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Fiscal Policy in a Fixed Exchange Rate Regime

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Abstract

In this paper, the New Open Economy Macroeconomics is used as the analytical framework for establishing a two-country model which fits the imperfectly competitive market structure and has a micro-foundation in order to explore the long-term effects of government spending shock on the macroeconomic variables (e.g. consumption, output, price, and terms of trade) in a fixed exchange rate regime. This paper also attempts to explain the roles of consumption home bias. Through theoretical derivation and simulated analysis, we found that, under a fixed exchange rate regime, over a long-term, without considering the behavior of the consumption home bias, government spending shows a positive relation with the output, but a negative relation with consumption, price index and terms of trade. Once the asymmetry of consumption bias behaviors, such as "consumers of both countries have consumption bias towards the products produced in the home country" is considered, the relation of government spending with consumption, output and price will be reversed.

Keywords: Fiscal Policy, Consumption Home Bias, Fixed Exchange Rate Regime, New Open Economy Macroeconomics
JEL Classifications: E62, F41

1. Introduction

Traditionally, the Keynesian school is deeply convinced that the fiscal policy is an effective means of reversing the economic cycle. In fact, the government is also very positive in the maneuvering of fiscal policy in economic regulation. The economic schools are quite different on the results of the effects of fiscal policy on output, consumption, interest rates and prices. In terms of government spending, Keynesian economics believes that the expansion of government spending will increase output, which in turn will make private investments increase. However, the rising prices and interest rates will crowd out private investments. Therefore, effect of private investments is uncertain, and the private consumption is dependent upon the marginal propensity to consume and the reaction to interest rates. The Classical School holds that a fiscal policy only affects nominal variables and does not affect the real variables, and an increase in government spending will cause prices to rise. In addition, the New Classical School emphasizes that temporary and permanent government spending have different levels of impact on the economy. In addition, Supply-Side Economics prefers the tax-cut policy with a belief that it will increase savings and investments and directly stimulate aggregate supply increases to reduce inflation and unemployment. The effect of fiscal policy on economic variables, whether theoretical or empirical, all show a great difference.

In addition, exchange rates represent the relative prices of domestic and foreign currencies and are charged with the important task of connecting domestic and international economics and maintaining the internal and external balance of the economy. The effects of fiscal policy under the floating exchange rate regime has been explicitly discussed in the existing literature (such as Pitterle and Steffen, 2004a; 2004b;Tervala, 2008). However, there is no comprehensive discussion on the exact effects of fiscal policy on the macroeconomic variables while a country adopts a fixed exchange rate regime and the exchange rate cannot exert the function of transmission in the economic system. Furthermore, consumption home bias is a common phenomenon in the real world, an indication of that in an economic system, consumers tend to prefer the commodities of domestic country. Therefore, this paper intends to integrate the consumption home bias into the discussion on the effect of fiscal policy to analyze the macroeconomic effects of fiscal policy under the fixed exchange rate regime, and describes the role of the consumption home bias.

Literature wise, the studies on the economic effect of fiscal policy mostly focused on the closed economy (such as Barro, 1981; 1990; Futagami et al, 1993;Devereux and Love, 1995; Greiner, 1998; Greiner and Hanusch, 1998; Dasgupta, 1999, and Xie et al, 1999, etc.) while the analysis on the effect of fiscal policy on an open economy was relatively lacking until the recent rapid rise of the New Open Economy Macroeconomics literature (hereinafter referred to as NOEM) and the literature by Corsetti and Pesenti (2001),Ganelli (2003) and Pitterle and Steffen (2004a; 2004b) which extend the study on the effect of fiscal policy to the open economy. However, in the conventional NOEM model, exchange rate fluctuations is caused mainly by private consumption behaviors, what triggers the interest in this paper is the effect of fiscal policy on the macro economy under the fixed exchange rate regime, if further assuming that the consumption behavior also includes the government's consumption, and the consumption home bias phenomenon exists regardless of private or government consumption behaviors, how will the result be changed? Hence, the purpose of this paper is to explore the relation among fiscal expenditure, consumption home bias and macroeconomic variables. Tervala (2008) has analyzed the effect of fiscal policy under the NOEM architecture and it was proved that marginal rate of substitution of government expenditure and private spending will affect the effect of fiscal spending on the welfare, however, ignored the discussion on the recent hot topic-consumption home bias.

