Terms of Trade and Current Account

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ABSTRACT:-*In this paper, we find that a rise in the price of land-using commodity would lead to a decrease in the interest rate and hence the price of capital would decline. In addition, we also find that a rise in the price of land-using commodity would lead to an increase in the land rent and hence lead to a rise in the price of land. Finally, we reveal that the impact of terms of trade on current account is ambiguous*

KeyWords: - *terms of trade; current account; small open economy*

1. Introduction

According to the traditional interpretation, a decrease in current income arising from an adverse terms of trade would decrease both private savings and the current account balance. The previous reasoning is known as the Harberger-Laursen-Metzler (hereafter HLM) effect, proposed by Harberger (1950) and Laursen and Metzler (1950). Many empirical studies reexamine the HLM effect, including Backus *et al*. (1994), Mendoza (1992, 1995), Cashin and McDermott (2002), Otto (2003), Kent and Cashin (2003), Chen and Hsu (2006), and Aquino and Espino (2013). Backus *et al*. (1994), Mendoza (1992, 1995), and Cashin and McDermott (2002) show that the effects of the terms of trade on the current account balance are ambiguous. Otto (2003), Kent and Cashin

(2003), Chen and Hsu (2006), and Aquino and Espino (2013) indicate that a deterioration in terms of trade implies a worsening of the current account balance. Namely, the empirical results are inconclusive. Therefore, this paper hopes to construct a theoretical model to re-examine the HLM effect.

The structure of the paper is as follows. Section 2 sets up a small open-economy and analyzes the impact of terms of trade on current account. Section 3 concludes the paper.

2. Model

Consider a small open economy producing two commodity (Q_1 and Q_2). The commodity 1, Q_1, hires capital (K_1) and labor (L_1) in production. The period t production function can be specified as:

$Q_{1t}=F(K_{1t}, L_{1t})$. The second commodity, Q_2, employs land (M_2) and labor (L_2) and the period t production function can be assumed as: $Q_{2t}=G(M_{2t}, L_{2t})$. Both $F(\cdot)$ and $G(\cdot)$ are continuous, twice differentiable and linear homogeneous. Capital and land are specific factors. Labor is intersectorally mobile. Hence, the equilibrium conditions of factor markets can be shown as: $K_{1t}=K_t$, $M_{2t}=M_t$, and $L_{1t}+L_{2t}=L_t$. Factor endowments K_t, M_t, and L_t which are exogenously given will yield an interest rate R_t, a land rent π_t, and a wage w_t. Assume that the relative price of commodity 2 in terms of commodity 1 is $p_t = p_{2t}/p_{1t}$. Product market and factor market are perfect competition market. The profit-maximizing conditions can be derived as:

$$w_t = F_L(K_t, L_{1t}),$$

(1a)

$$w_t = p_t G_L(M_t, L_t\text{-}L_{1t}),$$

(1b)

$$R_t= F_K(K_t, L_{1t}),$$

(1c)

$$\pi_t = p_t G_M(M_t, L_t\text{-}L_{1t}).$$

(1d)

We let $\hat{z} \equiv dz/z$, and then, from Equations (1a)-(1d), can obtain:

$$\hat{w}_t = \left[\theta_{K1}\lambda_{L2}\sigma_2\,\hat{p}_t - \theta_{K1}\theta_{M2}\left(\hat{L}_t - \lambda_{L1}\hat{K}_t\right)\right]\phi,$$

(2a)

$$\hat{R}_t = \left[-\theta_{L1}\lambda_{L2}\sigma_2\,\hat{p}_t + \theta_{L1}\theta_{M2}\left(\hat{L}_t - \lambda_{L1}\hat{K}_t\right)\right]\phi,$$

(2b)

$$\hat{\pi}_t = \left[\left(\lambda_{L1}\sigma_1 + \theta_{K1}\lambda_{L2}\sigma_2\right)\hat{p}_t + \theta_{K1}\theta_{L2}\left(\hat{L}_t - \lambda_{L1}\hat{K}_t\right)\right]\phi,$$

(2c)

where

$$\phi = \left(\theta_{M2}\lambda_{L1}\sigma_1 + \theta_{K1}\lambda_{L2}\sigma_2\right)^{-1}.$$

θ_{ij} ($i=K, M, L$ and $j=1, 2$) denotes the cost share of factor i of good j. λ_{Lj} is the fraction of labor employed in good j. σ_j represents the elasticity of substitution of good j.

