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Fiscal Policy in a Small Open Economy with Foreign Capital

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Abstract

Utilizing a two-sector general equilibrium model, the implications of a tax-financed fiscal expansion in a small open economy with or without internationally capital mobility are studied. Various welfare implications are shown to be possible. Conditions for different cases to happen are derived and discussed in the paper.

I. Introduction

The purpose of this paper is to study the welfare effects of a tax-financed fiscal expansion in a two-sector economy with foreign capital. Various studies, *e.g.* Jones [1984], Neary [1988], Beladi and Marjit [1992], and Michael [1992], have shown that the presence of foreign capital is crucial in the assessment of trade policy.[1] This paper will confirm the importance of for-

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1. Jones [1984] shows that a tariff-induced international capital flow reduces a country's welfare regardless of the factor intensity of the imported good, or whether capital is intersectorally mobile. Michael [1992] shows similar result in a more general model with nontraded good. Neary [1988] shows that the international mobility of capital is important in evaluating the implications of tariffs, quotas, and VER. Beladi and Marjit [1992] derive that the welfare implication of an expansion of export processing zone (*i.e.* an inflow of foreign capital) is ambiguous.

eign capital in studying the welfare implications of fiscal expansion.

It has been shown by Chao and Yu [1991, 1993] that the welfare implications of a fiscal expansion in a multi-sector economy can be significantly different from a standard one good macroeconomy.[2] Utilizing a two-sector open economy model, this paper will contribute to the literature by showing how the presence of foreign capital affects the welfare implications of the fiscal spending. In the presence of foreign capital, it will be shown that a fiscal expansion can improve the domestic residents' welfare even if they are taxed to pay for the expansion. Discussions on how the international mobility of capital affects the welfare effects will also be provided. This study will improve our understanding of the implications of fiscal policy in developing countries since the presence of foreign capital is a common feature there.[3]

The paper is organized as follows. Section II sets up a two-sector (tradable and nontradable) general equilibrium model with foreign capital. Section III examines the implications of a tax-financed fiscal expansion when the foreign capital in the host country is immobile. Section IV studies the implications in the case of perfect capital mobility between countries. Section V provides some concluding remarks.

II. Basic Model

Consider a small open economy (SOE) in which two types of commodities are produced: a composite of traded goods (Y) and one nontraded good (X). We assume quotas, taxes, subsidies, or tariffs are not levied on traded goods. Since the SOE has no market power in the world markets for traded goods, the price of the composite of traded goods is not affected by the SOE's economic conditions and thus it is normalized to be one. We use p to denote the nontraded good's price in the SOE. In addition, production functions of X and Y are assumed to be linearly homogeneous. There are three

2. Chao and Yu [1990] show that fiscal policy may reduce the national income in a developing economy with urban unemployment. They [1991] also show that an increase in fiscal expenditure can be expansionary or contractionary in a two-sector neoclassical economy with variable returns to scale.

3. According to Ball and McCulloch [1993], the foreign investment to developing countries has increased from U.S. $4.31 billions in 1973 to U.S. $18.52 billions in 1989.

or more factors of production which can be either intersectorally mobile or sector specific. The SOE's endowment of these factors are fixed. Specifically, one of the intersectorally mobile factors, namely capital, is assumed to be both domestically and foreign owned. Assuming the SOE is a capital-importing country, the economy's supply of capital (K) is composed of the SOE's endowment ($\bar{K}$) and the inflow of foreign capital (K^*):

$$K = \bar{K} + K^* \tag{1}$$

Markets are assumed to be perfectly competitive in the SOE. The total value of the SOE's output (GDP) in terms of the composite of traded goods is:

$$GDP = pX + Y = R(p, K) \tag{2}$$

where $R(p, K)$ is the revenue function. Since there is no distortion in the SOE, the following properties of the revenue function can be derived: $R_p = X > 0$, $R_{pp} = \partial X/\partial p > 0$, $R_K = r$ (the rental rate of capital) > 0, and $R_{pK} = \partial X/\partial K = \partial r/\partial p$. Provided that there are more than two factors of production, we shall call the nontraded good is (is not) relatively capital intensive in the case of $R_{pK} > (<)\ 0$, see Neary and Ruane [1988]. $R_{KK} = \partial r/\partial K$ is zero in the standard "Heckscher-Ohlin" case while it is non-positive in the more general case. It is further assumed that the rental income of foreign capital is fully repatriated to the source country.[4]

There is a representative private agent in the SOE. The agent is endowed with fixed amounts of production factors. We define the agent's utility on the consumption of the two private goods, C_X and C_Y, which are assumed to be normal. We use $E(p, u)$ to denote the minimum expenditure necessary for the agent to achieve a given utility level, u, when the nontraded good's price is p. Assuming all usual properties of the utility function are satisfied, the following properties of the expenditure function can be derived: $E_p = C_X > 0$, $E_{pp} = \partial C_X/\partial p < 0$, $E_u > 0$, $E_{pu} > 0$, $E_{uu} < 0$.

