Foreign Investment, Tax Policies and Economic Development

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Abstract

This study examines optimal tax and tariff policies for a small, open economy that seeks to attract capital from foreign investors who receive a credit for taxes paid to the host country. We prove that the optimal tax and tariff rates are not a unique pair, but are instead plural pairs. Therefore, the host country can maintain the after-tax rate of return of the foreign capital when it increases its tax and tariff rates at a ratio. In other words, the host country attracts foreign investment and maintains the real income of the country while raising tariff rates. This result suggests that the host country simultaneously realizes maximum income and protection of infant industries. We also prove that a decrease in the risk premium increases the real income of the country that implements optimal tax and tariff policies.

Keywords：Optimal tax, Foreign investment, Risk premium

1. Introduction

Research into optimal tax and tariff policies has a long history. Kemp (1966) and Jones (1967) analyzed effects of both capital income tax and tariffs on the real income of an open economy. Since then, numerous papers have developed the research. Wong (1995) synthesized them by analyzing the effects of tax and tariff on real income and other economic variables. Recently, the policies are developed from new viewpoints. Loewy (2004) confronted the data within the context of a two-country open-economy endogenous growth model in which public expenditure was financed by an optimal tariff and income tax. Kimbrough (2008) explored the implications of private information regarding a worker's skills for the optimal tax policy. This paper shows that the optimal policy distorts the labor-leisure choice. Itagaki (1994) reported optimal tariffs and

income taxes in the presence of both imperfection of, and uncertainty about, foreign investment using a specific-factor model. These analyses affect empirical studies. One of them is De Gorter, H. et al. (2009), which showed how the ethanol tax credit and import tariff each uniquely affected the ethanol and gasoline prices.

On the other hand, Bhagwati (1968, 1973) showed the possibility of immiserizing growth, where foreign investment to avoid tariff decreased the economic welfare of the host country. Brecher and Diaz-Alejandro (1977) also proved that the real income of a host country fell because the capital income was repatriated to the source country. Neary and Ruane (1988) extended Brecher and Diaz-Alejandro's model to a multiple-goods multiple-factors model and concluded that attracting foreign capital raised the cost of protecting domestic industries in the host country. These analyses show that research into optimal tax and tariff policies has pursued a variety of directions.

Most of the literature, however, does not assume that a tax credit is available in the country of origin: the source country reduces the tax liability on investment income by the amount of taxes paid to the host country. In the real world, most developed countries implement tax credit policies, by which a branch and a subsidiary in a foreign countries have the same effect on a company in terms of tax paid to the host country. As a result, the policies promote the foreign direct investment. Many developing countries exploit the foreign capital for their economic development.

Theoretical analysis of the optimal tax and tariff policies needs to be developed under a capital credit policy. Bond (1991) investigated those policies using with a one-factor model, which assumed capital as the only factor. Other papers focused on specific topics. Chao and Yu (1997) examined a subsidy on foreign capital and proved that the capital subsidy policy may fail to hold when the foreign country follows a tax credit system. Scharf (2001) investigated the influences of international tax evasion on the choice of tax credit policy and showed that tax credit policy can discourage tax evasion. Ida (2006, 2014) researched international tax competition and proved tax credit may not be beneficial to the capital-exporting country.

As described before, Bond (1991) proved that only one pair of optimal tax and tariff rates maximizes the real income of an economy, and other papers focused on some specific topics. To analyze more general effects of tax credit policies, we examine the policy with a standard model of the two-factor and two-good small economy.

We prove that the optimal tax and tariff rates are not a unique pair, but are instead plural pairs. As the Stolper-Samuelson theorem verifies, when a host country raises its tariff rate on a capital-intensive good, the return on capital rises. Therefore, the host country can keep the after-tax return rate of capital when the country increases both the tariff rate and the tax rate at a certain ratio. In other words, the host country attracts foreign investment and maintains the real income of the country while raising tariff rates.

From the viewpoint of theoretical analysis, this result indicates that the extension of models from one factor to two factors expands a country's options for implementing tax and tariff rates. From the viewpoint of policy implications, this result implies that a developing country simultaneously realizes maximum income and protection of infant industries.

We also prove that a decrease in the risk premium increases the real income of the economy that implements the optimal tax and tariff policies. The declining risk premium allows the host country to raise its tax rate while the after-tax return rate of the foreign capital remains above that in the foreign country by the margin of the risk premium. The tax rate hike increases the country's real income. Currently, many developing countries reduce tax and tariff rates to attract foreign capital. However, our theoretical research shows that developing countries should decrease not tariff rates but risk premiums by stabilizing exchange rates, business cycles, and other investment environments.

This paper is organized as follows. In Section 2, we present the model used in the paper. We introduce a tax credit policy into a small economy model. In Section 3, we analyze the optimal tax and tariff policies. Section 4 presents the conclusions.

