



TARIFF, CONSUMPTION HOME BIAS AND MACROECONOMIC DYNAMICS

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ABSTRACT

In this paper, New Open Economy Macroeconomics is served as an analytical framework to build a setting which is in line with structure of an imperfectly competitive market, we follow an open economy model with micro-foundation for two countries to explore the long-term and short-term effects of tariff shock on various macroeconomic variables (e.g. consumption, output, prices, exchange rate, terms of trade, and so on), and try to explain the role that consumption home bias plays therein. With theoretical derivation and simulation analysis, we find that the phenomenon such as undershooting, overshooting or mis-adjustment might happen to the dynamic adjustment process of each macroeconomic variable in face of domestic tariff shock while domestic and foreign consumers who have asymmetric behavior of consumption bias on the imported and exported goods.

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Contribution/ Originality

This study contributes to the existing literature by providing a detailed account of how tariff change on macroeconomic variables in an open economy. We found that if the asymmetric consumption bias behavior exists, the dynamic adjustment process of tariff shock on macroeconomic variables will present phenomenon of undershooting, overshooting or mis-adjustment.

1. INTRODUCTION

Free trade or protection has been a primary issue in fierce arguments on trade policy. Free trade theory advocated liberal foreign trade development, and strongly is opposed to the national intervention of economy with the levy of tariffs and other means, while the protectionism suggested the intervention on foreign trade by the use of the tax tools for imposing high tariffs on imported goods and implementing various restrictions to protect domestic markets and enterprises. Hence, so far, the effect of tariff policy remains a hot topic of scholars contesting on the studies. Moreover, although consumption home bias is a common phenomenon in the real world, indicating consumers often have tendency to prefer domestic commodities in an economic system, the existing literature keeps ignoring the role

of consumption home bias plays in the analysis of tariff policy effects, in view of this, this paper is seeking to advance breakthrough.

The initial development of open economy analysis be available is mainly on the basis of Mundell-Fleming model (see (Fleming, 1962; Mundell, 1963)) and Dornbusch (1976) model which were expanded by Keynes theory, although these open economy models in the early time reveal and explain the relationship among some major macroeconomic variables, there is a common defect therein, namely, the shortage of micro-foundation. Lucas (1976) believed that the change in the macroeconomic variables may affect micro-decisions of individuals, resulting in the change of the relationship among macroeconomic variables; hence the macroeconomic analysis lacks micro-foundation will produce a deviation. For this reason, the birth of New Open Economy Macroeconomics (hereinafter referred to as NOEM) further opens a new stage of the macroeconomics development, NOEM is a new generation method proposed by Obstfeld and Rogoff (1995) which is characterized by micro-foundation and monopolistic competition market structure, it also assumes rigidity presented by prices in the short-term, so that the economic system will exhibit dynamic adjustment process in the face of exogenous shocks, which helps us to analyze long-term and short-term effects generated. Since NOEM is quite suitable for analyzing the dynamic effects of exogenous shock on the macro economy, therefore, this paper uses NOEM as the basis for analysis.

Since Mundell (1961) had started paying attention to the topic of tariff shock affecting the macro economy in the early time, thereafter, Johnson (1966) and Tower (1973) also explored the effects of tariff on output, prices and welfare, however, the common drawbacks of early literature used comparative static analysis to analyze the effects of tariff shocks, which failed to completely spy the dynamic adjustment process of tariff shock on macro economy. Hence, after the 1980s, literatures with discussion on the effects of tariff from the perspective of dynamic analysis began to emerge, such as those completed by Eichengreen (1981); Razin and Svensson (1983); Van Wijnbergen (1987); Edwards and Van Wijnbergen (1987) and Roldos (1991) but in order to simplify the analysis, all of them were based on the analysis under perfect competitive market structure, they also faced the research that mismatch of the assumptive conditions and reality causing the shortage of reliability of theoretical analysis result. Rama (1993); Fender and Yip (1994); Bettendorf and Heijdra (1999); Devadoss and Lanclos (2000) and Sen (2001) further set the market structure to be a more realistic assumption with imperfect competition pattern to analyze the effects of tariff policy, at the same time, the analysis with micro-foundation is also a tendency of research, such as Razin and Svensson (1983) analyzed it based on two-period model, and found that the effects of tariff on the current account relates to the intertemporal elasticity of substitution, Roldos (1991) used specific factors model to discuss the effects of tariff changes on the current account and found that the effects is depend on the rate of accumulating capital stock, Brock and Turnovsky (1993) also established specific factors model with two departments and three factors to analyze the effects of different types of tariffs (e.g. consumption tax and investment tax) on capital accumulation, Osang and Pereira (1996) discussed the relationship among tariff structure, welfare and economic growth rate based on endogenous growth model with a small open economy, Bettendorf and Heijdra (2001) used dynamic overlapping-generations model to analyze tariff effects under imperfect competition of commodity markets, and found that the rise of tariff would drop down real output and employment level, but the terms of trade would improve in the long-term equilibrium, subsequent researchers also continue to seek a more suitable theoretical model for analysis basis.

Recently, rapid rise of NOEM model provides a clear micro-foundation and complete framework of dynamic analysis under an imperfectly competitive market structure, therefore, relevant scholars are also driven to re-examine a variety of macro issues from NOEM view, researches of the effects of tariff shock is one of topics of NOEM. Fender and Yip (2000) had ever explored the effects of protection policy (tariff) on domestic (foreign) output and welfare according to NOEM model proposed by Obstfeld and Rogoff (1995). Their findings indicated that increase in temporary tariff will result in fall of domestic output level and its effect of the level of foreign output is uncertain in

the short-term; the effect of tariff policy for the long-term is the same as the conclusion made for the short-term. On the other hand, for welfare, the rise of tariff will improve domestic welfare level, but the effect on the level of foreign welfare is negative, thus, the rise of domestic import tariff will generate an effect of “beggar thy neighbor”. However, the part which arose more attention is that although [Obstfeld and Rogoff \(2000\)](#) have deemed “home bias in consumption puzzle” as one of six puzzles in international economics,¹ in NOEM architecture, the phenomenon of “home bias in consumption” has not combined with the analysis on the effects of tariff shock.