The initial development of analysis on open economy featured the Mundell-Fleming model (Mundell, 1963; Fleming, 1962) and Dornbusch (1976) model derived from the Keynesianism as the theoretical basis. These early open economy models revealed and explained the relations among some of macroeconomic variables but had a common defect, the lack of a micro-foundation. Lucas (1976) argued that the change of macroeconomic variables could affect individual decisions in a microeconomy, which led to the change of relations among the variables of the macroeconomy, thereby causing deviation in the macroeconomic analysis as micro-foundation was lacked. The New Open Economy Macroeconomics (hereinafter referred to as NOEM) proposed by Obstfeld and Rogoff (1995)further opening of the birth of the macroeconomics development and opening up a new stage, NOEM is characterized by both a micro-foundation and monopolistic competition market structure characteristics, very suitable for analyzing the effects of exogenous shocks on the macroeconomic, therefore, this paper NOEM as the basis for analysis.

However, what caught the author's attention even more was that although Obstfeld and Rogoff (2000) had regarded the "home bias in consumption puzzle "as one of the six puzzles of international economics,[1] in the NOEM architecture, there was still a lack comprehensive analysis of the role of asymmetry in the consumption home bias. The so-called consumption home bias puzzle means in the real world, consumers have a tendency to buy domestic goods, but this phenomenon cannot be explained by the researchers. The early studies on the issue of consumption home bias, mostly concentrated on the exploration of the causes of consumption home bias, such as trade costs (Obstfeld

[1]The six puzzles listed by Obstfeld and Rogoff (2000)are home bias in consumption 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.

and Rogoff, 2000; Ried, 2009), country size and openness (Sutherland, 2005; De Paoli, 2009), non-traded goods (Stockman and Dellas, 1989; Pesenti and Van Wincoop, 2002),trade in intermediate inputs factors (Hillberry and Hummels, 2002) which were believed by scholars to be the main causes of consumption home bias. More recent studies have focused on the effect of consumption home bias, For example, Pierdzioch (2004) analyzed the effect of monetary policy at different levels of consumption home bias and capital mobility; Hau (2002), Pitterle and Steffen (2004a; 2004b), Kollmann (2004), Sutherland (2005), Leith and Lewis (2006) and Cooke (2010) investigated the effect of consumption home bias on exchange rate fluctuations; De Paoli (2009) discussed the welfare effects of consumption home bias and monetary policy. In addition, it is worth mentioning that the impact of consumption home bias on the enactment of optimal monetary policy has been a recent hot topic. The related studies include Faia and Monacelli (2006), Jondeau and Sahuc (2008), Galí and Monacelli (2008) and Wang (2010), apparently, there were many studies on the issue of consumption home bias, however, there is still no literature that can clearly explain the role of consumption home bias in the effect of fiscal expenditure under the fixed exchange rate regime.

This paper divided into four sections. Except for the introduction, the other sections are arranged as follows: Section 2 constructs a theoretical model; Section 3 makes the simulation analysis for exploration on the long-term effect of fiscal spending on the macroeconomic variables and the role of consumption home bias; Section 4 includes conclusions and recommendations.

2. Theoretical Model

2.1. Model Setting

This paper follows NOEM proposed by Obstfeld and Rogoff (1995) as theoretical framework. The main assumptions are as follows:

1) There are two countries in the world, the "home country" and the "foreign country", all the foreign country economic variables below are marked with "*" for identification.
2) The world population distribution falls in the interval [0,1], where home-country individuals are distributed between [0, n) and foreign individuals between [n,1].
3) Each individual is both a consumer and producer, and operates a monopolized competitive manufacturer and use labor for production.
4) The presence of consumption home bias of the economic system, and the fiscal expenditure is the only exogenous shocks.