2. The model of a capital-importing economy

In this section, we explain the model of a capital-importing small open economy.

Consider a two-good, two-factor economy. This economy imports good 1 and exports good 2, and receives foreign investment. We assume the condition of incomplete specialization,

$$\frac{a_{K1}}{a_{L1}} > \frac{K+K'}{L} > \frac{a_{K2}}{a_{L2}}, \qquad (1)$$

where a_{K1} and a_{L1} are the amounts of capital and labor, respectively, to produce one unit of good 1, and a_{K2} and a_{L2} are those for good 2. K and L are the stocks of capital and labor in the economy. K' is the amount of foreign capital. The above inequality means that good 1 is the capital-intensive good.

The endowment constraints are

$$a_{K1}X_1+a_{K2}X_2=K+K', \quad a_{L1}X_1+a_{L2}X_2=L, \qquad (2\text{-}1), (2\text{-}2)$$

where X_1 and X_2 are the outputs of goods 1 and 2, respectively, in the economy. From (2), we obtain

$$X_1 = \frac{a_{L2}(K+K')-a_{K2}L}{A}, \quad X_2 = \frac{a_{K1}L-a_{L1}(K+K')}{A}, \qquad (3\text{-}1), (3\text{-}2)$$

where $A=a_{K1}a_{L2}-a_{K2}a_{L1}$.

The economy levies a tariff on the import of good 1. The domestic price of good 1, p, is

$$p=p^*(1+t), \qquad (4)$$

where p^* is the world price of good 1 and t is the tariff rate. We choose good 2 as the numeraire and assume its price as 1.

The capital and the labor receive the rental cost and the wage, respectively, as returns. We define the rental cost of capital in the economy as r. This is the pretax return to capital. From the zero-profit condition, we obtain

$$r = \frac{pa_{L2}-a_{L1}}{A}. \qquad (5)$$

When t = 0, the rental cost of capital in the economy is equal to the world level of the rental cost of capital, r^*, which is

$$r^* = \frac{p^*a_{L2}-a_{L1}}{A}. \qquad (6)$$

Equations (5) and (6) show that r is larger than r^* when the tariff is imposed. This is because the tariff on the capital-intensive good raises the domestic price of the good, so the return to capital rises. This is the Stolper-Samuelson theorem.

Next, we explain the effect of taxes on capital income. We define the domestic and foreign tax rates on the capital return as s and s^*, respectively. We also assume a

tax credit policy of the foreign country on the capital income. This implies that the host country imposes a tax on capital income at rate s, and that the foreign country taxes capital income transmitted from the host country at rate s^*-s only when $s < s^*$. Therefore, the after-tax rate of return for the foreign owner of capital is

$$r(1-\max(s, s^*)). \tag{7}$$

A foreign owner of capital invests in the host country when the after-tax rate of return on investment in the host country equals or exceeds the sum of the after-tax rate of return on the investment in the foreign country and the risk premium. This is expressed as

$$r(1-\max(s, s^*)) \geq r^*(1-s^*)+f, \tag{8}$$

where f is the risk premium.

We define Gross National Product of the host country as Y, which is

$$Y = pD_1+D_2 = pX_1+X_2+tp^*M-r(1-s)K', \tag{9}$$

where D_i and M are consumption of good i (i=1, 2) and the import of good 1, respectively; that is, $M \equiv D_1-X_1$.[1] In the above equation, $r(1-s)K'$ is the capital income transmitted from the host country to the foreign owners of capital.

3. Effect of Capital Income Tax and Tariff on Real Income

We now explore the effect of changes in the income tax rate on capital and tariff rates on the host country's real income.

We define the change in real income as $dy = pdD_1+dD_2$. From (9), we obtain

$$dy = -Mdp+pdX_1+dX_2+p^*d[tM]-d[r(1-s)K'], \tag{10}$$

where $M=D_1-X_1$. From (3)-(5), we have

$$dp = p^*dt, \tag{11}$$

$$dX_1 = \frac{a_{L2}}{A}dK', \quad dX_2 = -\frac{a_{L1}}{A}dK', \tag{12-1), (12-2}$$

$$dr = \frac{p^*a_{L2}}{A}dt. \tag{13}$$

Substituting (11)-(13) into (10) yields

[1] The value of D_1 is obtained when the utility function of the economy is introduced.

$$dy = p^* t dD_1 + \left(rs - \frac{p^* a_{L2} t}{A} \right) dK' + rK'\, ds - \frac{p^* a_{L2}(1-s)K'}{A} dt\,. \qquad (14)$$

The deferential of K' with the after-tax return rate,

$$\frac{dK'}{d[r(1-\max(s, s^*))]}, \qquad (15)$$

is obtained from (13) as follows.