The so-called consumption home bias puzzle refers to a tendency of consumers preferring domestic goods in the real world, but such phenomenon happened in the goods market cannot be explained by researchers. Regarding to the study in the topic of consumption home bias, mostly of them concentrated in the early exploration of the causes of consumption home bias, such as trade costs ([Obstfeld and Rogoff, 2000](#); [Ried, 2009](#)) country size and degree of openness ([Sutherland, 2005](#); [De Paoli, 2009](#)) non-traded goods ([Stockman and Dellas, 1989](#); [Pesenti and Van Wincoop, 2002](#)) and trade in intermediate input factors ([Hillberry and Hummels, 2002](#)) which are all main causes of consumption home bias that scholars believed. More recent studies have focused on the discussion of the effects of consumption home bias, such as [Pierdzioch \(2004\)](#) analyzed the effects of monetary shock under different extent of consumption home bias and capital mobility, [Hau \(2002\)](#); [Pitterle and Steffen \(2004\)](#); [Kollmann \(2004\)](#); [Sutherland \(2005\)](#); [Leith and Lewis \(2006\)](#) and [Cooke \(2010\)](#) investigated the effect of consumption home bias on fluctuation of exchange rate, [De Paoli \(2009\)](#) discussed the welfare effects of consumption home bias and monetary policy. In addition, it is worthy to mention that the effect of consumption home bias on the optimal monetary policy is also a quite hot topic recently, which including researches made by [Faia and Monacelli \(2006\)](#); [Jondeau and Sahuc \(2008\)](#); [Galí and Monacelli \(2008\)](#) and [Wang \(2010\)](#). Evidently, although researches related with the topic of consumption home bias were quite enthusiastic, however, none of literature has been able to explain clearly the role of consumption home bias plays on the effects of tariff shock, which is the motivation to drive researches.

This paper will discuss it in four sections, except for introduction; other sections are arranged as follows: Section 2 constructs a theoretical model; Section 3 makes a simulation analysis; which discusses the dynamic effect of tariff shock on macroeconomic variables, and explains the role of home bias plays; Section 4 is conclusion and suggestions.

2. THEORETICAL MODEL

2.1. Model Setting

This paper follows NOEM model proposed by [Obstfeld and Rogoff \(1995\)](#) as a theoretical basis, main assumptions are as follows:

- (1). There are two countries exist in the world, “home country” and “foreign country”, all of the following foreign economic variables are marked with “*”.
- (2). The population in the world is distributed in the interval $[0,1]$, where domestic individual is distribution in $[0, n]$, and foreign individual is distributed in $[n, 1]$.
- (3). Each individual is both consumer and producer, operating a monopoly competitor factory and using labor for production.
- (4). Consumption home bias behavior exists in the economic system and tariff policy is the only one exogenous shock.
- (5). Prices have stickiness that commodity prices are adherent and cannot changed in the short-term, and may only be fully adjusted in the long-term.

¹ The six puzzles proposed by [Obstfeld and Rogoff \(2000\)](#). are consumption home bias puzzle, home bias in equity portfolios puzzle, purchasing power parity puzzle, exchange rate disconnect puzzle, the high investment-saving correlation puzzle, and the low international consumption correlation puzzle.

2.1.1. Household

Assuming that all individuals have the same preferences, utility (U) and consumption (C) and real money balances (M/P) are in positive proportional, and is inversely proportional to the output (y), wherein, the lifetime utility function of representative individual is set as follows:

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

Where β is the discount factor ($0 < \beta < 1$), ε is the marginal elasticity of demand for real money balances,² χ and κ represent the degree of significance of real money balances and output on the utility function, z refers to a particular product.

In Eq. (1), define the consumption index of representative consumer as the constant elasticity of substitution (CES) function:

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

Where $c_h(z)$ is the consumption of domestic consumer for domestic specific products z , $c_f(z)$ is the consumption of domestic consumer for foreign specific product z , α is the consumption home bias parameter to measure the degree of domestic consumers preferring domestic goods, and δ is the elasticity of substitution of goods between two countries.

As defined by Eq. (2), we could deduce that domestic price index (P) under the problem of expenditure minimization as:

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

Likewise, the foreign price index (P^*) is as follows:

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

In the above two equations, $p_h(z)$ represents the price expressed with domestic currency for domestic commodity z , $p_f(z)$ represents domestic currency price of foreign commodity z , $p_h^*(z)$ represents that the foreign currency price of domestic commodity z , $p_f^*(z)$ represents the foreign currency price of foreign commodity z , α^* represents the degree of foreign consumers preferring foreign commodities. Furthermore, because tariff exists in the economic system, we set the domestic and foreign tariff rates are τ and τ^* respectively, and the change of tariff rate is a permanent shock, that is, $\tau_t = \tau_{t+1} = \tau$; $\tau_t^* = \tau_{t+1}^* = \tau^*$.

² The elasticity of marginal utility of real money balance (\mathcal{E}) is defined as the response of the change in the marginal utility of real money balances under a change of real money balances.

For any product, the law of one price is stated as follows:

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

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

Where E represents the exchange rate.

From Eqs. (2) and (3), we can respectively derive the consumption of domestic representative consumer on domestic and foreign specific commodities as follows:

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

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

Likewise, the consumption that foreign representative consumer on domestic and foreign specific commodity as follows:

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

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

In both equations as above, $c_h^*(z)$ represents the consumption that foreign consumers for domestic specific product z , while $c_f^*(z)$ represents the consumption that foreign consumers for foreign specific product z .

2.1.2. Government

In order to focus on the analysis of macroeconomic effects of tariff, assuming that government sectors did not generate expenditure, and government will return seigniorage and customs revenues in lump-sum fashion to the agents, then, the government budget constraint equation is:

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

Where the 1st item of the left hand side of the equation is real seigniorage revenue, while the 2nd item is real tariff revenue, and the right item of the equation is the government transfer payments.

2.1.3. Asset Market

Suppose that there is an integrated international capital market between two countries, and each individual can trade real bonds (B) in this international capital market, the relationship between real interest rate (r) and domestic nominal interest rate (i) of maturing bonds is as shown in Fisher equation, namely:

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

Bonds holding reflects the lending relationship between the residents of two countries, thus satisfying $nB_t + (1-n)B_t^* = 0$, that is:

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

Where B refers to the amount of bonds held by domestic representative individual and B^* refers to that held by foreign representative individual.

