlation. Moreover, the degree of volatility in all macroeconomic variables intensifies when the ratio of export product price selling below its retail price in home country expands.

Finally, it merits mentioning that although the theoretical framework of NOEM is brought into full play among many economic issues, it is usually established under many assumptions in reality to facilitate solution. The outcome yielded could somewhat vary if the attempt to relax one of the assumptions or configurations (i.e. the form of utility function,…,etc.) is made. The paper thus includes this shortcoming in the limitations while the study on the short-term effect of antidumping duty can be an issue for further expansion in the future.

REFERENCES

Anderson, S.P., Schmitt, N., Thisse, J.F. (1995), Who benefits from antidumping legislation? Journal of International Economics, 38, 321-337.

Bergin, P., Shin, H., Tchakarov, I. (2007), Does exchange rate variability matter for welfare? A quantitative investigation of stabilization policies. European Economic Review, 51, 1041-1058.

Durling, J.P., Prusa, T.J. (2006), The trade effects associated with an antidumping epidemic: The hot-rolled steel market, 1996-2001. European Journal of Political Economy, 22, 675-695.

Feinberg, R.M., Kaplan, S. (1993), Fishing downstream: The political economy of effective administered protection. Canadian Journal of Economics, 26, 150-158.

Fender, J., Yip, K.C. (2000), Tariffs and exchange rate dynamics redux. Journal of International Money and Finance, 19, 633-655.

Kelly, K.M., Morkre, M.E. (1998), Do unfairly traded imports injure domestic industries. Review of International Trade, 6, 321-332.

Krupp, C.M., Pollard, P.S. (1996), Market responses to antidumping laws: Some evidence from US. Chemical industry. Canadian Journal of Economics, 29, 199-227.

Mankiw, N.G., Summers, L.H. (1986), Money demand and the effects of fiscal policies. Journal of Money, Credit, and Banking, 90, 1415-1433.

Obstfeld, M., Rogoff, K. (1995), Exchange rate dynamics redux. Journal of Political Economy, 103, 624-660.

Prusa, T.J. (1996), The Trade Effects of US. Antidumping Actions. NBER Working Paper, No. 5440.

Prusa, T.J. (1999), On the spread and impact of antidumping. NBER Working Paper, No. 7404.

Prusa, T.J. (2001), On the spread and impact of anti-dumping. Canadian Journal of Economics, 34, 591-611.

Schmidt, C. (2006), International transmission effects of monetary policy shocks: Can asymmetric price setting explain the stylized facts? International Journal of Finance and Economics, 11, 205-218.

Staiger, R.W., Wolak, F. (1994), Measuring Industry Specific Protection: Antidumping in the United States. NBER Working Paper, No. W4696.

Uhlig, H. (1995), A Toolkit for Analyzing Nonlinear Dynamic Stochastic Models Easily. Center for Economic Research Discussion Paper, No. 97, Tilburg University.

Webb, M. (1992), The ambiguous consequences of anti-dumping laws. Economics Inquiry, 30, 437-448.