2.1.1. Household

Assume that all individuals have the same preferences, utility (U) is positively proportional to consumption (C) and real money balances (M/P) and is inversely proportional to the output level (y), the lifetime utility function is set as follows:

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

Where β is the discount factor ($0 < \beta < 1$), ε is the elasticity of marginal utility of real money demand,[2] χ and κ represent the importance of real money balance and output level in the utility function respectively, and z refers to a particular product.

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

[2]In Eq. (1), ε is defined as the percentage of change of marginal utility of the real money demand triggered when the real money demand changes.

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

Where $c_h(z)$ is the consumption of home-country specific products z by the home-country consumer, $c_f(z)$ is the consumption of foreign specific products z by the home-country consumer, α is the consumption home bias parameter for measurement of the preference degree of home-country consumer for home-country products, δ is the elasticity of substitution of products between two countries.

Based on the definition of Eq. (2), it can be inferred that the domestic price index (P) as shown in the following equation:

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

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

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

In the two equations above, $p_h(z)$ is the price of home-country product z represented by the home-country currency, $p_f(z)$ is the price of foreign product z represented by the home-country currency, $p_h^*(z)$ is the price of home-country product z represented by the foreign currency, $p_f^*(z)$ is the price of foreign product z represented by the foreign currency, α^* is the preference level of foreign consumers for the foreign product.

For each product, the law of one price is held as follows:

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

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

Where E represents exchange rate.

The consumption of home-country specific product and foreign specific products by representative home-country consumer can be inferred from Eqs. (2) and (3) as follows:

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

$$c_{f,t}(z) = \left(\frac{(1-\alpha) p_{f,t}(z)}{P} \right)^{-\delta} C \tag{8}$$

Likewise, the consumption of home-country specific product and foreign specific product by representative foreign consumer is as follows:

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

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

Where $c_h^*(z)$ is the consumption of home-country specific product z by foreign consumer; $c_f^*(z)$ is the consumption of foreign specific product z by foreign consumer.

2.1.2.Government

The government spending can be financed by seigniorage revenue and lump-sum tax, so the government budget constraint is:

$$G_t = T_t + \frac{M_t - M_{t-1}}{P_t} \tag{11}$$

Where the item at the left of the equation is real government spending; the first item at the right of the equation is real tax revenue and the second item at the right of the question is real seignorage revenue.

Assume that both the government sector and private sector have the same preferences, the government spending follows CES function as:

$$G_t = \left[\int_0^n \alpha^{\frac{1}{\delta}} g_{h,t}(z)^{\frac{\delta-1}{\delta}} dz + \int_n^1 (1-\alpha)^{\frac{1}{\delta}} g_{f,t}(z)^{\frac{\delta-1}{\delta}} dz \right]^{\frac{\delta}{\delta-1}}$$

Where $g_h(z)$ is the consumption of the home-country specific product z by the domestic government sector; $g_f(z)$ is the consumption of the foreign country specific product z by the domestic government sector.

2.1.3 Asset Market

Assume that an integrated international asset market exists between two countries and each individual can trade real bonds (B), the relation between the real interest rate (r)and the nominal interest rate (i)upon the expiration of the bond is shown in the Fisher equation as follows:

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

The holding of bonds reflects the lending relation between the residents of the two countries and therefore satisfies $nB_t + (1-n)B_t^* = 0$, or

$$B_t^* = -\frac{n}{1-n} B_t \tag{13}$$

Where B_t is the bond holding amount of the home individual and B_t^* is the bond holding amount of the foreign individual.

2.1.4 Budget Constraint

The budget constraint of representative individual is as follows:

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

Where the income sources of the consumer in period t includes: money balances in period $t-1$ (M_{t-1}),the principal and interest of the bond from period $t-1$ ($P_t(1+r_{t-1})B_{t-1}$) and output revenue ($p_{h,t}(z) y_{h,t}(z)$)in period t. The consumers can use the income for money holding (M_t), consumption ($P_t C_t$) and bond purchases($P_t B_t$) as well as tax payments ($P_t T_t$).

