**Globalization of markets and consumption home bias:
new insights for the environment**

Ornella Tarola[1*] and Skerdilajda Zanaj[2]

[1]DISSE, University of Rome La Sapienza, Rome, Italy and [2]DEM, University of Luxembourg, Luxembourg.

*Corresponding author. E-mail: ornella.tarola@uniroma1.it

# ONLINE APPENDIX

# Appendices

## Appendix A. International trade condition

International trade takes place when

$$\begin{aligned} a &< \theta_h^* = \frac{a+b}{3} - \frac{t}{3(u_g - u_d)} - \frac{2(\gamma_h u_g - u_d)}{3(u_g - u_d)} < b \\ a &< \theta_l^* = \frac{a+b}{3} + \frac{t}{3(u_g - u_d)} + \frac{2(\gamma_l u_d - u_g)}{3(u_g - u_d)} < b \end{aligned}$$

Denote $t'' \equiv (b-2a)(u_g - u_d) - 2(u_g\gamma_h - u_d)$ and $\bar{t} \equiv (u_g - u_d)(2b-a) - 2(\gamma_l u_d - u_g)$. Then, trade takes place when $t \in t'' < t < \bar{t}$. Recall that the trade condition in absence of home bias is $t < t' \equiv (b-2a)(u_g - u_d))$. Then it is easy to rank these thresholds as follows: $t'' < t' < \bar{t}$. It follows that the feasible set for bilateral trade in presence of home bias is:

$$t'' < t < t'$$

## Appendix B. Profits in presence of home bias

Profit of both firms in absence of home bias are:

$$\begin{aligned} \Pi_g^* &= \frac{2}{9}\frac{t^2}{u_g - u_d} + \frac{2}{9}((2b-a)^2(u_g - u_d)) \text{ and} \\ \Pi_d^* &= \frac{2}{9}\frac{t^2}{u_g - u_d} + \frac{2}{9}((b-2a)^2(u_g - u_d), \end{aligned}$$

while in presence of home bias, each firms obtain $\hat{\Pi}_g^*$ and $\hat{\Pi}_d^*$ :

$$\begin{aligned} \hat{\Pi}_g^* &= \frac{2}{9}(2b-a)^2(u_g - u_d) + \frac{4}{9}(2b-a)(u_g - u_d + u_g\gamma_h - u_d\gamma_l) + \Gamma \\ \hat{\Pi}_d^* &= \frac{2}{9}(b-2a)^2(u_g - u_d) + \frac{4}{9}(b-2a)(u_d - u_g - u_g\gamma_h + u_d\gamma_l) + \Gamma \end{aligned}$$

where $\Gamma = \frac{2\left(2t((u_g\gamma_h - u_g)+(u_d\gamma_l - u_d))+t^2+2(u_d\gamma_l - u_g)^2+2(u_g\gamma_h - u_d)^2\right)}{9(u_g - u_d)}$. The difference of equilibrium in presence and in absence of home bias is:

$$\begin{aligned} \hat{\Pi}_g^* - \Pi_g^* &= \frac{4}{9}(2b-a)(u_d - u_g - u_g\gamma_h + u_d\gamma_l) + \tau \gtreqless 0 \Leftrightarrow t \gtreqless \hat{t} \\ \hat{\Pi}_d^* - \Pi_d^* &= \frac{4}{9}(b-2a)(u_d - u_g - u_g\gamma_h + u_d\gamma_l) + \tau \gtreqless 0 \Leftrightarrow t \gtreqless \tilde{t} \end{aligned}$$

where $\tau = \frac{4\left((u_g\gamma_h - u_d)^2+(u_d\gamma_l - u_g)^2+t(u_g\gamma_h - u_g - u_d + u_d\gamma_l)\right)}{9(u_g - u_d)}$ and

$$\begin{aligned} \hat{t} &= \frac{(u_g - u_d)(2b-a)(u_d\gamma_l - u_g\gamma_h + u_d + u_g) - (u_g\gamma_h - u_d)^2 - (u_d\gamma_l - u_g)^2}{(u_g\gamma_h - u_g - u_d + u_d\gamma_l)} \\ \tilde{t} &= \frac{(b-2a)(u_g - u_d)(u_g\gamma_h - u_d + u_g - u_d\gamma_l) - (u_g\gamma_h - u_d)^2 - (u_d\gamma_l - u_g)^2}{(u_g\gamma_h - u_g - u_d + u_d\gamma_l)}, \end{aligned}$$

with $\hat{t} > \tilde{t}$.

