Pigou Cycles in Closed and Open Economies with Matching Frictions

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Just suppose that ...

... consumers and firms become more optimistic about the future

What would be the short-term effect on

- consumption
- employment
- investment
- output
Answer:

Theory?
- Many economists’ priors:
  - a business cycle boom (increase in employment, output, consumption, and investment)
  - i.e., a Pigou cycle
- Many theoretical models: a recession

Empirical evidence?
- Tough to answer because of identification issues
Typical effect of a positive news shock

- Wealth effect $\rightarrow$ labour supply $\downarrow$
- Wealth effect $\rightarrow$ consumption $\uparrow$
- Labour supply $\downarrow$ & consumption $\uparrow$ $\rightarrow$ investment $\downarrow$
Does openness matter?

- Wealth effect would be bigger in open economy
  - $\implies$ Larger reduction in labour supply and savings?

- Ability to import $\implies$ resources can ↑ even when employment ↓
Effect of openness in a standard RBC

- Suppose productivity is known to increase in 1 year

- What happens during the *anticipation phase*?
  - i.e., before productivity ↑ is realized
Capital
Investment
With endogenous labour supply
Reinterpret what "posting a vacancy" means
  - Posting a vacancy = invest in a project
  - Finding a worker = successful project & finding a worker
Two sectors (consumption and investment)
  - Firms & workers can search in either sector
Allow for international trade
Matching model

Labour market

Household members beginning of period $t$

Labor market and production

Household members end of period $t$

- Out of the labor force
- Searching/unemployed
- Employed in C-sector
- Employed in I-sector

Vacancies

C-sector matching

I-sector matching

Not employed

Employed in C-sector

Employed in I-sector

Product in C-sector

Product in I-sector
Open economy

- International trade in
  - Consumption commodity
  - Investment commodity
  - One-period bond

- Prices determined by world prices *and* international trade
  - e.g., domestic price ↑ if import ↑
  - price sensitivity to trade calibrated to match US trade balance volatility
### Rest-of-the-world prices

<table>
<thead>
<tr>
<th>$p_{cons}$</th>
<th>$p_{inv}$</th>
<th>$r_{world}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>$\frac{1}{\beta} - 1$</td>
</tr>
</tbody>
</table>

### Domestic prices

<table>
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<tr>
<th>$p_{cons}$</th>
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</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

$r \uparrow$ if abount borrowed $\uparrow$
### International trade and domestic price changes II

<table>
<thead>
<tr>
<th>Rest-of-the-world prices</th>
<th>Domestic prices</th>
</tr>
</thead>
<tbody>
<tr>
<td>$p_{\text{cons}} = 1$</td>
<td>$p_{\text{cons}} \uparrow$ if import of cons. goods $\uparrow$</td>
</tr>
<tr>
<td>$p_{\text{inv}} = 1$</td>
<td>$p_{\text{inv}} \uparrow$ if import of inv. goods $\uparrow$</td>
</tr>
<tr>
<td>$r_{\text{world}} = \frac{1}{\beta} - 1$</td>
<td>$\Delta r \approx 0$ if abount borrowed $\uparrow$</td>
</tr>
</tbody>
</table>
Three economies

1. Closed economy

2. Small open economy with fixed prices & flexible interest rate

3. Small open economy with (almost) fixed interest rate & flexible prices
First key Euler equation

\[ p_{i,t} \psi_c = \pi_j,t \ V_{j,t} \]

\[ V_{j,t} = \beta E_t \left[ \frac{\tilde{\lambda}_{t+1}}{\tilde{\lambda}_t} \left( (1 - \alpha) p_{j,t+1} z_{t+1} k_{j,t+1}^\alpha n_{j,t+1}^{-\alpha} - w_{j,t+1} + (1 - \rho x) V_{j,t+1} \right) \right] \]

\[ j \in \{c, i\} \]

- \( \pi_{j,t} \): probability that a firm finds a worker in sector \( j \)
- \( V_{j,t} \): value of an extra worker in sector \( j \)
Second key Euler equation

\[ \phi \tilde{l}_t^{-\kappa} = \tilde{\pi}_{j,t} \tilde{W}_{j,t} \]

\[ \tilde{W}_{j,t} = \beta \left( \frac{w_{j,t+1}}{\rho_{c,t+1}} \tilde{c}_{t+1}^{-\gamma} - \phi \tilde{l}_{t+1}^{-\kappa} + (1 - \rho_x) \tilde{W}_{j,t+1} \right) \]

\[ j \in \{c, i\}. \]

- \( \phi \tilde{l}_t^{-\kappa} \): cost of searching
- \( \tilde{\pi}_{j,t} \): probability that a worker finds a firm in sector \( j \)
- \( \tilde{W}_{j,t} \): value of being employed
Both equations are forward looking:

- news shock $\implies$ vacancies ↑
- news shock $\implies$ wealth effect $\implies$ labour supply ↓
- news shock $\implies$ benefit of being matched $\uparrow$ now $\implies$ something to offset income effect
- news shock $\implies$ employment $\uparrow$ and output $\uparrow$
Key question

How does openness affect the impact of news shocks?
Results in a closed-economy version

- Positive news shock $\rightarrow$
  - Employment and output $\uparrow$
  - Consumption + investment $\uparrow$
  - Typically either consumption or investment $\downarrow$

- So a Pigou cycle as a not quite robust outcome

This is shown in Den Haan and Kaltenbrunner (2009).
Results in one open-economy version

- Positive news shock \implies
  - Employment and output $\uparrow$
  - Consumption + investment $\uparrow$
  - **Both** consumption and investment $\uparrow$
Openness & employment/output responses?

- Positive news shock
- *Real* rate still ↑ in a country with "sticky" $r$, but it changes by less.
- If $r$ ↑ by less $\implies$ value of a match increases by more $\implies$
  - vacancies increase by more,
  - labour supply decreases by less
Firm value

Results

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Investment in new projects

- Results

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Labor force participation

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Pigou Cycles

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Employment

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All three models predict a boom in

- Employment
- Output
- Investment in new projects

Largest responses in an open economy with sticky $r$
Consumption and Investment responses

Closed economy: typically $C + I \uparrow$, but $I$ in regular capital $\downarrow$

Why?

- Closed economy: $C + I$ just doesn’t go up enough
- Open economy: $C + I$ could go up by more because of imports
  - Are the incentives there,
  - i.e., does return on investment $\uparrow$?
Expected value of investing depends on

- Prices
- Marginal rate of substitution
- Employment decision

What drives differences in returns across 3 economies?

- Employment levels
Employment responses in a closed economy

- Inefficient time paths
Employment responses in a closed economy
Employment responses in open economies

Flexible $r$ open economy:

- To match trade balance volatility: $r$ is roughly as volatile as in the closed economy
  $\implies$ similar employment responses

Sticky $r$ open economy

- Smaller interest rate increase
  $\implies$ larger increase in discounted values
  $\implies$ higher employment responses
  $\implies$ more attractive for investors to increase capital
Employment responses in a sticky $r$ open economy

- **Employment consumption sector**
  - Trend line showing a gradual increase.

- **Employment investment sector**
  - Trend line showing a gradual decrease.

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Pigou Cycles

July 2010
Summary of main findings

- Easy to get Pigou cycles for employment and output
- Larger wealth effect in open economy can be overcome by other factors
  - Lower increase in $r$
- Full Pigou cycles possible in all three economies
  - Not robust in closed economies
  - Not robust in flexible $r$ open economy
  - **Robust in sticky $r$ open economy**