2.1.4. Budget Constraint

Budget constraint of representative individual is as follows:

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

Where consumer's source of income in period t includes: the money balances in period $t-1$ (M_{t-1}), the sum of principal and interest of bonds ($P_t(1+r_{t-1})B_{t-1}$), output revenue ($p_{h,t}(z)y_{h,t}(z)$), and government transfer income ($P_t T_t$). Consumers can use the income to money holding (M_t), consumption ($P_t C_t$), and bonds purchases ($P_t B_t$).

2.1.5. Aggregate Demand

From Eqs. (7) and (9), demand on the goods that domestic manufacturers face can be expressed as:

$$\begin{aligned} y_{h,t}(z) &= nc_{h,t}(z) + (1-n)c_{h,t}^*(z) \\ &= n\left(\frac{\alpha p_{h,t}(z)}{P_t}\right)^{-\delta} C + (1-n)\left(\frac{(1+\tau^*)(1-\alpha^*)p_{h,t}^*(z)}{P_t^*}\right)^{-\delta} C^* \end{aligned} \quad (15)$$

Likewise, from Eqs. (8) and (10), demand on the goods that foreign manufacturers face can be expressed as:

$$\begin{aligned} y_{f,t}^*(z) &= nc_{f,t}(z) + (1-n)c_{f,t}^*(z) \\ &= n\left(\frac{(1+\tau)(1-\alpha)p_{f,t}(z)}{P_t}\right)^{-\delta} C + (1-n)\left(\frac{\alpha^* p_{f,t}^*(z)}{P_t^*}\right)^{-\delta} C^* \end{aligned} \quad (16)$$

2.1.6. First Order Conditions

The first order conditions of consumer for maximizing utility (Eq. (1)) under budget constraint (Eq. (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 Eq. (17) is Euler equation of consumption, which describes intertemporal consumption behavior, Eq. (18) is an equation of money demand for indicating the substitution relationship between real money demand and consumption, Eq. (19) refers to the labor supply equation, which gives the alternative relationship between labor supply and consumption, in the equation, C^W represents world consumption, and $C_t^W \equiv nC_t + (1-n)C_t^*$.

2.2. Derivation of Steady-State

The following sections discuss the effects of tariff shock on macroeconomic variables. Firstly, given that the economic system does not exist consumption home bias behavior and tariff shock was not served in the initial state (0 steady state) as a baseline, and then to seek a long-term steady state of economy system. The following symbols, the subscript “ t ” represents the macroeconomic variables in the long-term steady state, and the subscript “ 0 ” represents the macroeconomic variables in the initial state. For example: C_t and C_0 represent the consumption in the long-term steady state and initial state respectively. When we were in the analysis of short-term equilibrium, we changed to express macroeconomic variables in a long-term steady state with null subscript and the subscript “ t ” represents the macroeconomic variables in a short-term steady state, with which to differentiate them.

We now apply the government’s budget constraint equation (Eq. (11)) into private sector’s budget constraint equation (Eq. (14)), and assuming that $B_{t-1} = 0$, we can get:

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

Likewise, for foreign aspect, we have:

$$C_t^* = -\hat{B}_t^* + \frac{p_{f,t}^*(z)y_{f,t}^*(z) + \tau^*np_{h,t}^*(z)}{P_t^*} \quad (21)$$

2.3. Log-linearization

In order to obtain closed-form solution, this paper uses the approach proposed by Uhlig (1995). Firstly, we put model in log-linearization, then, to assign values to the parameters of the model to perform simulation analysis.³ Below we will put all variables in the vicinity of the initial state into log-linearization to obtain the degree of each variable fluctuates in the steady state. In this paper, the superscript “ $\hat{}$ ” means the macroeconomic variables after log-linearization.

For example: If \hat{X}_t is the result of the variable X_t , performing log-linearization in the initial state (X_0), then:

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

³ Because of the complexity of the model setting, in order to obtain a closed-form of solution between exogenous variables and endogenous variables, two ways were more frequently used in the literature: log-linearization and numerical simulations. This model is to use log-linearization incorporated with numerical simulation for analysis.

2.3.1. Log-linearization of Price Index

Substitute Eqs. (5) and (6) into Eqs. (3) and (4) respectively, and process the log-linearization to obtain:

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

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

Subtract Eq. (23) from Eq. (22) to obtain the difference between fluctuations of price indices of two countries:

$$\begin{aligned} \hat{P}_t - \hat{P}_t^* &= n(\alpha - (1-\alpha^*))p_{h,t}(z) + ((1-n)(1-\alpha) + n(1-\alpha^*))\hat{E}_t \\ &+ (1-n)((1-\alpha) - \alpha^*)p_{f,t}^*(z) + (1-n)(1-\alpha)\hat{\tau} - n(1-\alpha^*)\hat{\tau}^* \end{aligned} \tag{24}$$

2.3.2. Log-linearization of the Law of One Price

Put Equation (5) and (6) into log-linearization to get:

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

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

2.3.3. Log-linearization of World Budget Constraint

We may get the world budget constraints equation from Eqs. (20) and (21) as follows:

$$\begin{aligned} C_t^W &= nC_t + (1-n)C_t^* \\ &= n\left(-\hat{B}_t + \frac{p_{h,t}(z)y_{h,t}(z) + \tau(1-n)p_{f,t}(z)}{P_t}\right) + (1-n)\left(-\hat{B}_t^* + \frac{p_{f,t}^*(z)y_{f,t}^*(z) + \tau^*np_{h,t}^*(z)}{P_t^*}\right) \end{aligned} \tag{27}$$

Put Eq. (27) into log-linearization and use Eqs. (25) and (26) to get:

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

2.3.4. Log-linearization of Demand Function

Put domestic and foreign demand functions (Eqs. (15) and (16)) into log-linearization to get:

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

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

2.3.5. Log-linearization of Labor Supply Function

Put the domestic labor supply function (Eq. (19)) into log-linearization to get:

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

Similarly, for foreign country, we have:

