APPENDIX B

SOLVING EQUATION (2.11)

$$\frac{\partial I_t}{\partial e_t} = A/K_t \left\{ \begin{array}{l} \dfrac{MKUP_t \dfrac{dp_t x_t}{de_t} - p_t x_t \dfrac{dMKUP_t}{de_t}}{MKUP^2} + \dfrac{MKUP_t^* \dfrac{de_t p_t^* x_t^*}{de_t} - e_t p_t^* x_t^* \dfrac{dMKUP_t^*}{de_t}}{MKUP^{*2}} \\ -e_t L_t^* \dfrac{dw_t^*}{de_t} - w_t^* L_t^* \dfrac{de_t}{de_t} \end{array} \right\}$$

$$\frac{\partial I_t}{\partial e_t} = A/K_t \left\{ \begin{array}{l} \dfrac{MKUP_t x_t \dfrac{dp_t}{de_t} \dfrac{e_t}{p_t} \dfrac{p_t}{e_t} - p_t x_t \dfrac{dMKUP_t}{de_t} \dfrac{e_t}{MKUP_t} \dfrac{MKUP_t}{e_t}}{MKUP_t^2} \\ + \dfrac{MKUP_t^* \left[e_t x_t^* \dfrac{dp_t^*}{de_t} \dfrac{e_t}{p_t^*} \dfrac{p_t^*}{e_t} + p_t^* x_t^* \right] - e_t p_t^* x_t^* \dfrac{dMKUP_t^*}{de_t} \dfrac{e_t}{MKUP_t^*} \dfrac{MKUP_t^*}{e_t}}{MKUP_t^{*2}} \\ -e_t L_t^* \dfrac{dw_t^*}{de_t} \dfrac{e_t}{w_t^*} \dfrac{w_t^*}{e_t} - w_t^* L_t^* \dfrac{de_t}{de_t} \end{array} \right\}$$

$$\frac{\partial I_t}{\partial e_t} = A/K_t \left\{ \frac{p_t x_t \left(\varepsilon_{p,e} - \varepsilon_{MKUP,e} \right)}{e_t MKUP_t} + \frac{e_t p_t^* x_t^* \left(\varepsilon_{p^*,e} + 1 - \varepsilon_{MKUP^*,e} \right)}{e_t MKUP_t^*} - \frac{e_t w_t^* L_t^* \left(1 + \varepsilon_{w*,e} \right)}{e_t} \right\}$$

$$\frac{\partial I_t}{\partial e_t} = A \cdot TR_t / K_t \left\{ \frac{p_t x_t \left(\varepsilon_{p,e} - \varepsilon_{MKUP,e} \right)}{TR_t MKUP_t} + \frac{e_t p_t^* x_t^* \left(\varepsilon_{p^*,e} + 1 - \varepsilon_{MKUP^*,e} \right)}{TR_t MKUP_t^*} - \frac{e_t w_t^* L_t^* \left(1 + \varepsilon_{w*,e} \right) TC_t}{TR_t TC_t} \right\} \frac{1}{e_t}$$

$$\frac{\partial I_t}{\partial e_t} = A \cdot TR_t / K_t \left\{ \frac{(1 - X_t) \left(\varepsilon_{p,e} - \varepsilon_{MKUP,e} \right)}{MKUP_t} + \frac{X_t \left(\varepsilon_{p^*,e} + 1 - \varepsilon_{MKUP^*,e} \right)}{MKUP_t^*} - \frac{\alpha_t \left(1 + \varepsilon_{w*,e} \right) TC_t}{TR_t} \right\} \frac{1}{e_t}$$

$$\frac{\partial I_t}{\partial e_t} = A \cdot TR_t / K_t \left\{ \frac{(1 - X_t) \left(\varepsilon_{p,e} - \varepsilon_{MKUP,e} \right)}{MKUP_t} + \frac{X_t \left(\varepsilon_{p^*,e} + 1 - \varepsilon_{MKUP^*,e} \right)}{MKUP_t^*} - \frac{\alpha_t \left(1 + \varepsilon_{w*,e} \right)}{MKUP_t} \right\} \frac{1}{e_t}$$

$$\frac{\partial I_t}{\partial e_t} = \frac{A'}{AMKUP} \left\{ (1 - X_t) \left(\varepsilon_{p,e} - \varepsilon_{MKUP,e} \right) + X_t \left(\varepsilon_{p^*,e} + 1 - \varepsilon_{MKUP^*,e} \right) - \alpha_t \left(1 + \varepsilon_{w*,e} \right) \right\} \frac{1}{e_t}$$

Note that:

profit gross of investment costs: $\prod_t = p_t x_t + e_t p_t^* x_t^* - w_t L_t - e_t w_t^* L_t^*$

F.O.C. of profit-max problem:

$$\frac{\partial \prod_t}{\partial K_t} = (1+\eta_t^{-1})\, p(x_t, e_t)\, \frac{\partial f}{\partial K} = 0$$

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

$$\frac{\partial \prod_t}{\partial K_t} = \frac{\prod_t}{K_t} - \left(\frac{p_t x_t + e_t p_t^* x_t^*}{K_t}\right) + \left[p(x_t, e_t)(1+\eta_t^{-1}) \right] \left[\frac{x_t + x_t^*}{K_t} \right] = 0$$

$$- w_t L_t - e_t w_t^* L_t^* + \left[p(x_t, e_t)(1+\eta_t^{-1}) \right] (x_t + x_t^*) = 0$$

$$\left[p(x_t, e_t)(1+\eta_t^{-1}) \right] (x_t + x_t^*) = w_t L_t + e_t w_t^* L_t^* \qquad (B.1)$$

$$\frac{TR_t}{TC_t} = \frac{p_t x_t + e_t p_t^* x_t^*}{w_t L_t + e_t w_t^* L_t^*} \qquad (B.2)$$

$$\frac{TR_t}{TC_t} = \frac{p_t (x_t + x_t^*)}{w_t L_t + e_t w_t^* L_t^*} \qquad (B.3) \quad \text{according to Law of one price}$$

$$\frac{TR_t}{TC_t} = \frac{p_t (x_t + x_t^*)}{\left[p(1+\eta_t^{-1}) \right] (x_t + x_t^*)} \qquad (B.4)$$

$$\frac{TR_t}{TC_t} = \frac{1}{1+\eta_t^{-1}} = MKUP_t \qquad (B.5)$$