

# Discussion on Product Variety, Firm Entry, and Terms of Trade Dynamics by Michiru Sakane

Hyeok Jeong

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# This Paper

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- Empirical Target: Terms of trade appreciates as domestic productivity increases.
- Key Equation to Explain

$$TOT_t \equiv \frac{\bar{p}_{Xt}^*}{\bar{p}_{Xt}} = \left( \frac{\frac{\tau_t^* W_t^*}{Z_t^*}}{\frac{\tau_t W_t}{Z_t}} \right) \left( \frac{z_{Xt}}{z_{Xt}^*} \right)$$

- **Income effect:**  $Z_t \uparrow \implies$  stronger domestic demand  $\implies z_{Xt}^* \downarrow \implies TOT_t \uparrow$  (depreciation).
- **Markup effect:**  $Z_t \uparrow \implies$  domestic marginal cost  $W_t/Z_t \downarrow \implies z_{Dt} \downarrow \implies$  domestic markup  $\mu_{Dt}(z) \downarrow \implies$  added competition on foreign firms, hence  $z_{Xt}^* \uparrow \implies TOT_t \downarrow$  (appreciation).
- Relative importance between the two effects depend on **asset market structure**.

# Other Components in the Formula

- RBC effects
  - Direct effect:  $Z_t \uparrow$ .
  - Domestic wage effect:  $Z_t \uparrow \implies MPL_t \uparrow \implies W_t \uparrow$ .
  - Unless the labor supply is perfectly inelastic,  $\frac{W_t}{Z_t} \downarrow \implies TOT_t \uparrow$  (depreciation)
- Domestic export margin effect:  $\frac{W_t}{Z_t} \downarrow \implies z_{Xt} \downarrow \implies TOT_t \downarrow$  (appreciation)
- Second-round effects on foreign wage through changes in  $z_{Xt}^*$ : income effect would raise  $W_t^*$  while markup effect would lower  $W_t^*$ , hence uncertain on  $TOT_t$ .
- International co-movement of productivity:  $Corr(Z_t, Z_t^*) > 0$  (see equation (49))  $\implies Z_t \uparrow \implies Z_t^* \uparrow \implies$  directions of the above effects will be reversed.
- Relative trade cost  $\frac{\tau_t^*}{\tau_t}$  was indeed constant during the sample period?
- What we observe in the data will reflect the sum of the all above effects.

$$TOT_t = \left[ \frac{\tau_t^*}{\tau_t} \right] \left[ \frac{W_t^*(Z_t) / Z_t^*(Z_t)}{W_t(Z_t)} Z_t \right] \left[ \frac{z_{Xt}(Z_t)}{z_{Xt}^*(Z_t)} \right]$$

# Nature of Exercise of This paper

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- Fix  $\frac{\tau_t^*}{\tau_t}$ .
- Fix  $Z_t^*$  shutting down the cross-country productivity co-movement channels.
- Then, three competing forces are:
  - RBC effects: Depreciation.
  - Extensive margin effects on domestic exporting: Appreciation
  - Extensive margin effects on foreign exporting: Uncertain, not only because of the income vs. markup effects, but also because of the second-round foreign wage effect.
- Asset market structure affects the relative size of income and markup effects: financial autarky maximizes income effect while complete market minimizes income effect.
- However, regardless of the asset market structure, there is **no definite prediction** on the direction of overall effects on  $TOT_t$ , even after controlling for  $\frac{\tau_t^*}{\tau_t}$  and  $Z_t^*$ .

## (continued) Nature of Exercise of This paper

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- In other words, this is a **quantitative exercise**, hence the **choice of parameters is the key**, rather than the asset market structure assumption itself (although this matters).
- Furthermore, these implications of asset market structure on terms of trade are already well-known. For example, asset market structure also matters in typical RBC models and in the same way as in this paper.
- Thus, the paper would better emphasize opening a new channel via the extensive margin effects, not the asset market structure.