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

2.3.6. Log-linearization of Money Demand Function

Put the domestic money demand function (Eq. (18)) into log-linearization to get:

$$\hat{M}_t - \hat{P}_t = \frac{1}{\varepsilon} \hat{C}_t \quad (33)$$

Likewise, for foreign country, we have:

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

Subtract Eq. (33) from Eq. (34), also use Eq. (24) to get the following relationship equation:

$$\begin{aligned} ((1-n)(1-\alpha) + n(1-\alpha^*))\hat{E}_t &= \hat{M}_t - \hat{M}_t^* - \frac{1}{\varepsilon}(\hat{C}_t - \hat{C}_t^*) - n(\alpha - (1-\alpha^*))p_{h,t}(z) \\ &- (1-n)((1-\alpha) - \alpha^*)p_{f,t}^*(z) - (1-n)(1-\alpha)\hat{\tau} + n(1-\alpha^*)\hat{\tau}^* \end{aligned} \quad (35)$$

2.3.7. Log-linearization of Terms of Trade

Define the terms of trade (*TOT*) as the ratio of export price to import price of the commodity, namely:

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

Put the foregoing equation into log-linearization to get:

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

2.4. Steady-State Solution

The Eqs. (20) and (21) are given the log-linearization process to obtain the following equations:

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

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

In the long-term steady state, prices can be adjusted flexibly, and $\hat{B}_t = \hat{B}_{t+1} = 0$. We will seek solution of a total of 13 simultaneous equations, including the price index after log-linearization (Eqs. (22) and (23)), law of one price after log-linearization (Eqs. (25) and (26)), the world consumption equation with log-linearization (Eq. (28)), domestic and foreign demand function after log-linearization (Eqs. (29) and (30)), domestic and foreign labor supply function after log-linearization (Eqs. (31) and (32)), domestic and foreign money demand function subtraction equation with log-linearization (Eq. (35)), the terms of trade after log-linearization (Eq. (36)) and domestic and foreign private budget constraints equation after log-linearization (Eqs. (37) and (38)) to get correlation equation among 13 endogenous and exogenous variables ($\hat{\tau}$), the 13 endogenous variables includes domestic consumption (\hat{C}_t), foreign consumption (\hat{C}_t^*), the world consumption (\hat{C}_t^W), domestic output ($\hat{y}_{h,t}(z)$), foreign output ($\hat{y}_{f,t}^*(z)$), domestic prices of particular product produced by domestic country ($\hat{p}_{h,t}(z)$), foreign prices of particular

product produced by domestic country ($\hat{p}_{h,t}^*(z)$), foreign prices of particular product produced by foreign country ($\hat{p}_{f,t}^*(z)$), domestic prices of a specific product produced by foreign country ($\hat{p}_{f,t}(z)$), exchange rate (\hat{E}_t), domestic price index (\hat{P}_t), foreign price index (\hat{P}_t^*) and the terms of trade (\hat{TOT}_t).

Among the following symbols, in order to distinguish between long-term and short-term variable, we changed to express the macroeconomic variable in a long-term steady state with null subscript and the subscript “ $_t$ ” represents the variable in a short-term steady state, with which to differentiate them. In the short-term, the price has rigidity ($\hat{p}_{h,t}(z) = 0$; $\hat{p}_{f,t}^*(z) = 0$), besides, if we put Euler equation of domestic consumption (Eq. (17)) into log-linearization and uses a relative foreign Euler equation, we can obtain the following equation of world consumption in the short-term:

$$\hat{C}_t^W = \hat{C}^W - (1 - \beta)\hat{r}_t \quad (40)$$

Where \hat{C}_t^W and \hat{C}^W represent the world consumption in the short-term steady state and long-term steady state respectively.

In the short-term, prices have rigidity ($\hat{p}_{h,t}(z) = 0$; $\hat{p}_{f,t}^*(z) = 0$), we then seek solution for a total of 14 simultaneous equations which including price index after log-linearization (Eqs. (22) and (23)), law of one price after log-linearization (Eqs. (25) and (26)), world consumption equation with log-linearization (Eq. (28)), domestic and foreign demand function after log-linearization (Eqs. (29) and (30)), domestic and foreign labor supply function after log-linearization (Eqs. (31) and (32)), domestic and foreign money demand function subtraction equation with log-linearization (Eq. (35)), the terms of trade after log-linearization (Eq. (37)), domestic and foreign private budget constraints after log-linearization (Eqs. (38) and (39)) as well as long-term and short-term world consumption correlation equation with log-linearization (Eq. 40)) to acquire correlation equations for tariff shock ($\hat{\tau}$) and domestic consumption (\hat{C}_t), foreign consumption (\hat{C}_t^*), world consumption (\hat{C}_t^W), domestic output ($\hat{y}_{h,t}(z)$), foreign output ($\hat{y}_{f,t}^*(z)$), foreign prices of particular product produced by domestic country ($\hat{p}_{h,t}^*(z)$), domestic prices of specific product produced by foreign country ($\hat{p}_{f,t}(z)$), the exchange rate (\hat{E}_t), the domestic price index (\hat{P}_t), foreign prices index (\hat{P}_t^*), domestic current account (\hat{B}_t), foreign current account (\hat{B}_t^*), interest rate (\hat{r}_t) and terms of trade (\hat{TOT}_t).

3. THE EFFECTS OF TARIFF SHOCKS ON MACROECONOMIC DYNAMICS

In order to capture the dynamic effects of consumption home bias parameter change on tariff impact, this paper conducted simulation analysis.

3.1. Parameterisation

In order to simplify the analysis in this paper, on NOEM basis, we set two economic systems with equivalent size as the subjects of analysis. On the selection of the parameter, we try best to introduce empirical data on the United States and countries with similar scale (such as OECD nations, the European Union) to analyze the effects of tariff shock among the United States and other countries with similar size. Firstly, we follow setting mode of Bergin *et al.* (2007) to set the elasticity of substitution of goods between two countries (δ) to 5, besides, we follow practices of related literature submitted by Mankiw and Summers (1986) and Schmidt (2006) to set the elasticity of marginal utility of real money balances (ε) to 1, then adopt the consumption home bias parameter set by Wang (2010) ($\alpha = 0.85$), also simulate circumstances without home bias ($\alpha = 0.5$) and with bias to foreign product ($\alpha = 0.15$), the setting of parameter of consumption bias that foreign country is also the same as the home bias parameter that domestic country. As for the exogenous variables other than the domestic tariff growth rate ($\hat{\tau}$), such as domestic money supply (\hat{M}), foreign money supply (\hat{M}^*), foreign tariff rate ($\hat{\tau}^*$), were not the focus of discussion in this paper, let's assume that its change rate is 0, and parameter settings are sorted out as shown in Table 1.