2.1.5 Aggregate Demand

Based on the equation of consumption of home-country specific products by domestic consumer (Eq. (7)) and the equation of consumption of home-country specific products by foreign consumer (Eq. (9)), it can be inferred that the demand function faced by the domestic manufacturers is:

$$y_{h,t}(z) = n(c_{h,t}(z) + g_{h,t}(z)) + (1-n)(c_{h,t}^*(z) + g_{h,t}^*(z))$$

$$= n\left(\frac{\alpha p_{h,t}(z)}{P}\right)^{-\delta}(C_t + G_t) + (1-n)\left(\frac{(1-\alpha^*)p^*_{h,t}(z)}{P^*}\right)^{-\delta}(C^*_t + G^*_t) \tag{15}$$

Where G^* is the consumption by foreign government sector.

Similarly, based on the equation of consumption of home-country specific products by foreign consumer (Eq. (8)) and the equation of consumption of foreign specific products by foreign country consumers (Eq. (10)), it can be inferred that the demand function faced by the foreign manufacturers is:

$$y^*_{f,t}(z) = nc_{f,t}(z) + (1-n)c^*_{f,t}(z)$$

$$= n\left(\frac{(1-\alpha)p_{f,t}(z)}{P}\right)^{-\delta}(C_t + G_t) + (1-n)\left(\frac{\alpha^* p^*_{f,t}(z)}{P^*}\right)^{-\delta}(C^*_t + G^*_t) \tag{16}$$

2.1.6 First Order Conditions

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

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

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

$$(y_t(z))^{\frac{\delta+1}{\delta}} = \left(\frac{\delta-1}{k\delta}\right)C_t^{-1}(C^W_t + G^W_t)^{\frac{1}{\delta}} \tag{19}$$

Where Eq. (17) is the Euler Equation of consumption, which describes the inter temporal consumption behaviors, Eq.(18) is the equation of money demand for indicating the substitution relation between real money demand and consumption, Eq.(19) is the labor supply equation which stipulates the substitution relation between labor supply and consumption. In Eq. (19), C^W represents the world private consumption, $C^W_t \equiv nC_t + (1-n)C^*_t$; G^W represents the world government consumption, $G^W_t \equiv nG_t + (1-n)G^*_t$.

2.2 Derivation of Steady-State

The effect of fiscal policy on macroeconomic variables is explored below. First, the non-existence of consumption home bias behavior and government spending in a given economic system as the 0 steady state is used as the basis of comparison to obtain the long-term steady state of the economic system. For the symbols below, the subscript "$_t$" represents the economic variables in long-term steady state, and the subscript "$_0$" represents the economic variables in the 0 steady state. For example: C_t and C_0 represent the consumption of long-term steady state and 0 steady state respectively.

The long-term steady state describes the convergence state of the economic system after experiencing the exogenous shock. Under the steady state, all the variables are fixed, and $B_t = B_{t+1} = 0$. Therefore, by substituting the government budget constraint (Eq. (11)) into the private budget constraint (Eq. (14)), the following equation is obtained:

$$C_t = \frac{p_{h,t}(z)y_{h,t}(z))}{P_t} - \hat{G}_t \tag{20}$$

Likewise, in a foreign context, we have:

$$C^*_t = \frac{p^*_{f,t}(z)y^*_{f,t}(z)}{P^*_t} - \hat{G}^*_t \tag{21}$$

2.3 Log-linearization

To obtain closed-form solution, this paper uses Uhlig (1995)'s approach to first log linearize the model and then assigns values to parameters in the model for simulated analysis.[3] We log linearized the variables near the 0 steady state to obtain their fluctuation level in the steady state. The superscript "$\wedge$ "indicates the variable after log linearization.