# Key Assumptions Behind the Formula

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- Pareto distribution of idiosyncratic productivity (not much to say, although it will be better to check the specification test using firm level data).
- Quadratic preferences, inducing **linear demand for variety**.

$$\begin{aligned} & \frac{\overline{p}_{Xt}^*}{\overline{p}_{Xt}} \\ &= \frac{\frac{2\theta+1}{2\theta+2} \frac{\tau_t^* W_t^*}{Z_t^* z_{Xt}^*}}{\frac{2\theta+1}{2\theta+2} \frac{\tau_t W_t}{Z_t z_{Xt}}} \\ &= \left( \frac{\frac{\tau_t^* W_t^*}{Z_t^*}}{\frac{\tau_t W_t}{Z_t}} \right) \left( \frac{z_{Xt}}{z_{Xt}^*} \right) \end{aligned}$$

# Implications of CES Preferences

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- $$C_t = \left[ \int_{i \in \Omega} q_t(i)^{\frac{\varphi-1}{\varphi}} di \right]^{\frac{\varphi}{\varphi-1}}$$

- $$q_t(i) = \left[ \frac{p_t(i)}{\lambda_t} \right]^{-\varphi} Q_t$$

$$\lambda_t = P_t = \left[ \int_{i \in \Omega} p_t(i)^{1-\varphi} di \right]^{\frac{1}{1-\varphi}}$$

- $$\frac{dq_t(i)}{dQ_t} \frac{Q_t}{q_t(i)} > 0$$

# Implications of Quadratic Preferences

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- $$C_t = \omega \int_{i \in \Omega} q_t(i) di - \frac{1}{2} \gamma \int_{i \in \Omega} q_t(i)^2 di - \frac{1}{2} \eta \left[ \int_{i \in \Omega} q_t(i) di \right]^2$$

- $$q_t(i) = \frac{1}{\gamma} \left[ \omega - \frac{p_t(i)}{\lambda_t} - \eta Q_t \right]$$

$$\lambda_t = \frac{\bar{p}_t}{\omega - \bar{q}_t (\gamma + \eta N_t)}$$

- $$\frac{dq_t(i)}{dQ_t} \frac{Q_t}{q_t(i)} = -\frac{1}{\gamma} \left( \frac{p_t(i)}{\bar{p}_t} \left( \frac{\gamma}{N_t} + \eta \right) - \eta \right) \frac{Q_t}{q_t(i)} < 0 \text{ if } \frac{\eta N_t \bar{p}_t}{\gamma + \eta N_t} < p_t(i)$$

- Does this income elasticity implication have plausible empirical foundation?
- Why not using CES aggregate? The extensive margin implications remain the same with the CES specification.



# Problems in Entry Specification

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- No fixed cost of export, hence every firm exports? Why separate between domestic firms and exporting firms?
- New firms also produce. Then, equilibrium prices and the mass of new firms from equation (33) should be **simultaneously** determined. How do you handle this problem? What happens to your IR functions if the new entrants start to produce next period?
- What is the meaning of the number of the "possibly producing" firms  $N_{p,t}$ ? The numbers of domestic and exporting firms  $N_{D,t}$  and  $N_{X,t}$  should be defined on "actually producing" firms. Related, the death shock hits the "actually producing" firms (not the possibly producing firms) after they produce. In sum, equations (36) to (38) seem unclear.
- In the household budget constraint in page 15, the term  $N_{p,t-1} (1 - \delta) (\pi_t + v_t)$  appears in the income side. Using equation (38), this means  $(N_{pt} - N_{E,t}) (1 - \delta) (\pi_t + v_t)$ , i.e., no dividend and sales value for the new entrants, which is inconsistent with equation (33), which states that new entrants also produce.

# Explain the Data in Figure 1

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- Positive productivity shock hits and persists until 20 quarters (5 years).
- Why does the terms of trade depreciates after 9th quarters?
- Why does the net exports continue to decrease even after depreciation?
- Why do the relative output and consumption decrease in the end?
- Clear explanation on these issues seems important.