Table-1. Selection of Parameters

Symbol	Meaning	Value
n	Country size	0.5
δ	Elasticity of substitution of product between countries	5
ε	Elasticity of marginal utility of the real money balances	1
α	Consumption bias of the home country	0.15; 0.5; 0.85
α^*	Consumption bias of the foreign country	0.15; 0.5; 0.85

Source: Simulation results.

3.2. Simulation and Comparative Static Analysis

In this section, parameters set in the preceding section were used in the simulation to discuss the dynamic effects of tariff on macroeconomic variables including consumption, prices, output, exchange rate, and the terms of trade, wherein, the simulation and comparative static analysis results under long-term steady state are set out in Table 2.

Table-2. The Long-Term Effect of the Tariff on the Macroeconomic Variables

(a) Long-Term Effect of Tariff on Domestic Consumption

$\partial \hat{C} / \partial \hat{\tau}$				
	α			
α^*		0.15	0.5	0.85
	0.15	0.093	0.290	0.580
	0.5	-0.228	-0.072	-0.736
	0.85	0.270	-0.012	-0.407

(b) Long-Term Effect of Tariff on Foreign Consumption

$\partial \hat{C}^* / \partial \hat{\tau}$				
	α			
α^*		0.15	0.5	0.85
	0.15	0.319	0.219	0.487
	0.5	-0.230	-0.303	-1.193
	0.85	0.038	-0.274	-0.755

(c) Long-Term Effect of Tariff on World Consumption

$\partial \hat{C}^W / \partial \hat{\tau}$				
	α			
α^*		0.15	0.5	0.85
	0.15	0.206	0.254	0.534
	0.5	-0.229	-0.188	-0.965
	0.85	0.154	-0.143	-0.581

(d) Long-Term Effect of Tariff on Domestic Output

$\partial y_h(z) / \partial \hat{\tau}$				
	α			
α^*		0.15	0.5	0.85
	0.15	-0.043	-0.200	-0.395
	0.5	0.152	0.029	0.453
	0.85	-0.199	-0.014	0.243

(e) Long-Term Effect of Tariff on Foreign Output

$\partial y_f^*(z) / \partial \hat{\tau}$				
	α			
α^*		0.15	0.5	0.85
	0.15	-0.232	-0.140	-0.317
	0.5	0.153	0.221	0.833
	0.85	-0.006	0.205	0.532

(f) Long-Term Effect of Tariff on Domestic Price Index

$\partial \hat{P} / \partial \hat{\tau}$				
	α			
α^*		0.15	0.5	0.85
	0.15	0.601	0.309	0.309
	0.5	0.022	-0.240	-1.047
	0.85	-0.013	-0.402	-0.911

(g) Long-Term Effect of Tariff on Foreign Price Index

$\partial \hat{P}^* / \partial \hat{\tau}$				
	α			
α^*		0.15	0.5	0.85
	0.15	0.374	0.381	0.402
	0.5	0.023	-0.010	-0.590
	0.85	0.219	-0.140	-0.564

(h) Long-Term Effect of Tariff on the Price of Domestic Product z Denoted in Domestic Currency

$\partial \hat{p}_h(z) / \partial \hat{\tau}$				
	α			
α^*		0.15	0.5	0.85
	0.15	-0.252	0.056	0.406
	0.5	-0.896	-0.692	-1.947
	0.85	-0.083	-0.747	-1.586

(i) Long-Term Effect of Tariff on the Price of Domestic Product z Denoted in Foreign Currency

$\partial \hat{p}_h^*(z) / \partial \hat{\tau}$				
α				
		0.15	0.5	0.85
α^*	0.15	0.642	0.743	0.742
	0.5	-0.006	0.269	-0.192
	0.85	1.231	0.666	1.064

(j) Long-Term Effect of Tariff on the Price of Foreign Product z Denoted in Domestic Currency

$\partial \hat{p}_f(z) / \partial \hat{\tau}$				
α				
		0.15	0.5	0.85
α^*	0.15	0.458	0.179	0.822
	0.5	-0.791	-1.269	-3.920
	0.85	-1.017	-1.859	-4.164

(k) Long-Term Effect of Tariff on the Price of Foreign Product z Denoted in Foreign Currency

$\partial \hat{p}_f^*(z) / \partial \hat{\tau}$				
α				
		0.15	0.5	0.85
α^*	0.15	1.352	0.865	1.158
	0.5	0.100	-0.308	-2.166
	0.85	0.298	-0.446	-1.514

(l) Long-Term Effect of Tariff γ on Exchange Rate

$\partial \hat{E} / \partial \hat{\tau}$				
α				
		0.15	0.5	0.85
α^*	0.15	-0.894	-0.686	-0.336
	0.5	-0.890	-0.962	-1.755
	0.85	-1.314	-1.413	-2.650

(m) Long-Term Effect of Tariff γ on Terms of Trade

$\partial T\hat{O}T / \partial \hat{\tau}$				
α				
		0.15	0.5	0.85
α^*	0.15	-0.710	-0.228	-0.416
	0.5	-0.105	0.577	1.973
	0.85	0.934	1.112	-2.577

Source: Simulation results.