## Appendix C. Total environmental damage of home bias

Denote $\hat{\gamma}_h = \gamma_h u_g - u_d); \hat{\gamma}_l = \gamma_l u_d - u_g), \Delta\beta = \beta_d - \beta_g$. Recall that the difference of emissions in production and transportation for each good write as:

$$
\begin{aligned}
\hat{E}_g - E_g^* &= \frac{2}{3}\frac{(\hat{\gamma}_h - \hat{\gamma}_l)\,\mu_p - \hat{\gamma}_l \mu_t}{(u_g - u_d)} \\
\hat{E}_d^* - E_d^* &= 2\frac{\hat{\gamma}_l - 2\hat{\gamma}_h}{3\,(u_g - u_d)}
\end{aligned}
$$

The damage from consumption for each good is

$$
\begin{aligned}
\hat{E}_{g,c} - E_{g,c} &= \beta_g \frac{2\,(\hat{\gamma}_h - \hat{\gamma}_l)}{3\,(u_g - u_d)} \\
\hat{E}_{d,c} - E_{d,c} &= \beta_d x_d^* - \beta_d \frac{2\,(\hat{\gamma}_h - \hat{\gamma}_l)}{3\,(u_g - u_d)} - \beta_d x_d^* = -\beta_d \frac{2\,(\hat{\gamma}_h - \hat{\gamma}_l)}{3\,(u_g - u_d)}
\end{aligned}
$$

Then

$$
\begin{aligned}
\hat{E}_{g,c} - E_{g,c} + \hat{E}_{d,c} - E_{d,c} &= \beta_g \frac{2\,(\hat{\gamma}_h - \hat{\gamma}_l)}{3\,(u_g - u_d)} - \beta_d \frac{2\,(\hat{\gamma}_h - \hat{\gamma}_l)}{3\,(u_g - u_d)} \\
&= -\Delta\beta \frac{2\,(\hat{\gamma}_h - \hat{\gamma}_l)}{3\,(u_g - u_d)}
\end{aligned}
$$

It follows that the total damage writes as

$$
\begin{aligned}
\hat{E}^* - E^* &= \frac{2}{3}\frac{(\hat{\gamma}_h - \hat{\gamma}_l)\,\mu_p - \hat{\gamma}_l \mu_t}{(u_g - u_d)} + 2\frac{\hat{\gamma}_l - 2\hat{\gamma}_h}{3\,(u_g - u_d)} - \Delta\beta \frac{2\,(\hat{\gamma}_h - \hat{\gamma}_l)}{3\,(u_g - u_d)} \\
&= \frac{2}{3}\frac{\left(\left(\mu_p - \Delta\beta - 2\right)\hat{\gamma}_h + \left(1 + \Delta\beta - \left(\mu_t + \mu_p\right)\right)\hat{\gamma}_l\right)}{(u_g - u_d)}
\end{aligned}
$$

where we find that when $\mu_p - \Delta\beta - 2 > 0 \Leftrightarrow \mu_p > 2 + \Delta\beta$, then $\hat{E} - E^* \gtreqless 0$ iff $\hat{\gamma}_h \gtreqless \vec{\gamma} \equiv \frac{(\mu_t + \mu_p) - 1 - \Delta\beta}{\mu_p - \Delta\beta - 2}\hat{\gamma}_l$ . Otherwise, when $\mu_p < 1 + \Delta\beta - \mu_t$, then $\hat{E} - E^* \gtreqless 0$ iff $\hat{\gamma}_h \lesseqgtr \vec{\gamma}_h$. Finally, if $1 + \Delta\beta - \mu_t < \mu_p < 2 + \Delta\beta$, then $\hat{E}^* - E^* < 0$ for any $\hat{\gamma}_h$.