For example, if $\hat{X}_t$ is the result of variables X_t after log-linearization near the 0 steady state (X_0), then:

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

2.3.1 Log-Linearization of Price Index

Substitute Eqs. (5) and (6) into Eqs. (3) and (4) and perform log-linearization with the fixed exchange rate regime ($\hat{E}_t = 0$), the result can be obtained as follows:

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

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

Subtract Eq. (23) from Eq.(22) and the difference of price index change between the two countries is obtained as follows:

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

2.3.2 Log-linearization of the Law of One Price

Log-linearize Eqs. (5) and (6) under the fixed exchange rate regime ($\hat{E}_t = 0$), and the following can be obtained:

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

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

2.3.3 Log-linearization of World Budget Constraint

The world budget constraint can be obtained from Eqs. (20) and (21):

$$C^W_t = nC_t + (1-n)C^*_t = n\frac{p_{h,t}(z)y_{h,t}(z)}{P_t} + (1-n)\frac{p^*_{f,t}(z)y^*_{f,t}(z)}{P^*_t} - G^W_t \tag{27}$$

Log-linearize Eq. (27) and use Eqs. (25) and (26), the following can be obtained:

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

2.3.4 Log-linearization of Demand Function

Log-linearize domestic and foreign demand functions (Eqs. (15) and (16)), the following equations can be obtained:

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

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

[3]Due to the complexity of model setting, to obtain the closed-form solution between the exogenous variables and endogenous variables, two methods are commonly used: log linearization and numerical simulations. In our model, log linearization with numerical simulations is used.

2.3.5 Log-linearization of Labor Supply Function

Log-linearize domestic labor supply function (Eq. (19)) and the following can be obtained:

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

Likewise, for the foreign labor supply, we can get:

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

2.3.6 Log-linearization of Money Demand Function

Log-linearize domestic money demand function (Eq. (18)) and the following can be obtained:

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

Similarly, for the foreign money demand, we then have:

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

Subtract Eq. (34) from Eq. (33) and use Eq. (24), the following equation can be obtained:

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

2.3.7 Log-linearization of Terms of Trade

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

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

Log-linearize the equation above under the fixed exchange rate regime ($\hat{E}_t = 0$) and the following equation can be obtained:

$$\hat{TOT} = \hat{p}_{h,t}(z) - \hat{p}_{f,t}^*(z) \tag{36}$$

2.4. Steady-State Solution

Log-linearize Eqs. (20) and (21) and the following equation can be obtained:

$$\hat{C}_t = \hat{p}_{h,t}(z) + \hat{y}_{h,t}(z) - \hat{P}_t - \hat{G}_t \tag{37}$$

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

We performed simultaneous solution on a total of 12 equations: log-linearized price index (Eqs. (22) and (23)), log-linearized law of one price (Eqs. (25) and (26)), log-linearized world consumption(Eq. (28)), log-linearized domestic and foreign demand functions (Eqs. (29) and (30)), log-linearized domestic and foreign labor supply equation (Eqs. (31) and (32)), log-linearized terms of trade (Eq. (36)) and log-linearized domestic and foreign private budget constraint (Eqs. (37) and (38)) to obtain the relationships between the 12 endogenous and exogenous variables ($\hat{G}$),the 12 endogenous variables are 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 ($\hat{y}_{f,t}^*(z)$), price of domestic specific product in domestic currency ($\hat{p}_{h,t}(z)$),price of domestic specific product in foreign currency ($\hat{p}_{h,t}^*(z)$),price of foreign specific product in domestic currency ($\hat{p}_{f,t}(z)$),price of foreign specific product in foreign currency ($\hat{p}_{f,t}^*(z)$)),domestic price index ($\hat{P}_t$), foreign price index ($\hat{P}_t^*$), and terms of trade ($\hat{TOT}_t$).

3. The Effects of Government Spending Shocks on Macroeconomic Variables

To grasp the impact of the change of consumption home bias parameters on government spending, this paper conducted a simulation analysis.

