Carbon Taxes and Tariffs, Financial Frictions, and International Spillovers

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Motivation

- Ambitious climate policy needed to address climate change
- Climate-policy-induced ‘transition risk’
  - Risk of a recession from unanticipated ambitious climate policy
  - Banks exposed to carbon-intensive sectors
  - Growing concern among financial regulators
- Need for an analysis of the international aspects of transition risk
  - Cross-border implications of climate policies
  - Macroprudential policy

Research Questions

- How does ambitious climate policy transmit across borders in presence of financial flows?
- Can macroprudential policy mitigate transition risk?
- Addressed with simulation exercises:
  - Unilateral domestic carbon tax
  - Unilateral domestic carbon tax and border carbon adjustment (BCA)
  - Global carbon tax

Model

- Two countries - Home & Foreign
  - Households consume, save (deposits), supply labor
  - Banks collect deposits, lend to Home & Foreign non-financial firms
  - Non-financial firms
    - Polluting (tradable) T and ‘Green’ (non-tradable) N
    - Capital producers
  - Government implements climate and macroprudential policies
- Banks
  - Bank i combines net worth \( W_{i,t} \) and deposits \( D_{i,t} \) to fund loans to polluting and green firms in Home & Foreign countries \( \left( S_{i,t}^{S}, S_{i,t}^{F} \right) \)\)_{t \in (T,N)}
  - Agency problem between a bank and its depositors
    - Follows Gertler & Kiyotaki (2010)
    - The bank may divert fraction \( \kappa \) of assets for its personal benefit
    - The depositors will lend as long as a banker does not have incentives to misbehave:
      \[
      V_{i,t} \geq \sum_{j \in (T,N)} \left( q_{i,j} S_{i,j,t} + q_{i,j} S_{i,j,t}^{F} \right) \text{benefit}
      \]
      where \( q_{i,j} \): a unit price of loans to Home (Foreign) firms in sector \( j \)
  - Exogenous i.i.d. bank exit probability \( \pi \)
  - Bank i chooses \( D_{i,t} \) to maximize the discounted value of the terminal dividends:
    \[
    V_{i,t} = \max_{D_{i,t}} \left\{ \left( 1 - \pi \right) M_{i,t} + \pi M_{i,t,D_{i,t}} + \rho \right\}
    \]
    subject to the balance sheet constraint, IC, and the evolution of net worth
      - Balance sheet constraint:
        \[
        \sum_{j \in (T,N)} \left( q_{i,j} S_{i,j,t} + q_{i,j} S_{i,j,t}^{F} \right) + W_{i,t} = D_{i,t} + NW_{i,t}
        \]
      - Net worth:
        \[
        NW_{i,t} = \sum_{j \in (T,N)} \left[ R_{i,j,1} S_{i,j,t} + R_{i,j,2} S_{i,j,t}^{F} \right] - R_{i,j,1} D_{i,j,t-1}
        \]
        where \( R_{i,j,1} \) and \( R_{i,j,2} \): returns on assets; \( R_{i,j,1} \): interest on deposits
        - When banks are financially constrained, \( \Sigma_{j \in (T,N)} \left( q_{i,j} S_{i,j,t} + q_{i,j} S_{i,j,t}^{F} \right) = \frac{2}{\rho} NW_{i,t} \)
        - Effect of an exogenous carbon tax shock at Home
            \[
            \frac{2}{\rho} NW_{i,t} \]
      - Differences in carbon leakage between Home and Foreign countries

Results

- Two sets of simulations:
  1. Exogenous carbon tax shock at Home ($80 per ton of CO2; with and without financial frictions (FF))
  2. Exogenous carbon tax shock & BCA at Home (BCA: $10 per ton of CO2 as import tariff on foreign tradable good; vs. carbon tax only; FF in place)
- Main findings:
  - With FF, domestic transition risk transmits to the foreign country through cross-border bank lending:
    - Global recession
    - Carbon leakage
  - BCA reduces leakage, although makes recession more severe at Home.
  - Macroprudential policies mitigate the transition risk

Conclusions

- DSGE model
  - Multi-sector, multi-country,
  - Cross-border financial and trade flows,
  - Climate and macroprudential policies.
- Transition risk has global implications: financial linkages and frictions are important for the propagation of transition risk across sectors and borders.
- BCA can alleviate carbon leakage but make recession deeper.
- Macroprudential policies can mitigate transition risk.

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