Known by Table 2 (a) to (m), in an open economy system which only exists two countries (home and foreign), except for an explicit negative relationship between the rise of domestic tariff rate and exchange rate which were not affected by consumption bias coefficients, the relationship between domestic tariff rates and other macroeconomic variables (such as consumption, output, price index and terms of trade, etc.) are all affected by asymmetry of domestic (foreign) consumers' behavior of consumption bias on the imported and exported goods. Wherein, in the effect of tariffs on domestic consumption, except for the situation that "foreigners have consumption bias on domestically produced products (regardless of how domestic consumer bias on the products)" and "both domestic and foreign consumers have consumption bias on the consumption of foreign produced products" that the raised domestic

tariff rate would rise up domestic consumption, in the remaining cases, the raised domestic tariff rate will drop down the level of domestic consumption. In the effect of tariffs on domestic output, except for the situation that “foreigners have no consumption bias behavior (regardless of how domestic consumer bias on the products)” and “consumers of both countries have consumption preference for their own products” that the raised domestic tariff rate would rise up domestic output level, in the remaining cases, the raised domestic tariff rate will drop down the level of domestic output. In the effect of tariffs on the domestic price index, except for the situation that “foreigners have consumption bias on domestically produced products (regardless of how domestic people bias on the products)” and “foreigners have no consumption bias behavior, but domestic consumer have consumption bias on foreign produced products” that domestic tariff rate has positive correlation with domestic price index, in the remaining cases, domestic tariff rate has negative correlation with domestic price index. Finally, in the effect of tariffs on the terms of trade, except for four kinds of situation below that “consumer in both countries have consumption bias on foreign produced products” and “domestic and foreign consumers both have no consumption bias behavior”, “domestic consumer have no consumption bias behavior, but foreigners have consumption bias on foreign produced products” and “foreigners have no consumption bias behavior, but domestic consumer have consumption bias on domestically produced products” that the rise of domestic tariff rate would cause improved terms of trade, in the remaining cases, the rise of domestic tariff rate will worsen the terms of trade. The intuition on economy behind the foregoing conclusions can be explained as follows: If consumers in both countries do not have asymmetric behavior of consumption bias ($\alpha = \alpha^* = 0.5$), the rise of domestic tariff rate will increase the cost of production and trade, also will inhibit the will of production and consumption, reduce the willingness of importing the goods, thereby dropping down the demand for foreign exchange and resulting in the fall of exchange rate and appreciation of domestic currency, the results appreciation of domestic currency will improve the terms of trade. However, if the consumers in both countries have asymmetric consumption bias behavior, such as the circumstances that “consumers in both countries have consumption bias behavior on products produced by one of the country” and “consumers in a country have no consumption bias behavior, but consumers in the other country have consumption bias behavior”, then, the direction that tariff rate affect each macroeconomic variable could change (inclusive of the exchange rate).

The results in simulation and comparative static analysis under short-term steady state are as shown in Table 3.

Table-3. The Short-Term Effect of the Tariff on the Macroeconomic Variables

(a) Short-Term Effect of Tariff on Domestic Consumption

$\partial \hat{C}_t / \partial \hat{\tau}_t$				
		α		
α^*		0.15	0.5	0.85
	0.15	-0.568	-0.162	0.173
	0.5	-0.141	0.188	0.542
	0.85	0.098	0.365	0.729

(b) Short-Term Effect of Tariff on Foreign Consumption

$\partial \hat{C}_t^* / \partial \hat{\tau}_t$				
		α		
α^*		0.15	0.5	0.85
	0.15	0.156	0.033	0.098
	0.5	0.234	0.188	0.329
	0.85	0.173	0.196	0.433

(c) Short-Term Effect of Tariff on World Consumption

$\partial \hat{C}_t^W / \partial \hat{\tau}_t$				
	α			
		0.15	0.5	0.85
α^*	0.15	-0.206	-0.064	0.135
	0.5	0.047	0.188	0.435
	0.85	0.135	-0.281	0.581

(d) Short-Term Effect of Tariff on Domestic Output

$\partial y_{h,t}(z) / \partial \hat{\tau}_t$				
	α			
		0.15	0.5	0.85
α^*	0.15	0.439	0.124	-0.122
	0.5	0.125	-0.125	-0.379
	0.85	-0.059	-0.258	-0.511

(e) Short-Term Effect of Tariff on Foreign Output

$\partial y_{f,t}^*(z) / \partial \hat{\tau}_t$				
	α			
		0.15	0.5	0.85
α^*	0.15	-0.164	-0.039	-0.059
	0.5	-0.187	-0.125	-0.201
	0.85	-0.122	-0.117	-0.264

(f) Short-Term Effect of Tariff on Domestic Price Index

$\partial \hat{P}_t / \partial \hat{\tau}_t$				
	α			
		0.15	0.5	0.85
α^*	0.15	0.575	0.23	0.052
	0.5	0.394	0.125	0.008
	0.85	0.128	-0.073	-0.11

(g) Short-Term Effect of Tariff on Foreign Price Index

$\partial \hat{P}_t^* / \partial \hat{\tau}_t$				
	α			
		0.15	0.5	0.85
α^*	0.15	-0.15	0.034	0.128
	0.5	0.018	0.125	0.222
	0.85	0.052	0.097	0.185

(h) Short-Term Effect of Tariff on the Price of Domestic Product Z Denoted in Foreign Currency

$\partial \hat{p}_{h,t}^*(z) / \partial \hat{\tau}_t$				
	α			
		0.15	0.5	0.85
α^*	0.15	-0.352	0.081	0.302
	0.5	0.074	0.5	0.888
	0.85	0.698	1.29	2.472

(i) Long-Term Effect of Tariff on the Price of Foreign Product z Denoted in Domestic Currency

$\partial \hat{p}_{f,t}(z) / \partial \hat{\tau}_t$				
	α			
		0.15	0.5	0.85
α^*	0.15	0.352	-0.081	-0.302
	0.5	-0.074	-0.5	-0.888
	0.85	-0.698	-1.29	-2.472

(j) Short-Term Effect of Tariff on Exchange Rate

$\partial \hat{E}_t / \partial \hat{\tau}_t$				
	α			
		0.15	0.5	0.85
α^*	0.15	0.352	-0.081	-0.302
	0.5	-0.074	-0.5	-0.888
	0.85	-0.698	-1.29	-2.472

(k) Short-Term Effect of Tariff on Terms of Trade

$\partial \hat{TOT}_t / \partial \hat{\tau}_t$				
	α			
		0.15	0.5	0.85
α^*	0.15	-0.352	0.081	0.3012
	0.5	0.074	0.5	0.888
	0.85	0.698	1.29	2.472