Let assume the fiscal spending in terms of the composite of traded goods be denoted by $\bar{G}$, which is allocated between the nontraded good and the composite of traded goods such that:

$$\bar{G} = pG_X + G_Y \tag{3}$$

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4. Similar assumption is made by Dei [1985] and Jones [1984].

where $G_X(G_Y)$ is the government demand for the nontraded good (the composite of traded goods).

We follow Frenkel and Razin [1985] to adopt the following fiscal spending rule:

$$pG_X = \gamma\bar{G};\ G_Y = (1-\gamma)\bar{G}. \tag{4}$$

where γ and $(1-\gamma)$ are the weights of fiscal spending on the nontraded and the composite of traded goods, respectively.

We assume that the fiscal spending is tax-financed such that the government budget is balanced, *i.e.* the fiscal spending equals the taxation revenue. We want to focus on the welfare implications on the domestic residents by assuming that the government spending is solely financed by them. This is not a highly unrealistic assumption since tax rates on foreign capital are kept at a low level in LDCs in order to encourage investment from abroad. Additionally, we assume away the presence of indirect taxes in the model and then all taxation revenue comes from direct taxes[5] imposed on the SOE's private agent. Since the determination of the government expenditure, $\bar{G}$, is not the main issue being studied in this paper, we do not endogenize $\bar{G}$ in the model. However, we are going to consider the effects of a fiscal expansion, *i.e.* an increase in $\bar{G}$.

Two cases of different mobility of the foreign capital will be discussed in the paper. In the first case, there were inflows of capital in the SOE. However, the outflow of foreign capital is limited when there is fiscal expansion. The immobility of foreign capital can be taken as a short run case since it takes time and resources to move the capital or it may due to some administrative restrictions on the international mobility of capital, see Sellin and Werner [1993]. The main implication of this assumption is that the rental rate of capital is determined by the SOE's endogenous conditions. Dei [1985] suggests that we can get similar implication if we assume that the flow of capital is too small to equalize the return to capital internationally. The general equilibrium of the economy in the first case can be represented by (3), (4), and the following two equations:

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5. In this model, the implications of income taxes on private agent are equivalent to a lump-sum tax as specified since both labor and capital are inelastically supplied.

$$E(p, u) = R(p, K) - R_K(p, K)K^* - \bar{G} \tag{5}$$

$$E_p(p, u) + G_X = R_p(p, K) \tag{6}$$

(5) implies that the private agent's expenditure equals the national income minus the tax payment. (6) implies that the equilibrium is reached in the nontraded good's market, in which the private agent's demand, C_X, plus the government's demand, G_X, equals the supply of the good, X. The system contains four equations, (3)–(6), four endogenous variables, u, G_X, G_Y and p, and one exogenous variables, $\bar{G}$.

In the second case, the SOE's foreign capital is assumed to be internationally mobile. The general equilibrium of the SOE can then be represented by (3)–(6), and the following equation:

$$r^* = R_K(p, K) \tag{7}$$

where r^* is the rental rate of capital which is exogenously determined in the international market.

(7) implies that the SOE's rental rate of capital must equal the rate determined in the international market for capital. The system in the second case contains five equations, (3)–(7), five endogenous variables, u, G_X, G_Y, p, and K^*, and two exogenous variables, $\bar{G}$ and r^*.

III. Effects of Fiscal Policy in the Presence of Immobile Foreign Capital

In this section, we discuss the welfare effects of fiscal policy in the presence of immobile foreign capital. The policy effect on the nontraded good's price will be discussed first because of its importance in the welfare implications. According to (3) – (6), we can derive the effect on the nontraded good's price:

$$dp/d\bar{G} = E_u\,(m - \gamma)/\Delta \tag{8}$$

where $0 < m = pE_{pu}/E_u < 1$ is the private agent's marginal propensity to consume the nontraded good, $\Delta = pE_u(E_{pp} - R_{pp}) + pE_{pu}(G_X - K^*R_{pK}) - E_uG_x = E_uX[(1 - \alpha_{XG})e_p - \varepsilon_p - (1 - m)\alpha_{XG} - m\eta_K^*e_K]$, $0 < \alpha_{XG} = G_X/X < 1$ is the share of government consumption in the economy's supply of the nontraded good, $e_p = pE_{pp}/C_X < 0$ is the compensated elasticity of the private demand for the

nontraded good with respect to its own price, $0 < \varepsilon_p = pR_{pp}/X$ is the elasticity of the supply of the nontraded good with respect to its own price, $\varepsilon_K = KR_{pK}/X$ is the elasticity of the supply of the nontraded good with respect to the supply of capital in the economy which is positive (negative) when the production of nontraded good is (is not) relatively capital intensive, and $0 < \eta_K^* = K^*/K < 1$ is the share of the foreign capital in the economy's supply of capital. We have shown in the appendix that the stability of nontraded good's market requires $\Delta < 0$.