When $s < s^*$, $$\frac{dK'}{d[r(1-s^*)]} = \frac{A}{p^* a_{L2}(1-s^*)} \cdot \frac{dK'}{dt}, \qquad (16\text{-}1)$$

when $s \geq s^*$, $$\frac{dK'}{d[r(1-s)]} = dK' \Big/ \left\{ \frac{p^* a_{L2}(1-s)}{A} dt - r ds \right\}. \qquad (16\text{-}2)$$

Using the above equations, we consider the effect of the changes in tax and tariff rates on real income. First, we examine the effect of a change in the tariff rate while the tax rate remains fixed. From (14), we have

$$c \left. \frac{dy}{dt} \right|_{ds=0} = \left(rs - \frac{p^* a_{L2} t}{A} \right) \frac{dK'}{dt} - \frac{p^* a_{L2}(1-s)K'}{A}, \qquad (17)$$

where $c = 1 - tp^*(dD_1/dy)$. When both goods are normal goods, $0 < p^*(dD_1/dy) < 1$ is realized, so $c > 0$. Using (16) and (17), we obtain the following values:

When $s < s^*$, $$\left. \frac{dy}{dt} \right|_{ds=0} = \frac{p^* a_{L2}(1-s)}{cA} \left\{ \frac{1-s^*}{1-s} \left(rs - \frac{p^* a_{L2} t}{A} \right) \frac{dK'}{d[r(1-s^*)]} - K' \right\}, \qquad (18\text{-}1)$$

when $s \geq s^*$, $$\left. \frac{dy}{dt} \right|_{ds=0} = \frac{p^* a_{L2}(1-s)}{cA} \left\{ \left(rs - \frac{p^* a_{L2} t}{A} \right) \frac{dK'}{d[r(1-s)]} - K' \right\}. \qquad (18\text{-}2)$$

The signs of (18-1) and (18-2) are negative, except when the value of K' is extremely small compared with other variables.

Next, we examine the effect of a change in the tax rate while the tariff rate is fixed. From (14), we have

$$c \left. \frac{dy}{ds} \right|_{dt=0} = \left(rs - \frac{p^* a_{L2} t}{A} \right) \frac{dK'}{ds} + rK', \qquad (19)$$

This yields the following values:

when $s<s^*$, $$\left.\frac{dy}{ds}\right|_{dt=0}=\frac{r}{c}K'>0, \tag{20-1}$$

when $s\geq s^*$, $$\left.\frac{dy}{ds}\right|_{dt=0}=\frac{r}{c}\left\{K'-\left(rs-\frac{p^*a_{L2}t}{A}\right)\frac{dK'}{d[r(1-s)]}\right\}. \tag{20-2}$$

The sign of (20-1) is positive. The sign of (20-2) is positive, except when the value of K' is extremely small compared with other variables.

dy/dt <0 and dy/ds >0. These inequities indicate that the host country's real income rises when it decreases the tariff rate and increases the tax rate on capital income. This result occurs for the following reasons. When the host country decreases the tariff rate, the pretax return on capital diminishes; therefore the income for foreign investors shrinks. Besides, when the host country increases the tax rate on returns to capital, foreign investors' after-tax income shrinks.

However, the host country must keep the after-tax return rate for foreign investors above a certain level. The country cannot freely raise the tax rate on capital income. Therefore, we examine (8), which is the condition that foreign capital owners invest in the host country. First, when $s<s^*$, (8) yields

$$t\geq mf, \tag{21}$$

where $m=A/\{p^*a_{L2}(1-s^*)\}$. Next when $s\geq s^*$, (8) yields

$$s\leq 1-\frac{(p^*a_{L2}-a_{L1})(1-s^*)+Af}{p^*a_{L2}(1+t)-a_{L1}}. \tag{22}$$

Therefore, the range in the values of t and s at which foreign owners of capital invest in the host country is the area surrounded by the t axis, the perpendicular of $t=mf$, and the curve,

$$s=1-\frac{(p^*a_{L2}-a_{L1})(1-s^*)+Af}{p^*a_{L2}(1+t)-a_{L1}}, \tag{23}$$

as shown in Figure 1.

As described, when the host country decreases t and increases s, its real income rises. When we apply this result to Figure 1, we deduce that the optimal values of t and s lie along the curve (23).

