Exchange Rates and Monetary Policy with Heterogeneous Agents: Sizing up the Real Income Channel

by

Auclert, Rognlie, Souchier and Straub

Discussion by Sushant Acharya

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The views expressed herein are those of the author and not necessarily those of the Bank of Canada

question

how do changes in exchange rates affect aggregate demand?

this paper argues:

- ☐ devaluations generally expansionary in RANK
- ☐ but can be contractionary in HANK via real income channel

what is the "**real income**" channel?

$$\max_{c_H, c_F} \left[(1-\alpha)^{\frac{1}{\eta}} (c_H)^{\frac{\eta-1}{\eta}} + \alpha^{\frac{1}{\eta}} (c_F)^{\frac{\eta-1}{\eta}} \right]^{\frac{\eta}{\eta-1}} \qquad \text{s.t} \qquad p c_H + c_F = p\omega$$

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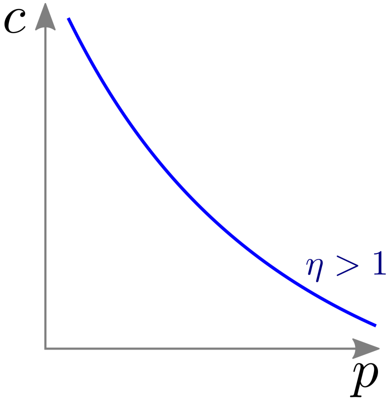
- ☐ ... but slope of **Walrasian** demand depends on η relative to 1

$$-\frac{d \ln c_H}{d \ln p} = \underbrace{\frac{(1-\alpha)\, p + \alpha p^{\eta} \eta}{(1-\alpha)\, p + \alpha p^{\eta}}}_{\text{substitution due to } p \downarrow} - \overbrace{1}^{\text{income effect due to } p \downarrow}$$

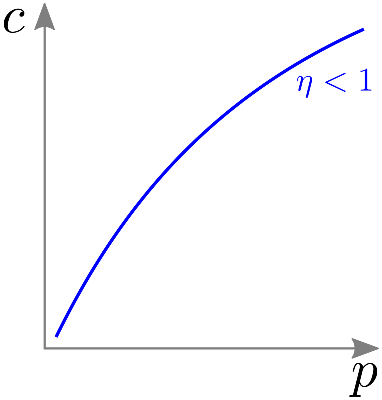
real income channel



$\eta > 1$: substitution dominates income effect

decrease in price **increases** demand

real income channel



$\eta < 1$: **income effect overwhelms substitution**

decrease in price **decreases** demand

Need small η for real income channel to have bite

why is this effect small in RANK SOE models?

- infinite horizon **permanent income hypothesis** consumers
  - current consumption depends on **lifetime income**, NOT **current income**

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- if instead **borrowing constrained** (htm) $\qquad dc_t = dy_t = -1\%$

a bare bones heterogeneous agent SOE

- ☐ fixed PPI $\pi_{H,t} = \pi^*_{F,t} = 0$ but not CPI

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- Demand for Home goods

$$\hat{y}_t = (1-\alpha)\left[(1-\theta)\hat{c}_t^{\textsf{pih}} + \theta \hat{c}_t^{\textsf{htm}}\right] + \underbrace{\frac{\alpha}{1-\alpha}\chi \hat{q}_t}_{\text{substitution}}$$

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- aggregate euler equation

$$\Delta\hat{c}_{t+1} = (1-\theta)\underbrace{\gamma\left(\hat{i}_t - \frac{\alpha}{1-\alpha}\Delta\hat{q}_{t+1}\right)}_{\text{consumption growth of pih}} + \theta\underbrace{\left(\overbrace{-\frac{\alpha}{1-\alpha}\Delta\hat{q}_{t+1}}^{\text{real-income channel}} + \Delta\hat{y}_{t+1}\right)}_{\text{consumption growth of htm}}$$

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- **uip**

$$i_t = i^*_t + \frac{1}{1-\alpha}\Delta q_{t+1}$$

effect of Foreign interest rates on Home output

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- care about dy/dQ, but Q is endogenous
- depend on how domestic monetary policy responds to $\hat{i}_t^* \uparrow$ shock:

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  - $\hat{i}_t = 0$: monetary policy lets ex-rate depreciate $\Delta \hat{q}_{t+1} = -(1-\alpha)\hat{i}_t^*$
  - Auclert et al: **real rate unchanged**:

$$\hat{r}_t = 0 \qquad \Rightarrow \qquad \hat{i}_t = -\frac{\alpha}{1-\alpha}\hat{i}_t^*$$

effect of exchange rates on Home output

- RANK with $\hat{i}_t = 0$:

$$\Delta \hat{y}_{t+1} = \Big(\underbrace{\alpha\gamma}_{\text{intertemporal substitution}} - \underbrace{\frac{\alpha\chi}{1-\alpha}}_{\text{expenditure switching}} \Big) \hat{i}^*_t$$

  - **contractionary depreciation in RANK:** $\hat{y}_t < 0$ and $\hat{q}_t > 0$ if $\gamma > \frac{\chi}{1-\alpha}$

effect of exchange rates on Home output

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- RANK with $\widehat{r}_t = 0$

$$\Delta \hat{y}_{t+1} = -\frac{\alpha\chi}{1-\alpha}\hat{i}_t^*$$

no contractionary depreciation: $\hat{y}_t > 0$ and $\hat{q}_t > 0$

effect of exchange rates on Home output

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$$\Delta \hat{y}_{t+1} = \left(\alpha\gamma - \frac{\alpha\chi}{1-\alpha}\right)\hat{i}_t^*$$

- HANK $(\theta > 0)$ with $\hat{i}_t = 0$

$$\Delta \hat{y}_{t+1} = \underbrace{\frac{1}{1-\theta(1-\alpha)}}_{\text{Keynesian multiplier}} \times \left(\underbrace{\alpha\theta}_{\text{real income}} + \underbrace{(1-\theta)\,\alpha\gamma}_{\text{intertemporal substitution}} - \underbrace{\frac{\alpha\chi}{1-\alpha}}_{\text{expenditure switching}} \right)\hat{i}_t^*$$

effect of exchange rates on Home output

- ☐ RANK with $\hat{i}_t = 0$:

$$\Delta \hat{y}_{t+1} = \left(\alpha - \frac{\alpha\chi}{1-\alpha}\right)\hat{i}^*_t$$

- ☐ HANK $(\theta > 0)$ with $\hat{i}_t = 0$ **with** $\gamma = 1$

$$\Delta \hat{y}_{t+1} = \underbrace{\frac{1}{1-\theta(1-\alpha)}}_{\text{Keynesian multiplier}} \times \left(\alpha - \frac{\alpha\chi}{1-\alpha}\right)\hat{i}^*_t$$

contractionary depreciation in HANK only when it is also in RANK

overall...

- ☐ thought provoking paper!
- ☐ however, both HANK and RANK can feature contractionary depreciation
- ☐ ... but not when monetary policy tries to keep $\widehat{r}_t = 0$, need small χ
- ☐ important to provide empirical support for small χ

END