(l) Short-Term Effect of Tariff on Interest Rate

$\partial \hat{r}_t / \partial \hat{\tau}_t$				
	α			
		0.15	0.5	0.85
α^*	0.15	41.225	31.843	39.855
	0.5	-27.56	0.05	-140.027
	0.85	1.855	-42.365	-116.225

(m) Short-Term Effect of Tariff on Domestic Current Account

$\partial \hat{B}_t / \partial \hat{\tau}_t$				
	α			
		0.15	0.5	0.85
α^*	0.15	1.008	0.54	0.088
	0.5	0.363	0	-0.541
	0.85	0.189	-0.099	-0.722

(n) Short-Term Effect of Tariff on Foreign Current Account

$\partial \hat{B}_t^* / \partial \hat{\tau}_t$				
	α			
		0.15	0.5	0.85
α^*	0.15	-0.458	-0.221	-0.316
	0.5	-0.637	-0.5	-0.756
	0.85	-0.412	-0.373	-0.828

Source: Simulation results.

From the results in the comparison of long-term and short-term simulation analysis (Table 2 and Table 3), we can find:

(1). On the consumption side, in the face of domestic tariff shock, phenomenon of undershooting will be presented by

the domestic consumption of two cases that “domestic consumers have consumption bias on foreign products, foreigners have no consumption bias behavior”, and “consumers in both countries have consumption bias on domestically produced products”; in the remaining cases, domestic consumption will show a mis-adjustment phenomenon.

- (2). On the output side, in the face of the domestic tariff shock, domestic output in five cases including that “consumers in both countries have consumption bias on the products produced by the other country respectively”, “no special bias by domestic consumer, but foreigners have consumption bias on domestically produced products”, “the consumers in two countries both have no consumption bias behavior”, “domestic consumer have consumption bias on domestically produced products and foreigners have no consumption bias behavior”, and “consumers of both countries have consumption bias on their own produced products”, the domestic output will show phenomenon of mis-adjustment; in three cases where “domestic consumers have consumption bias on foreign products, foreigners have no special bias of consumption”, “consumer in two countries have consumption bias on foreign products”, and “consumer in both countries have consumption bias on domestically produced products”, the domestic output will show phenomenon of undershooting; in the case where “domestic consumers have no special bias of consumption, but foreigners have consumption bias on foreign products”, the domestic output will show an overshooting phenomenon.
- (3). On the price side, in the face of the domestic tariff shock, the domestic price in three cases where “consumers in both countries have consumption bias on foreign products”, “consumers in both countries have no consumption bias behavior”, and “domestic consumer have consumption bias on domestic products, foreigners have no special bias of consumption”, there will be phenomenon of mis-adjustment; in five cases where “consumers in both countries have consumption bias on the product produced by the other country”, “domestic consumers have no consumption bias behavior, foreigners have consumption bias of consumption on domestic products”, “domestic consumers have no consumption bias, foreigners bias on foreign produced products”, “consumers of both countries have consumption bias on domestic produced products”, and “consumers of both countries have consumption bias on their own produced products”, the domestic prices will show mis-adjustment; in the case where “domestic consumers have consumption bias on foreign products, foreigners have no consumption bias behavior”, the domestic prices will happen with phenomenon of overshooting.
- (4). On the exchange rate side, in the face of the domestic tariff shock, except that the exchange rate presents mis-adjustment in the case where “consumers of both countries have consumption bias on products produced by the other country”, in the remaining cases, the exchange rate will show phenomenon of undershooting.
- (5). On the terms of trade side, in the face of the domestic tariff shock, the terms of trade will present mis-adjustment in four cases where “domestic consumers have consumption bias on foreign products and foreigners have no special bias of consumption”, “domestic consumers have no consumption bias, but foreigners have consumption bias on domestic produced products”, “consumers of both countries have consumption bias on products produced domestically”, and “consumers of both countries have consumption bias on their own products”, in four situations where “consumers of both countries have of consumption bias on products produced by the other country respectively”, “consumers of both countries have consumption bias on foreign products”, “the consumers in two countries have no consumption bias behavior”, and “domestic consumers have consumption bias on domestic products, while foreigners have no special bias of consumption” the terms of trade will present phenomenon of undershooting; in the case where “domestic consumers have no special consumer bias, foreign consumers have consumption bias on the foreign products”, the terms of trade will show a phenomenon of overshooting.

4. CONCLUSION AND SUGGESTIONS

The development of NOEM has been two decades since its inception, however, compared to the popularity in the study of effect by monetary and fiscal shock, those in topic of tariff shock are rare, in view of the above reasons, this paper take NOEM proposed by [Obstfeld and Rogoff \(1995\)](#) as an analysis framework to integrate consumption home bias into the original NOEM model, and to explore the long-term and short-term effects of tariff shock on macroeconomic variables, we also hope that the findings herein can be provided to the relevant authorities as reference for policy-makers.

With the findings of theoretical derivation and simulation analysis, we find that the relationship of dynamic adjustment between domestic tariff rates and macroeconomic variables (such as consumption, output, price index and the terms of trade) is depending on the asymmetric degree of consumers preferring the exported and imported goods in both countries, when the asymmetric consumption bias behavior exists in the economic system, the dynamic adjustment process of tariff shock on each macroeconomic variable will present phenomenon of undershooting, overshooting or mis-adjustment.

Finally, it shall be specially noted that, although NOEM theoretical framework had played its significance among each economic issue, in fact, it usually needs to build under a number of hypothesis to seek solution easily. If we try to relax one of assumptions or settings (such as the form of utility function), the results obtained may differ and this deficiency will also be included in the restrictions suffered herein.