3.1 Parameterisation

In order to simplify the analysis in this paper, based on NOEM, we select two economies of equal scale for analysis. Therefore, for the selection of the parameter values, we try to use the empirical data of the United States and countries of similar size (e.g. OECD countries, EU) to analyze the effects of government spending in the United States and countries of a similar size. We follow the method of Bergin et al. (2007) by setting the elasticity of substitution of goods between countries at 5; we then adopted the approaches in the literature by Mankiw and Summers (1986) and Schmidt (2006) by setting the elasticity of marginal utility of real money balances at 1; Wang (2010)'s setting of consumption home bias parameter value ($\alpha = 0.85$) was used; the situation of non-existence of consumption home bias ($\alpha = 0.5$)and preference for foreign products ($\alpha = 0.15$) was simulated. The parameter setting of foreign consumption home country is the same as consumption home bias parameter values; other home (foreign) country policy variables such as home-country money supply ($\hat{M}$), foreign-country money supply ($\hat{M}^*$), foreign-country government spending ($\hat{G}^*$) are not the main issues in this paper, their change rate was assumed to be 0 and the parameter values are summarized 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

3.2.Simulation and Comparative Static Analysis

The parameter values in the previous section are used in this section for simulation for analyzing on the effects of fiscal policy on price, consumption, output and terms of trade. The details of simulation results are shown in Table 2.

Table 2: The Long-Term Effect of Fiscal Policy on the Macroeconomic Variables

a) Long-Term Effect of Fiscal Policy on Domestic Consumption

$\partial \hat{C}_t / \partial \hat{G}_t$				
	α			
α^*		**0.15**	**0.5**	**0.85**
	0.15	-0.654	-0.573	8.75
	0.5	-0.696	-0.583	-0.538
	0.85	-75.25	-0.647	-0.573

b) Long-Term Effect of Fiscal Policy on Foreign Consumption

$\partial \hat{C}_t^* / \partial \hat{G}_t$				
	α			
α^*		**0.15**	**0.5**	**0.85**
	0.15	0.154	0.196	74.75
	0.5	0.073	0.083	0.147
	0.85	-9.25	0.038	0.073

c) Long-Term Effect of Fiscal Policy on World Consumption

$\partial \hat{C}_t^W / \partial \hat{G}_t$				
	α			
α^*		**0.15**	**0.5**	**0.85**
	0.15	-0.25	-0.189	41.75
	0.5	-0.311	-0.25	-0.196
	0.85	-42.25	-0.304	-0.25

d) Long-Term Effect of Fiscal Policy on Domestic Output

$\partial y_{h,t}(z) / \partial \hat{G}_t$				
	α			
α^*		**0.15**	**0.5**	**0.85**
	0.15	0.587	0.530	-0.25
	0.5	0.611	0.528	0.499
	0.85	55.75	0.572	0.519

e) Long-Term Effect of Fiscal Policy on Foreign Output

$\partial y^*_{f,t}(z) / \partial \hat{G}_t$				
	α			
α^*		**0.15**	**0.5**	**0.85**
	0.15	-0.087	-0.111	-55.25
	0.5	-0.030	-0.028	-0.072
	0.85	0.75	0.001	-0.019

f) Long-Term Effect of Fiscal Policy on Domestic Price Index

$\partial \hat{P}_t / \partial \hat{G}_t$				
	α			
α^*		**0.15**	**0.5**	**0.85**
	0.15	0.062	0.071	28
	0.5	-0.010	0	0.009
	0.85	-28	-0.064	-0.050

g) Long-Term Effect of Fiscal Policy on Foreign Price Index

$\partial \hat{P}^*_t / \partial \hat{G}_t$				
	α			
α^*		**0.15**	**0.5**	**0.85**
	0.15	-0.062	0.010	28
	0.5	-0.071	0	0.064
	0.85	-28	-0.009	0.050