Consider a standard Diamond (1965) type overlapping-generations model with no population growth. Every consumer lives for two periods. In each period, a new generation is born. The young consumer supplies one unit of labor inelastically in return for wage. Some wage income is consumed, the other is saved which is invested in capital, land or foreign assets denominated in the import good. The rate of return of foreign assets, r, is given. The consumer retires in his second period and consumes the earnings or his assets as well as the principal. He makes no bequests. The consumer born at period t should solve the following maximization problem:

$$Max \quad U\left(c_t^y, c_{t+1}^o\right)$$

$$\text{s.t.} \quad c_t^y = w_t - b_t - q_t k_t - x_t m_t$$

$$c_{t+1}^o = (1+r)b_t + (q_{t+1} + R_{t+1})k_t + (x_{t+1} + \pi_{t+1})m_t,$$

where c_t^y (c_{t+1}^o) is consumption by the consumer

born at period t when young (old), b_t (k_t) is investment in foreign assets (capital), and m_t is investment in land. q_t (x_t) is the price of capital (land). The function $U(\cdot)$ expresses the consumer's intertemporal preferences and is homothetic function.

The non-arbitrage conditions among assets are:

$$1+r = \frac{q_{t+1} + R_{t+1}(K_{t+1}, p_{t+1})}{q_t},$$

$$(3a)$$

$$1+r = \frac{x_{t+1} + \pi_{t+1}(K_{t+1}, p_{t+1})}{x_t}.$$

$$(3b)$$

Optimal real saving function, $s(w_t, r, p_t, p_{t+1})$, can yield the expression:

$$b_t+q_t k_t+x_t m_t = s(w_t, r, p_t, p_{t+1}).$$

$$(4)$$

For simplicity, assume that the endowments of capital, land, and labor are constant, i.e., $K_t=K$, $M_t=1$, and $L_t=L$. The equilibrium condition of capital and land markets can be rewritten as follows:

$$K_{t+1}=Lk_{t+1},$$

$$(5)$$

$$M_{t+1}=1=Lm_{t+1}.$$

$$(6)$$

Only the young have an incentive to hold assets in this economy. Let B_t be the net asset position of the economy at the end of period t. From Equations (4), (5), and (6), we can obtain:

$$B_t=Ls(w_t, r, p_t, p_{t+1})-q_t K-x_t. \qquad (7)$$

Given a time path of the terms of trade, $\{p_t\}$, and a transversality condition on q_t and x_t, and hence, from Equation (7), the current account, $CA_t=B_t-B_{t-1}$, can be derived as:

$$CA_t=B_t-B_{t-1}=(Ls_t-q_t K-x_t)-(Ls_{t-1}-q_{t-1}K-x_{t-1}).$$

By using $s_t=w_t-c_t^y$, $c_t^o=(1+r)s_{t-1}$, and Equations (3a) and (3b), we obtion:

$$CA_t=B_t-B_{t-1}=rB_{t-1}+B_t-(1+r)B_{t-1}$$

$$=(rB_{t-1}+Lw_t+R_t K+\pi_t)-L(c_t^y+c_t^o).$$

$$(8)$$

Equation (8) reveals another identity for the current account: GNP minus national absorption, as shown in Matsuyama (1988). Equation (8) can be rewritten as:[1]

$$CA_t=rB_{t-1}+Q_{1t}+p_t Q_{2t}-L[(c_{1t}^y+p_t\,c_{2t}^y)+(c_{1t}^o+p_t\,c_{2t}^o)]$$

$$=rB_{t-1}+p_t[Q_{2t}-L(c_{2t}^y+c_{2t}^o)]+[Q_{1t}-L(c_{1t}^y+c_{1t}^o)].$$

$$(9)$$

Equation (9) indicates that the current account is the sum of the service account and the trade account, as suggested by Matsuyama (1988).