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REFERENCES

- Bergin, P.R., H.C. Shin and I. Tchakarov, 2007. Does exchange rate variability matter for welfare? A quantitative investigation of stabilization policies. *European Economic Review*, 51(4): 1041-1058.
- Bettendorf, L. and B. Heijdra, 1999. Intergenerational and international welfare leakages of a tariff in a small open economy. CCSO Working Papers, No. 10, University of Groningen.
- Bettendorf, L. and B. Heijdra, 2001. Intergenerational welfare effects of a tariff under monopolistic competition. *Journal of Economics*, 73(3): 313-346.
- Brock, P.L. and S.J. Turnovsky, 1993. The growth and welfare consequences of differential tariffs. *International Economic Review*, 34(4): 765-794.
- Cooke, D., 2010. Consumption home bias and exchange rate behavior. *Journal of Macroeconomics*, 32(1): 415-425.
- De Paoli, B., 2009. Monetary policy and welfare in a small open economy. *Journal of International Economics*, 77(1): 11-22.
- Devadoss, S. and K. Lanclos, 2000. Trade in imperfectly competitive industries: The role of market size and consumer preference. *Applied Economics*, 32(9): 1189-1200.
- Dornbusch, R., 1976. Expectations and exchange rate dynamics. *Journal of Political Economy*, 84(6): 1161-1176.
- Edwards, S. and S. Van Wijnbergen, 1987. Tariffs, the real exchange rate and the terms of trade: On two popular propositions in international economics. *Oxford Economic Papers*, 39(3): 458-464.
- Eichengreen, B.J., 1981. A dynamics model of tariff, output and employment under flexible exchange rate. *Journal of International Economics*, 11(3): 341-359.
- Faia, E. and T. Monacelli, 2006. Optimal monetary policy in a small open economy with home bias. CEPR Discussion Papers, No. 5522.
- Fender, J. and K.C. Yip, 1994. Open economy macroeconomics under imperfect competition: A two country model. *Journal of International Economics*, 37(1-2): 49-63.

- Fender, J. and K.C. Yip, 2000. Tariffs and exchange rate dynamics redux. *Journal of International Money and Finance*, 19(5): 633-655.
- Fleming, J.M., 1962. Domestic financial policies under fixed and under floating exchange rates. *IMF Staff Papers*, 9(3): 369-379.
- Galí, J. and T. Monacelli, 2008. Optimal monetary and fiscal policy in a currency union. *Journal of International Economics*, 76(1): 116-132.
- Hau, H., 2002. Real exchange rate volatility and economic openness: Theory and evidence. *Journal of Money, Credit and Banking*, 34(3a): 611-630.
- Hillberry, R.H. and D.L. Hummels, 2002. Explaining home bias in consumption: The role of intermediate input trade. NBER Working Paper, No. 9020.
- Johnson, H.G., 1966. A model of protection and the exchange rate. *Review of Economic Studies*, 33(2): 159-163.
- Jondeau, E. and J.G. Sahuc, 2008. Optimal monetary policy in an estimated DSGE model of the Euro area with cross-country heterogeneity. *International Journal of Central Banking*, 4(2): 23-72.
- Kollmann, R., 2004. Welfare effects of a monetary union: The role of trade openness. *Journal of the European Economic Association*, 2(2-3): 289-301.
- Leith, C. and S.W. Lewis, 2006. The optimal monetary policy response to exchange rate misalignment. Center for Dynamic Macroeconomic Analysis Conference Papers.
- Lucas, R.E., 1976. Econometric policy evaluation: A critique. *Carnegie-Rochester Conference Series on Public Policy*, 1: 19-46.
- Mankiw, N.G. and L.H. Summers, 1986. Money demand and the effects of fiscal policies. *Journal of Money, Credit and Banking*, 18(4): 415-429.
- Mundell, R., 1961. Flexible exchange rates and employment policy. *Canadian Journal of Economics and Political Science*, 27(4): 509-517.
- Mundell, R.A., 1963. Capital mobility and stabilization policy under fixed and flexible exchange rates. *Canadian Journal of Economics and Political Science*, 29(4): 475-485.
- Obstfeld, M. and K. Rogoff, 1995. Exchange rate dynamics redux. *Journal of Political Economy*, 103(3): 624-660.
- Obstfeld, M. and K. Rogoff, 2000. The six major puzzles in international macroeconomics: Is there a common cause? In B.S. Bernanke and K. Rogoff, Eds., *NBER Macroeconomics Annual*, 15(1): 339-390.
- Osang, T. and A. Pereira, 1996. Import tariffs and growth in a small open economy. *Journal of Public Economics*, 60(1): 45-71.
- Pesenti, P. and E. Van Wincoop, 2002. Can nontradables generate substantial home bias? *Journal of Money, Credit, and Banking*, 34(1): 25-50.
- Pierdzioch, C., 2004. Home-product bias, capital mobility, and the effects of monetary policy shocks in open economies. Kiel Working Paper, No. 1141.
- Pitterle, I. and D. Steffen, 2004. Fiscal policy in a monetary union model with home bias in consumption. Mimeo: University of Frankfurt.
- Rama, M., 1993. How labor markets and imperfect competition affect tariff policy. Policy Research Department Working Paper, No.1149. Washington, DC : World Bank.
- Razin, A. and L.E.O. Svensson, 1983. Trade taxes and the current account. *Economics Letters*, 13(1): 55-57.
- Ried, S., 2009. Putting up a good fight: The Galí-Monacelli model versus the six major puzzles in international macroeconomics. SFB 649 Discussion Papers, Humboldt University, Berlin, Germany.
- Roldos, J.E., 1991. Tariffs, investment and the current account. *International Economic Review*, 32(1): 175-194.
- 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(3): 205-218.
- Sen, P., 2001. Tariff and welfare in an imperfectly competitive overlapping-generations model. *Review of Development Economics*, 5(2): 227-238.

- Stockman, A.C. and H. Dellas, 1989. International portfolio nondiversification and exchange rate variability. *Journal of International Economics*, 26(3-4): 271-289.
- Sutherland, A., 2005. Incomplete pass-through and the welfare effects of exchange rate variability. *Journal of International Economics*, 65(2): 375-399.
- Tower, E., 1973. Commercial policy under fixed and flexible exchange rates. *Quarterly Journal of Economics*, 87(3): 436-454.
- Uhlig, H., 1995. A toolkit for analyzing nonlinear dynamic stochastic models easily. Center for Economic Research Discussion Paper, No. 97, Tilburg University.
- Van Wijnbergen, S., 1987. Tariffs, employment and the current account: Real wage resistance and the macro-economics of protectionism. *International Economic Review*, 28(3): 691-706.
- Wang, J., 2010. Home bias, exchange rate disconnect, and optimal exchange rate policy. *Journal of International Money and Finance*, 29(1): 55-78.

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