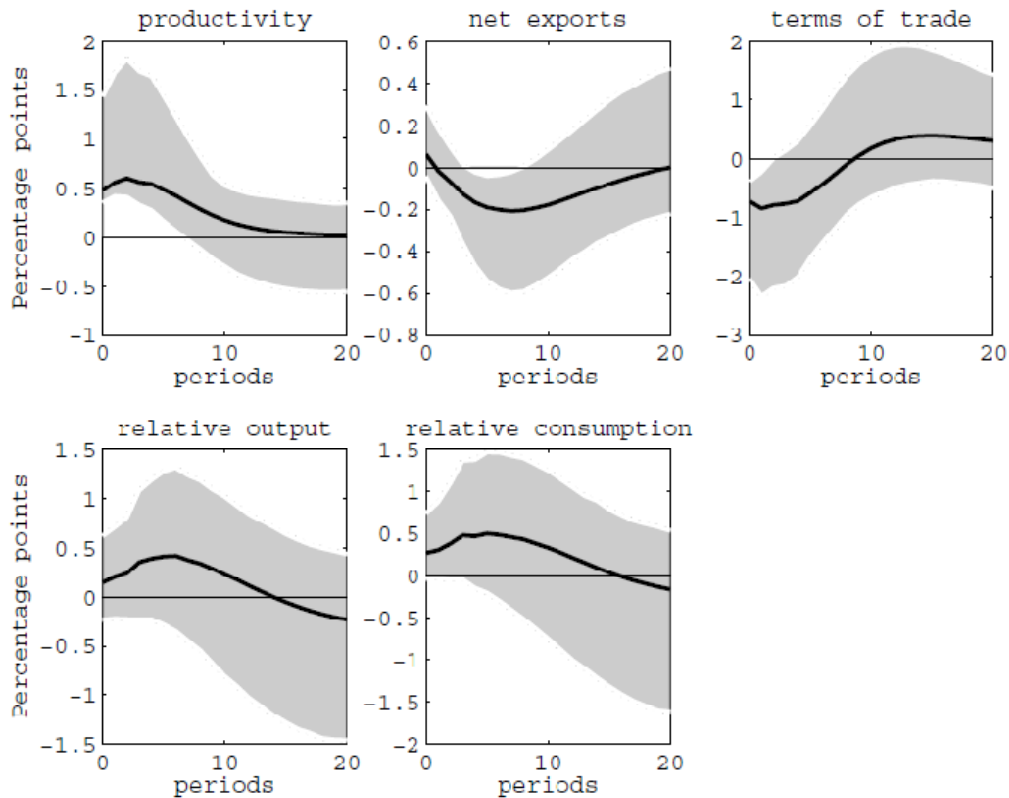


FIGURE 1: EFFECTS OF A POSITIVE US TECHNOLOGY SHOCK

# Calibration

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- The bivariate AR(1) parameters from Backus, Kehoe and Kydland (1992) fit the 1970Q1-1986Q4 period. Your sample period is 1973Q1-2010Q2. You'd better re-estimate them.
- $f_E = 0.1$  meaning? in consumption unit?
- $\kappa$  is set to steady state hours  $H = 0.2$ . What is such value of  $\kappa$ ? Report. Isn't  $H = 0.2$  too low?
- Sensitivity analysis?
- How to control the other mechanisms favoring appreciation?
  - Home bias.
  - Inelastic labor supply.

# Simulated Impulse Responses

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- Figure 1 (financial autarky): Simulated terms of trade depreciates throughout. However, main force of such depreciation is the relative cutoff. Relative cost effect in fact "appreciates" the TOT. It seems RBC models can generate appreciation with proper choice of parameters.
- Figures 2 and 3 (incomplete or complete asset markets): Relative cutoff begins to play the role of appreciating factor and the relative cost the role of depreciating factor.
- Comparing between incomplete and complete asset market cases, appreciation becomes stronger via the relative cutoff. Which is more important, the domestic export margin effect  $z_{Xt}$  or the foreign export margin  $z_{Xt}^*$ ? Too much emphasis on the changing trade-off between income and markup effects through  $z_{Xt}^*$  in Section 5 can be misleading.
- What happens to other real variables, in particular the exports and imports?