The intuition behind (8) can be explained. A unit increase in the government expenditure, financed by an increase in direct taxes on the private agent by one unit, increases the government demand for the nontraded good by γ/p and decreases the private demand for the nontraded good by m/p. Hence, the net change in the demand for the good will be positive (negative) if γ is larger (smaller) than m. Accordingly, the nontraded good's price will be increased (will be decreased) by a fiscal expansion. This price effect is referred to as the transfer-problem criterion.

We now turn to derive the welfare effect. According to (8), the implication on the private agent's welfare of a fiscal expansion in the general equilibrium can be represented as follows:

$$E_u(du/d\bar{G}) = [(G_X - K^*R_{pK})dp/d\bar{G} - 1] \tag{9}$$
$$= E_u X[\varepsilon_p - (1-\alpha_{XG})e_p + (1-\gamma)\alpha_{XG} + \gamma\eta_K^*\varepsilon_K]/\Delta$$

The first term on the right hand side of (9) is the revenue effect by which a price change will alter the private agent's income from selling the nontraded good to the government, which has a positive (negative) effect on the private agent's welfare if the nontraded good's price is increased (is decreased) by the fiscal expansion. The second term denotes the rental payment effect due to the change in the rental payment to foreign capital by the policy-induced change in the nontraded good's price. The relationship between the change in nontraded good's price and the rental payment depends on the sign of R_{pK}. When the nontraded good is (is not) relatively capital intensive, an increase in the nontraded good's price will increase (will decrease) the rental payment to foreign capital and then has a negative (positive) effect on the private agent's welfare. Alternatively, opposite wel-

Table 1
Welfare Effect of a Tax-financed Fiscal Expansion

No foreign owned capital	Capital internationally immobile but partly foreign owned				Capital internationally mobile
	$R_{pK} > 0$	$R_{pK} < 0$			
		I	II	III	
–	–	–	–	+	–

Note: I : $m \geq \gamma$ II : $\sigma > \gamma > m$ III: $\gamma > \sigma > m$

fare effects can be derived in the case of a reduction in the nontraded good's price. The third term is the taxation effect of a fiscal expansion since the fiscal expenditure is financed by the increase in direct taxes imposed on the private agent. This taxation effect on the agent's welfare is always negative. The net effect on the private agent's welfare will depend on the interaction of the three-mentioned effects with two of which subject to the effects on the nontraded good's price.

One result is immediate. *Provided that the stability condition is satisfied, the fiscal expansion financed by the domestic residents decreases their welfare when there is no foreign capital in the SOE* (*i.e.* $\eta_K^* = 0$). However, we can show that the same policy may improve the private agent's welfare in the presence of immobile foreign capital.

Conditions for different welfare implications to happen in a stable equilibrium is presented in Table 1. As we have discussed earlier, the welfare implications depend on the magnitude of the price induced effects which depend on how much the nontraded good's price is changed. Because of its importance, we shall discuss the factors affecting the size of the price change. Besides the elasticities of the excess demand, *i.e.* $(1 - \alpha_{XG})e_p - \varepsilon_p$, there are two repercussion effects which may magnify or mitigate the price change. We are going to discuss the nature of these effects by assuming an increase in the nontraded good's price. First, the supposed increase in p increases the agent's income through the revenue effect which increases the agent's demand for the good and hence has a magnification effect on the increase in p. The size of the effect will be larger, other things being constant, if the

magnitude of α_{XG} is larger. Second, the increase in p increases (decreases) the agent's income through the rental payment effect when the nontraded good is not (is) relatively capital intensive. It will increase (will decrease) the agent's demand for the good and then will magnify (will mitigate) the increase in p. The magnitude of this effect will be larger, other things being constant, if the absolute magnitude of $\eta_K^* \varepsilon_K$ is larger. We define a term $\sigma \equiv -[(1-\alpha_{XG})e_p - \varepsilon_p - \alpha_{XG}]/(\alpha_{XG} - \eta_K^* \varepsilon_K)$ to facilitate our discussion in the next paragraph.

We can show that a tax-financed fiscal policy, in the presence of immobile foreign capital, reduces the private agent's welfare if either one of the following conditions is satisfied: i) $R_{pK} > 0$: this condition implies a mitigation effect on the price change and then the negative taxation effect always dominates the sum of other price-induced effects (the sum of the rental payment and revenue effects) and then the private agent's welfare is worsened; ii) $R_{pK} < 0$ and $m \geq \gamma$: this condition implies that the price-induced effects on the private agent's welfare are non-positive and hence the agent's welfare must be decreased; iii) $R_{pK} < 0$ and $\sigma > \gamma > m$:[6] this condition implies that the sum of the positive price-induced effects is sufficiently small such that it is dominated by the negative taxation effect.

