Managing an Energy Shock with Heterogeneous Agents: Fiscal and Monetary Policy

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Bank of Canada, November 2022
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Energy prices and aggregate demand

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• Existing models to answer these are representative Agent (RA) NK-SOE:
  [Clarida-Gali-Gertler 02, Gali-Monacelli 05, Schmitt-Grohe-Uribe 17, Bodenstein et al 2011 ...]

• shock leads to expenditure switching, raising demand
• magnitude governed by the elasticity of substitution $\chi$
• weak or no real income effects
• little trade-off for monetary policy: raise rates to limit boom & inflation
Heterogeneous agents provide a new perspective

Today: Revisit by embedding **Heterogeneous Agents (HA)** in NK-SOE model

[Part of fast growing literature: De Ferra-Mitman-Romei, Zhou, Guo-Ottonello-Perez, Oskolkov, Auclert-Rognlie-Souchier-Straub, Pieroni ... ]

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  $\rightarrow$ “stagflationary shock”: recession, imported inflation, wage-price spiral
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- **fiscal policy**: powerful in isolation ...
  $\rightarrow$ but may have huge **negative externalities**!
Roadmap

1. The model in 1 slide
2. The energy shock
3. Managing the energy shock: Monetary policy
4. Managing the energy shock: Fiscal policy
The model in 1 slide
Start with Gali-Monacelli model of a small open economy (SOE). Three changes:

1. Introduce one additional good: energy $E$.
2. Large ROW is endowed with $E$, SOE is part of a continuum of $E$ importers.
3. SOE households consume $E$, elasticity of substitution $\chi$. $E$ not used in production.
4. Energy trades at world price $P^*E_t$ — this is what we shock.
5. Households face borrowing constraint and idiosyncratic income risk.
6. Generates high (intertemporal) marginal propensities to consume (MPCs).
7. Wage rigidity with indexation to past CPI inflation (Blanchard-Gali). Slow pass through of $P^*E_t$ into domestic $E$ prices.
Start with Gali-Monacelli model of a small open economy (SOE). Three changes:

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- Energy trades at world price $P_{Et}^*$ — this is what we shock
Model overview: Gali-Monacelli + Energy + HANK

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# 2: Households face borrowing constraint + idiosyncratic income risk
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Start with Gali-Monacelli model of a small open economy (SOE). Three changes:

# 1: Introduce one additional good: **energy** \( E \)
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# 2: Households face **borrowing constraint + idiosyncratic income risk**
   - Generates high (intertemporal) **marginal propensities to consume** (MPCs)

# 3: Wage rigidity with indexation to past CPI inflation (Blanchard-Gali)
   - [ + slow pass through of \( P^*_{Et} \) into domestic \( E \) prices]
The energy shock
Feeding in the shock

• Preliminary calibration to a European country

• AR(1) shock to $P^*_t$

• Simulate:
  • Representative agent (RA)
  • Heterogeneous agents (HA)

• Monetary policy: raises nominal rate to stabilize real rate (for now)
• **RA: boom** due to expenditure switching!

• If energy was used in production: same hours + consumption. Only $Y$ lower.
HA: Output and consumption

- **HA**: Higher MPCs ⇒ negative income effect; any movement in $Y$ is amplified.
- $\chi = 1$: those forces offset each other $\text{HA} = \text{RA}$! Lower $\chi$ ⇒ bust.

![Graph showing output and consumption over time with different values of $\chi$.]
HA: Predictions for inflation

- Blanchard-Gali Phillips curve generates wage-price spiral ... 

\[ \pi_{wt} = \eta \pi_{t-1} + \kappa_w \left( \frac{v'(N_t)}{u'(C_t)\mu_w W_t/P_t} - 1 \right) + \beta (\pi_{wt+1} - \eta \pi_t) \]
Managing the energy shock: Monetary policy
Monetary policy: three scenarios

- Three scenarios for monetary policy

![Graph showing nominal interest rate and (Ex ante) real interest rate over quarters.](image-url)
• Tight monetary policy causes deeper recession (as expected)
• Tight monetary policy not that effective against imported inflation.
Monetary policy: Coordination

- **Positive spillovers**: Brings down $P_E^*$ for everyone else.
Monetary policy: Coordination

- **Positive spillovers**: Brings down $P_E^*$ for everyone else.
- Coordination problem. If continuum of SOE’s consume $E$ and all hike:

![Graphs showing domestic energy prices, output, and CPI inflation over time.](image-url)
Managing the energy shock: Fiscal policy
• Next: fiscal policy

• Compare:
  • price subsidy
  • targeted transfers (based on previous $E$ consumptions)
  • untargeted transfers

• All initially deficit financed
Fiscal policy (uncoordinated): output and consumption

- All three policies effectively mitigate output loss...
Fiscal policy (uncoordinated): inflation

- Transfer programs do not raise inflation by much...
Fiscal policy (uncoordinated): inflation

- Transfer programs do not raise inflation by much...
- ... but subsidy seems like a silver bullet?
Fiscal policy (uncoordinated): inequality

- All programs seem to reduce inequality (var of log consumption)
Fiscal policy (coordinated): inflation

- Subsidy is a disaster if everyone uses it. No one adjusts $E$ consumption!
- Huge **negative externalities** on everyone else.
Fiscal policy (coordinated): inflation

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Fiscal policy (coordinated): inequality

- Even the inequality benefits are gone if everyone subsidizes energy.
Conclusion
• Use **open economy HA model** to speak to current energy price shock.

• Shock is **stagflationary** in our HA model.

• **Monetary tightening** alone does little, but has **positive externalities**.
  → Want major countries to hike together.

• **Fiscal support** alone is very powerful, but hugely **negative externalities**.
  → Developing countries with less fiscal space will bear the cost. Do less?