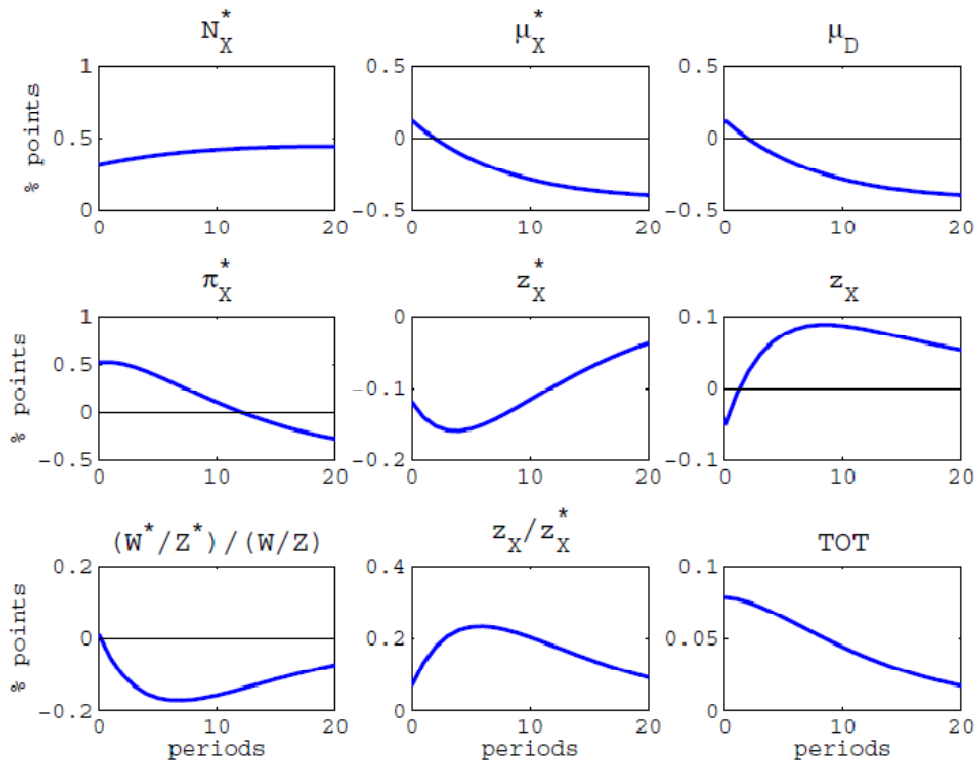


FIGURE 2: EFFECT OF HOME POSITIVE AGGREGATE PRODUCTIVITY SHOCK (1 PERCENT INCREASE) IN A MODEL WITH FINANCIAL AUTARKY

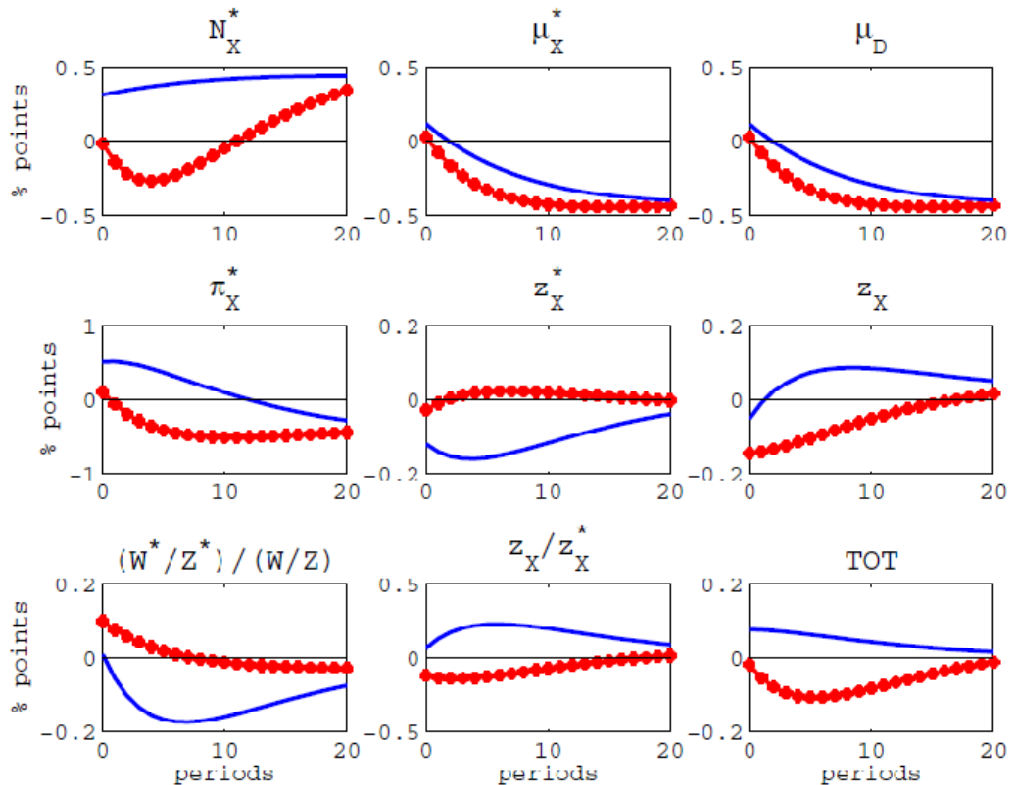


FIGURE 3: EFFECT OF HOME POSITIVE TFP SHOCK (1 PERCENT INCREASE) IN A MODEL WITH INCOMPLETE ASSET MARKET. (BLUE LINES: UNDER FINANCIAL AUTARKY, RED LINES: UNDER AN INCOMPLETE ASSET MARKET)