A steady state equilibrium can be stated as follows:

$$B^*=Ls(K, r, p^*)-q^* K-x^*,$$

$$(10a)$$

$$q^*=R(K, p^*)/r,$$

$$(10b)$$

$$x^*=\pi(K, p^*)/r,$$

(10c)

where

$$s(K, r, p^*) \equiv s(w(K, p^*), r, p^*).$$

Equation (10a) indicates that, although the current account is zero in a steady state, the net asset position need not be zero. Equation (10b) shows that the price of capital is the present discounted value of constant future capital income. Equation (10c) reveals that the price of land is the present discounted value of constant future land income. Totally differentiating Equations (10a), (10b), and (10c) can obtain:

$$\hat{B} = \frac{B + qK + x}{B}\left[\eta_w \hat{w} + \eta_r \hat{r} + \eta_p \hat{p} - \mu_1 \hat{K} - \mu_1 \hat{q} - \mu_2 \hat{x} + \hat{L}\right],$$

(11a)

$$\hat{q} = \hat{R} - \hat{r},$$

(11b)

$$\hat{x} = \hat{\pi} - \hat{r},$$

(11c)

where

$$\eta_z \equiv \frac{z s_z}{s}, \quad z = w, r, p, \quad \mu_1 \equiv \frac{qK}{Ls}, \quad \text{and}$$

$$\mu_2 \equiv \frac{x}{Ls}.$$

By using Equations (2a), (2b), (2c), (11a), (11b), and (11c), we can get:

$$\frac{\hat{B}}{\hat{p}} = \frac{B + qK + x}{B}\left[\eta_p + \phi\theta_{K1}\lambda_{L2}\sigma_2(\eta_w - \mu_1 - \mu_2) + \phi(\mu_1\lambda_{L2}\sigma_2 - \mu_2\lambda_{L1}\sigma_1)\right].$$

(12)

From Equations (2b) and (11b), we show that a rise in the terms of trade, p, which is the price of land-using commodity, would lead to a decrease in the interest rate, R, and hence the price of capital, q, would decline. From Equations (2c) and (11c), we find that a rise in the terms of trade, p, would lead to an increase in the land rent, π, and hence lead to a rise in the price of land, x. However, from Equation (12), we indicate that the impact of the terms of trade on the net asset position, B, is ambiguous.

3. Concluding remarks

In this paper, we find that a rise in the price of land-using commodity would lead to a decrease in the interest rate and hence the price of capital would decline. In addition, we also find that a rise in the price of land-using commodity would lead to an increase in the land rent and hence lead to a rise in the price of land. Finally, we reveal that the impact of terms of trade on current account is ambiguous.

Appendix 1 The derivation of Equation (9)

Considering constant returns to scale, competitive markets, and intersectoral factor mobility, we can show the equilibrium conditions in commodity and factor markets in each period as:

$$a_{L1}Q_1 + a_{L2}Q_2 = L,$$

(A.1)

$$a_{K1}Q_1 = K,$$

(A.2)

$$a_{M2}Q_2 = M = 1,$$

(A.3)

$$a_{L1}w + a_{K1}R = 1,$$

$$(A.4)$$

$$a_{L2}w + a_{M2}\pi = p.$$

$$(A.5)$$

a_{ij} ($i=K$, M, L and $j=1$, 2) denotes the quantity of factor i required to produce a unit of good j. Substituting Equations (A.1)-(A.5) into Equation (8) can obtain Equation (9).

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