APPENDICES

APPENDIX A

SOLVING EQUATION (2.9)

$$\frac{\partial \Pi}{\partial K}=\frac{\partial \Pi}{\partial X}\cdot\frac{\partial X}{\partial K}$$

$$=\left[\frac{dp(\cdot)x}{dx}\cdot\frac{dx}{dX}+\frac{dep^{*}x^{*}}{dx^{*}}\cdot\frac{dx^{*}}{dX}\right]F_K$$

$$=\left[\left[\frac{p(\cdot)dx}{dx}+\frac{xdp(\cdot)}{dx}\right]+\left[ep^{*}(\cdot)\frac{dx^{*}}{dx^{*}}+x^{*}\frac{dep^{*}(\cdot)}{dx^{*}}\right]\right]F_K$$

$$=\left[\left[p(\cdot)+p(\cdot)\frac{x}{p(\cdot)}\frac{dp(\cdot)}{dx}\right]+\left[ep^{*}(\cdot)+ep^{*}(\cdot)\frac{x^{*}}{ep^{*}}\frac{dep^{*}(\cdot)}{dx^{*}}\right]\right]F_K$$

$$=\left[p(\cdot)\left(1+\frac{1}{\eta}\right)+ep^{*}(\cdot)\left(1+\frac{1}{\eta^{*}}\right)\right]F_K \qquad (A1)$$

The first-order condition of profit maximization problem implies:

$$(1+\eta_t^{-1})p(x_t,e_t)=(1+\eta_t^{*-1})e_t p^{*}(x_t^{*},e_t) \qquad (A2)$$

Equation(A.2) is said that

marginal revenue from domestic market=marginal revenue from foreign market

$$\left[p(x_t,e_t)(1+\eta_t^{-1})\right]\frac{\partial f}{\partial L_t}=W_t \qquad (A3)$$

$$\left[e_t p^{*}(x_t^{*},e_t)(1+\eta_t^{*-1})\right]\frac{\partial f}{\partial L_t^{*}}=e_t W_t^{*} \qquad (A4)$$

Equation(A.3) and (A.4) are said that

marginal cost of domestic and foreign market=value of their marginal productivity

From (A2) we have:

$$\left[p(x_t,e_t)(1+\eta_t^{-1})\right]\frac{\partial f}{\partial L_t^{*}}=e_t W_t^{*} \qquad (A5)$$

From (A1) and (A.2) we have:

$$\frac{\partial \Pi_t}{\partial K_t}=2(1+\eta_t^{-1})p(x_t,e_t)\frac{\partial f}{\partial K} \qquad (A6)$$

Recognize equation(9):

$$\prod_t = p_t x_t + e_t p_t^* x_t^* - w_t L_t - e_t w_t^* L_t^*$$

From (A.3), (A.4) and (A.5)we have:

$$\frac{\prod_t}{K_t} = \frac{p_t x_t + e_t p_t^* x_t^*}{K_t} - \frac{\left[p(x_t, e_t)(1+\eta_t^{-1})\right]\frac{\partial f}{\partial L_t} L_t}{K_t} - \frac{\left[p(x_t, e_t)(1+\eta_t^{-1})\right]\frac{\partial f}{\partial L^*_t} L_t^*}{K_t} \qquad (A.7)$$

$$\frac{\prod_t}{K_t} = \frac{p_t x_t + e_t p_t^* x_t^*}{K_t} - \left[p(x_t, e_t)(1+\eta_t^{-1})\right]\left[\frac{L_t}{K_t}\frac{\partial f}{\partial L_t} + \frac{L_t^*}{K_t}\frac{\partial f}{\partial L^*_t}\right] \qquad (A.8)$$

Euler's theorem:

$$\frac{\partial f}{\partial K_t} K_t + \frac{\partial f}{\partial L_t} L_t + \frac{\partial f}{\partial L^*_t} L_t^* = x_t + x_t^* \qquad (A.9)$$

Substituting(A.9) into (A.8)

$$\frac{\prod_t}{K_t} = \frac{p_t x_t + e_t p_t^* x_t^*}{K_t} - \left[p(x_t, e_t)(1+\eta_t^{-1})\right]\left[\frac{x_t + x_t^*}{K_t} - \frac{\partial f}{\partial K_t}\right] \qquad (A.10)$$

Rearranging(A.10):

$$\frac{\partial f}{\partial K_t} = \frac{\frac{\prod_t}{K_t} - \left(\frac{p_t x_t + e_t p_t^* x_t^*}{K_t}\right) + \left[p(x_t, e_t)(1+\eta_t^{-1})\right]\left[\frac{x_t + x_t^*}{K_t}\right]}{\left[p(x_t, e_t)(1+\eta_t^{-1})\right]} \qquad (A.11)$$

Substituting(A.11) into (A.6)

$$\frac{\partial \prod_t}{\partial K_t} = 2\left(\frac{\prod_t}{K_t} - \left(\frac{p_t x_t + e_t p_t^* x_t^*}{K_t}\right) + \left[p(x_t, e_t)(1+\eta_t^{-1})\right]\left[\frac{x_t + x_t^*}{K_t}\right]\right)$$

$$\frac{\partial \prod_t}{\partial K_t} = \frac{2}{K_t}\left[p_t x_t\left(1 + \frac{1}{\eta}\right) + e_t p_t^* x_t^*\left(1 + \frac{1}{\eta^*}\right) - w_t L_t - e_t w_t^* L_t^*\right] \qquad (A.12)$$