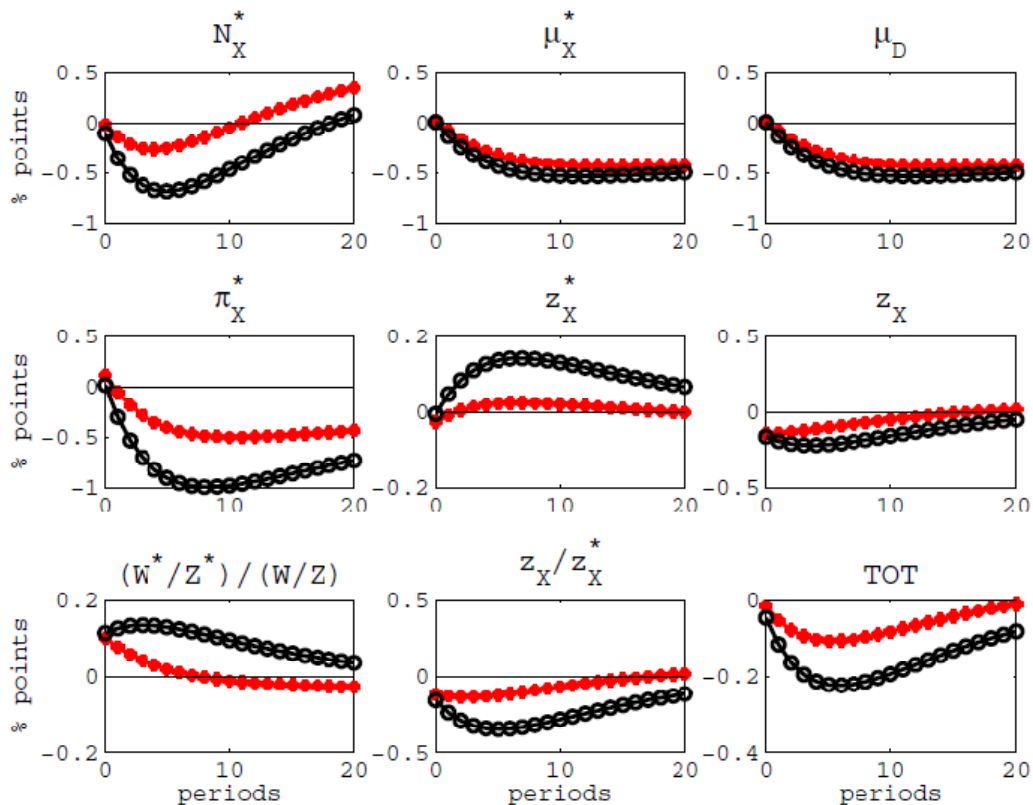


FIGURE 4: EFFECT OF HOME POSITIVE TFP SHOCK IN A MODEL WITH COMPLETE MARKET. (RED LINES: UNDER AN INCOMPLETE ASSET MARKET, BLACK LINES: UNDER A COMPLETE MARKET)



# Comparison between Model and Data in Section 7

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- Feeding the empirical response  $Z$  into the model with complete market to produce simulated responses from the model. And then, compare them with the data responses, assuming incomplete asset market? Why are different asset market structures assumed in this comparison?
- Parameters are re-estimated and then simulated responses of terms of trade are compared to the data impulse responses on average. But the estimates here are very different from the calibrated values. Then, what's the meaning of impulse responses in Figures 2-4? They need to be tied up to this section.

Parameters	Calibration (Sections 4 & 6)	Estimation (Section 7)
$\theta$	3.4	21.08
$\eta$	1	0.003
$\gamma$	0.5	0.11
$\omega$	10	1.65

- For more valid evaluation of the model, it is advised to select the parameters using other implications of the model than impulse responses, which is the target to match.

## Other Details

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- typo in line 9 in page 12:

$$\frac{1}{1 - G(z)} \implies \frac{1}{1 - G(z_{jt})}$$

- In section 3.7.2, bond sharing will be equalized between countries, i.e.,  $B_{t+1} = B_{*,t+1}$  and  $B_{t+1}^* = B_{*,t+1}^*$ , implying uncovered interest parity, which implicitly imposes too smooth movement of real exchange rate.
- Where is Table 7 referred in page 23?