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

$\partial \hat{p}_{h,t}(z) / \partial \hat{G}_t$				
	α			
α^*		**0.15**	**0.5**	**0.85**
	0.15	-0.178	-0.032	38
	0.5	-0.317	-0.111	-0.029
	0.85	-158	-0.283	-0.143

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

$\partial \hat{p}^*_{h,t}(z) / \partial \hat{G}_t$				
	α			
α^*		**0.15**	**0.5**	**0.85**
	0.15	-0.178	-0.032	38
	0.5	-0.317	-0.111	-0.029
	0.85	-158	-0.283	-0.143

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

$\partial \hat{p}_{f,t}(z)/\partial \hat{G}_t$				
	α			
α^*		**0.15**	**0.5**	**0.85**
	0.15	0.178	0.317	158
	0.5	0.032	0.111	0.283
	0.85	-38	0.029	0.143

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

$\partial \hat{p}^*_{f,t}(z)/\partial \hat{G}_t$				
	α			
α^*		**0.15**	**0.5**	**0.85**
	0.15	0.178	0.317	158
	0.5	0.032	0.111	0.283
	0.85	-38	0.029	0.143

l) Long-Term Effect of Fiscal Policy on Terms of Trade

$\partial \hat{TOT}_t/\partial \hat{G}_t$				
	α			
α^*		**0.15**	**0.5**	**0.85**
	0.15	-0.357	-0.349	-120
	0.5	-0.349	-0.222	-0.311
	0.85	-120	-0.311	-0.286

Items (a) to (m) in Table 2 shows that, under the long term, government spending has a clear negative relation with terms of trade and its relation with other variables (such as consumption, price, and output) is affected by the asymmetry of consumption bias of the consumers of the two countries. Except for the condition "consumers of both countries have consumption bias for products produced by home country", where the increase of government spending will lead to the rise of domestic consumption and fall of domestic output, under other conditions, the increase of government spending will lead to the fall of domestic consumption and rise of domestic output; for the relation between government spending and price index, except for the conditions "consumers of both countries have consumption bias for the products produced by home country", "consumers of home country have no consumption bias, but consumers of foreign country have consumption bias for products produced by home country "and "consumers of foreign country have no consumption bias, but consumers of home country have consumption bias for products produced by home country", where government spending will lead to the rise of price in home country. Under other conditions, the increase of government spending will cause the domestic price index to fall.

The economic intuition behind the conclusions above can be explained as follows: without considering the consumption bias, the increase of government spending will cause the domestic commodity demand to rise, which will lead to the rise of domestic output. However, due to the crowding out effect, the private consumption will fall and trigger the deterioration of price and terms of trade; once the asymmetry of consumption bias behaviors such as the condition of "consumers of both countries have consumption bias for products produced by home country", the relation of government spending with consumption, output and price may be the opposite.

4. Conclusion and Suggestions

NOEM has been in existence for more than 20 years since it was developed. However, in contrast with the widespread of studies on the effect of monetary policy, the research on the effect of government spending is lacking. Therefore, this paper uses NOEM presented by Obstfeld and Rogoff (1995) proposed as the theoretical framework to explore the long-term effects of consumption home bias on

the macroeconomic variables in a country faced with government spending shock. It is also hope that the results of this study will serve as a reference for the competent authority in formulating policies.

Through theoretical derivation and simulation analysis, we find that the relation between government policy and macroeconomic variables depends on the asymmetry of consumption bias of the two countries. This paper has proved that the theoretical "crowding out effect" is not necessarily true. In an economic system where there are only two countries, if "consumers of both countries have consumption bias for the products produced by the home country", there will be no crowding out effect, and the relation of government spending with output and price will be changed.

Finally, for a particular note, to simplify the analysis, this paper only focuses on the long-term analysis, and therefore the economic dynamic adjustment process has not been highlighted. This is one of the limitations of this article; Furthermore, although the NOEM theoretical framework has played to its importance in various economic issues, however, to enable easy solutions, many assumptions were made. If one of the assumptions or settings (such as the form of utility function) is loosened, the results may be different and this situation is also included as one of the limitations of this paper.

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