Otherwise ($R_{pK} < 0$ and $\gamma > \sigma > m$), the increase in the nontraded good's price is sufficiently large such that the sum of the positive price-induced effects dominates the negative taxation effect and then the private agent's welfare will be improved in a stable equilibrium. We summarize the above discussion into the following proposition:

Proposition 1: *Provided that the stability condition is satisfied and the nontraded good is not relatively capital intensive, a fiscal expansion may improve the domestic residents' welfare in a small open economy with immobile foreign capital even if the expansion is paid by them.*

The importance of the above proposition is that the welfare implication of a tax-financed fiscal expansion, in the presence of immobile foreign capital, can be very different when the rental payment to foreign capital is substantially reduced by the policy.

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6. It can be shown that the stability condition implies $\sigma > m$.

IV. Effects of Fiscal Policy with Internationally Mobile Foreign Capital

In this section, we discuss the implication of fiscal policy when the capital is internationally mobile. According to (3) – (7), we can derive the effect of a tax-financed fiscal expansion on the nontraded good's price:

$$dp/d\bar{G} = E_u R_{KK}(m - \gamma)/\Delta' \tag{10}$$

where $\Delta' = E_u R_{KK} p(E_{pp} - R_{pp}) + pE_u(R_{pK})^2 - R_{KK}(E_u - pE_{pu})G_X > 0$. It is shown in the appendix that the system is stable with internationally mobile capital.

As we have shown in (10), the policy-induced flow of foreign capital has no directional effect on the nontraded good's price which depends on whether γ is larger than m or not. We turn next to the welfare effect of a tax-financed fiscal expansion when the capital is internationally mobile:

$$\begin{aligned} E_u(du/d\bar{G}) &= [G_X(dp/d\bar{G}) - 1] \\ &= -\{R_{KK}[p(E_{pp} - R_{pp}) - (1 - \gamma)G_X] + p(R_{pK})^2\}/\Delta' < 0 \end{aligned} \tag{11}$$

which implies the following proposition:

Proposition 2: *A fiscal expansion which is financed by the domestic residents necessarily worsens their welfare in a small open economy with internationally mobile foreign capital.*

In the absence of the rental payment effect, we find that the welfare effect is unambiguously negative which does not depend on how the nontraded good's price is affected or whether the nontraded good is relatively capital intensive or not.

V. Concluding Remarks

Utilizing a two-sector general equilibrium model, we have shown that a purely dissipative government spending (*i.e.* not valuable in either production or utility), financed by direct taxes on the residents of a small open economy, may raise their welfare in the presence of immobile foreign capital. This result holds despite the fact that the economy has no influence on the terms of trade. However, we have also shown that the same policy necessarily worsens the residents' welfare when the capital is internationally mobile.

We are not suggesting that the government in LDC should limit the mobility of foreign capital and then increases the government spending. The major implication of the results implies that the welfare assessment of fiscal expansion in the presence of foreign capital in the short run can be very different in the long run, which can improve our understanding of the political economy of fiscal expansion in LDCs.

Appendix

Following Dei [1995], the adjustment process for the demand for nontraded good is

$$\dot{p} = aZ(p) \tag{A1}$$

where the dot represents the time derivative, a is a positive constant and $Z = E_p(p, u) - R_p(p, K)$ denotes the excess demand for nontraded good. By keeping $\bar{G}$ constant, we can take a linear approximation of the above adjustment process around the equilibrium point p^* as

$$\dot{p} = a(dZ/dp)(p - p^*) \tag{A2}$$

Hence, the necessary and sufficient condition for stability of the system is $dZ/dp < 0$.

A.1 Immobile Foreign Capital

From (5) and (6), we obtain

$$dZ/dp = \Delta/(pE_u) \tag{A3}$$

where $\Delta = pE_u(E_{pp} - R_{pp}) + pE_{pu}(G_X - K^*R_{pK}) - E_uG_X = E_uX[(1 - \alpha_{XG})e_p - \varepsilon_p - (1 - m)\alpha_{XG} - m\eta_K^*\varepsilon_K]$. Accordingly, the stability of the system requires that $\Delta < 0$.

A.2 Internationally Mobile Foreign Capital

Assuming the capital flow is instantaneous, we can obtain the following equation from (5), (6), and (7).

$$dZ/dp = \Delta'/(pE_uR_{KK}) \tag{A4}$$

where $\Delta' = E_u R_{KK} p(E_{pp} - R_{pp}) + pE_u(R_{pK})^2 - R_{KK}(E_u - pE_{pu})G_X > 0$. Accordingly, the system is stable.

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