On the curve (23), the equal sign of (8) holds. In other words, the amount of foreign

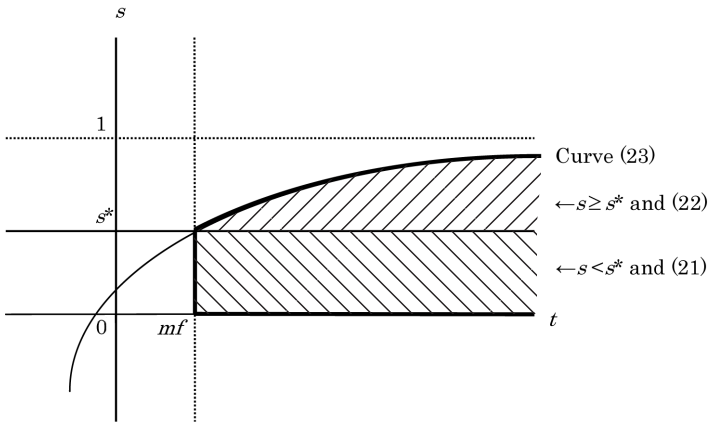

Figure 1　The range of the tariff rate, *t*, and the capital income tax rate, *s*, at which foreign owners of capital invest in the host country

investment stays at the same level on the curve. This implies that $dK'/dt = 0$ on (23). The curve (23) is an increasing function in Figure 1. When the host country raises the tariff rate and the income tax rate on capital along this curve, both the pre-tax rate of return on capital and the capital income tax rate increase. Therefore, the after-tax rate of return for capital remains unchanged.

To find the optimal values of t and s, we examine the change in the real income when t and s change along the curve (23). From Equation (23), we have

$$ds = \frac{p^* a_{L2}\{(p^* a_{L2} - a_{L1})(1 - s^*) + Af\}}{\{p^* a_{L2}(1+t) - a_{L1}\}^2} dt . \qquad (24)$$

By substituting (24) and (16-2) into (14), we obtain the effect of changes of t and s on real income on the curve (23),

$$\frac{dy}{dt} = 0 . \qquad (25)$$

This occurs because the amount of foreign capital and the value of after-tax capital income for foreigners remain unchanged on the curve. Therefore, the host country's real income also remains at the same level.

This result indicates that the host country maximizes its real income when the country chooses arbitrary values on the curve (23). We obtain the following proposition.

Proposition 1. The optimal values of the tax rate, s, and the tariff rate, t, to maximize the host country's real income are the arbitrary values which meet (21) and (23).

Bond (1991) proves that there is only one pair of the optimal tax and tariff rates. Our two-factor model has a different result. This indicates that the increase in the number of factors widens the host country's policy choices.

Next, we examine the effect of a change in the risk premium when the host country implements the optimal tax and tariff policies. When the risk premium, f, changes on the curve (23), we have

$$ds = \frac{-\{p^* a_{L2}(1+t) - a_{L1}\}df + p^* a_{L2}\{(p^* a_{L2} - a_{L1})(1-s^*) + Af\}}{\{p^* a_{L2}(1+t) - a_{L1}\}^2} dt. \qquad (26)$$

Substituting this into (14), we obtain

$$\frac{dy}{df} = \frac{1}{c}\left\{\left(rs - \frac{p^* a_{L2} t}{A}\right)\frac{dK'}{df} - K'\right\}. \qquad (27)$$

The sign of (27) is negative except for when value of K' is extremely small compared with other variables. Therefore, the decrease in the risk premium raises real income for the following reason. We assume that foreign owners of capital invest in the host country when its after-tax rate of return equals or exceeds the sum of the after-tax return rate in the foreign country and the risk premium. This implies that the lower the risk premium, the lower is the after-tax return rate that the host country needs to maintain. Hence when the risk premium decreases, the host country can raise its income tax rate or reduce its tariff rate to diminish the after-tax rate of return. The decline in the after-tax return rate of foreign capital results in the rise in the real income. We obtain the following proposition.

Proposition 2. Under the optimal tax and tariff policies, when the risk premium decreases, real income of the host country increases.

This proposition shows that decreasing the risk premium is an important policy agenda for the host country. The country should pursue this policy by stabilizing the exchange

rate, the business cycle, and other investment environments.

4. Conclusion

This study introduced a tax credit policy into a two-factor, two-good small economy model and examined the optimal tax and tariff policies. We obtained a formula of tax and tariff rates to maximize the real income of an economy. The economy should choose any tax and tariff rates suggested by the formula. This implies that the host country can raise its tariff rate while maximizing its real income. We also proved that a decrease in the risk premium increases the economy's real income under the optimal tax credit policies.

Our results indicate that free trade is not always the best policy for raising a country's real income. Today, many developing countries reduce tax and tariff rates to attract foreign capital. However, our theoretical research proved that a country can attract foreign capital and raise its income while protecting its domestic industries with tariffs. In other words, a country can realize both infant-industry protection and the optimal tax and tariff policies on the condition of the tax credit policies. Therefore, developing countries should decrease not tariff rates but risk premiums by stabilizing exchange rates, business cycles, and other investment environments.

Research into optimal tax and tariff policies should develop from new viewpoints. Infant-industry protection can coexist alongside optimal tax credit policies. Reduction of the risk premium is important for optimizing those policies. This line of research deserves further exploration.

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