The Role of International Financial Integration in Monetary Policy Transmission[a]

Jing Cynthia Wu [1] Yinxi Xie [2] Ji Zhang [3]

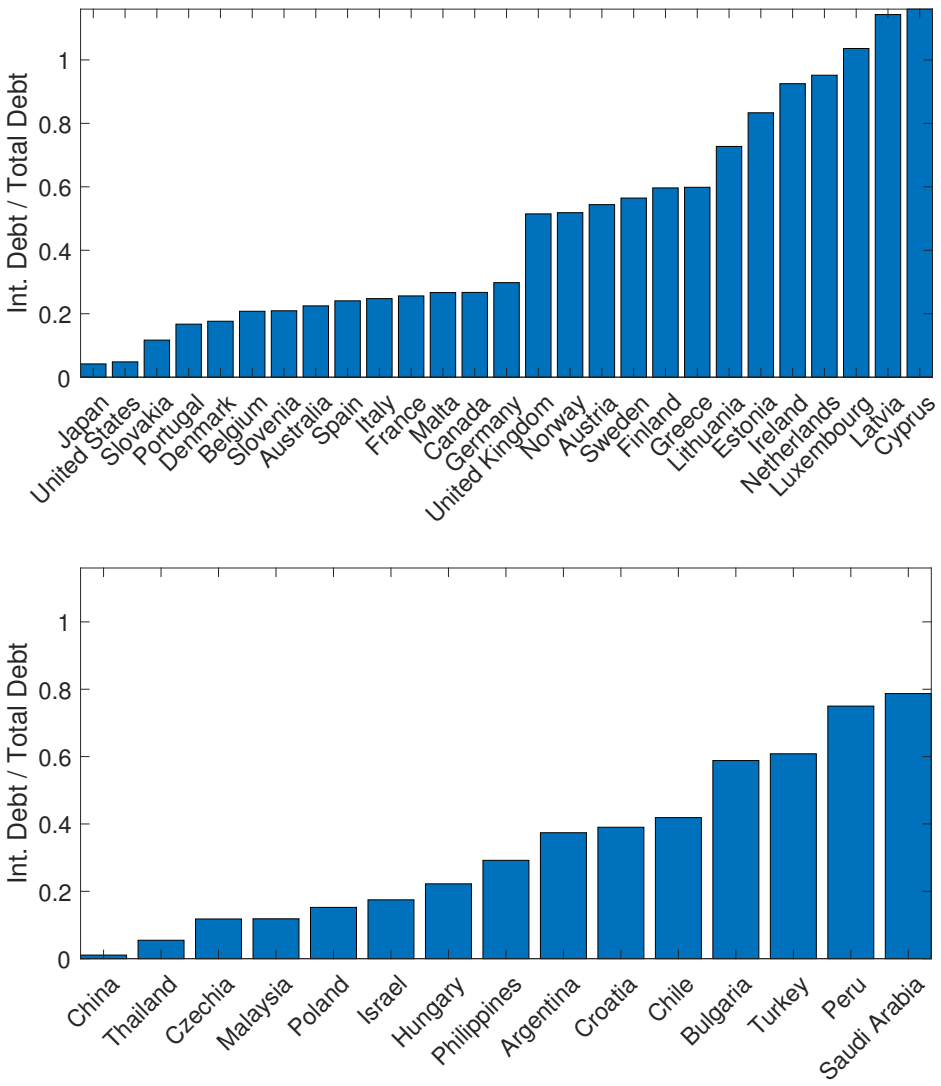
[1]Notre Dame and NBER

[2]Bank of Canada

[3]Tsinghua PBCSF

[a]The views are our own and do not necessarily represent those of the Governing Council of the Bank of Canada.

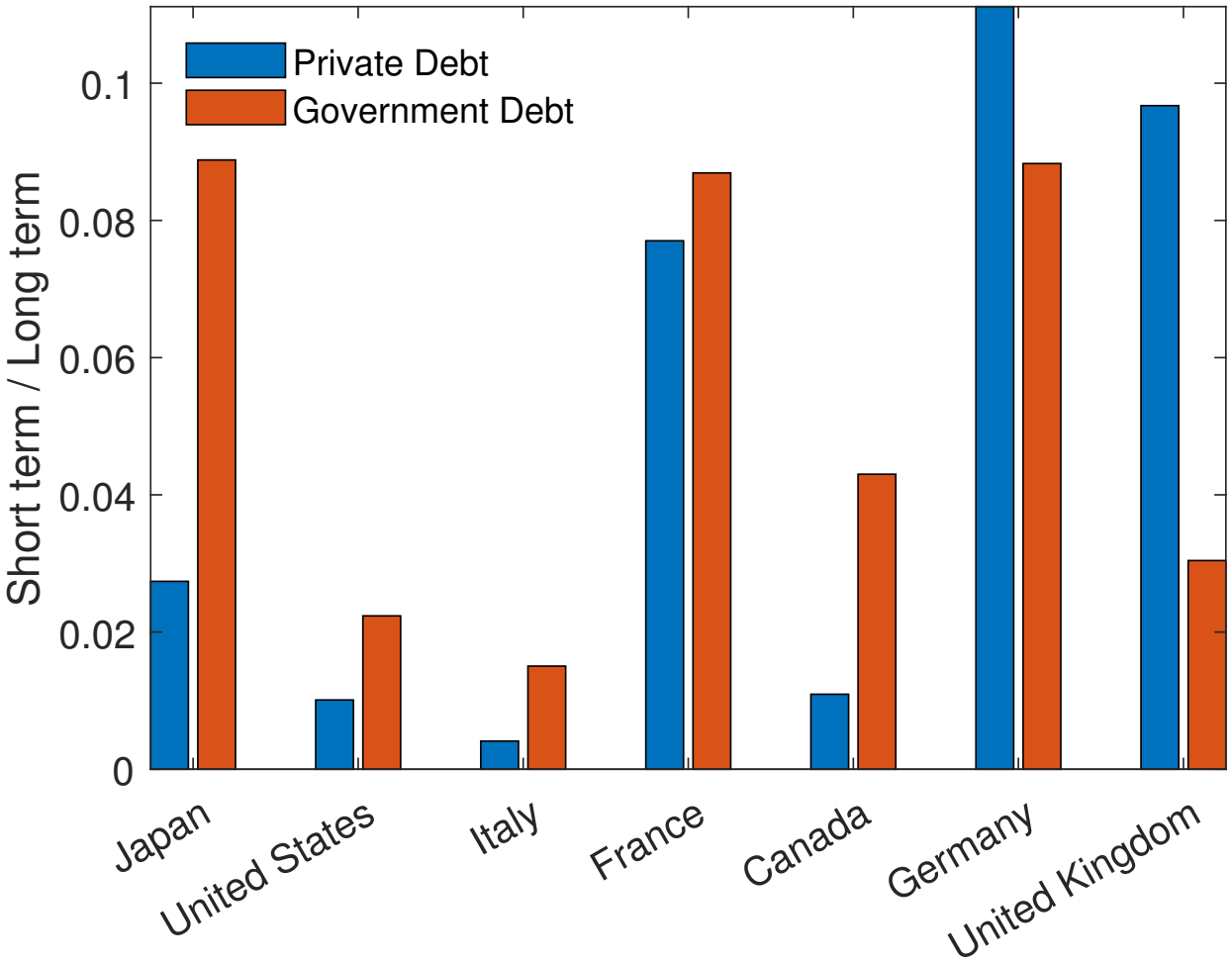
Variations in Cross-Country Bond Holdings



Internationally-Issued Debt in 2022Q1

- Some countries engage in international market, while some not

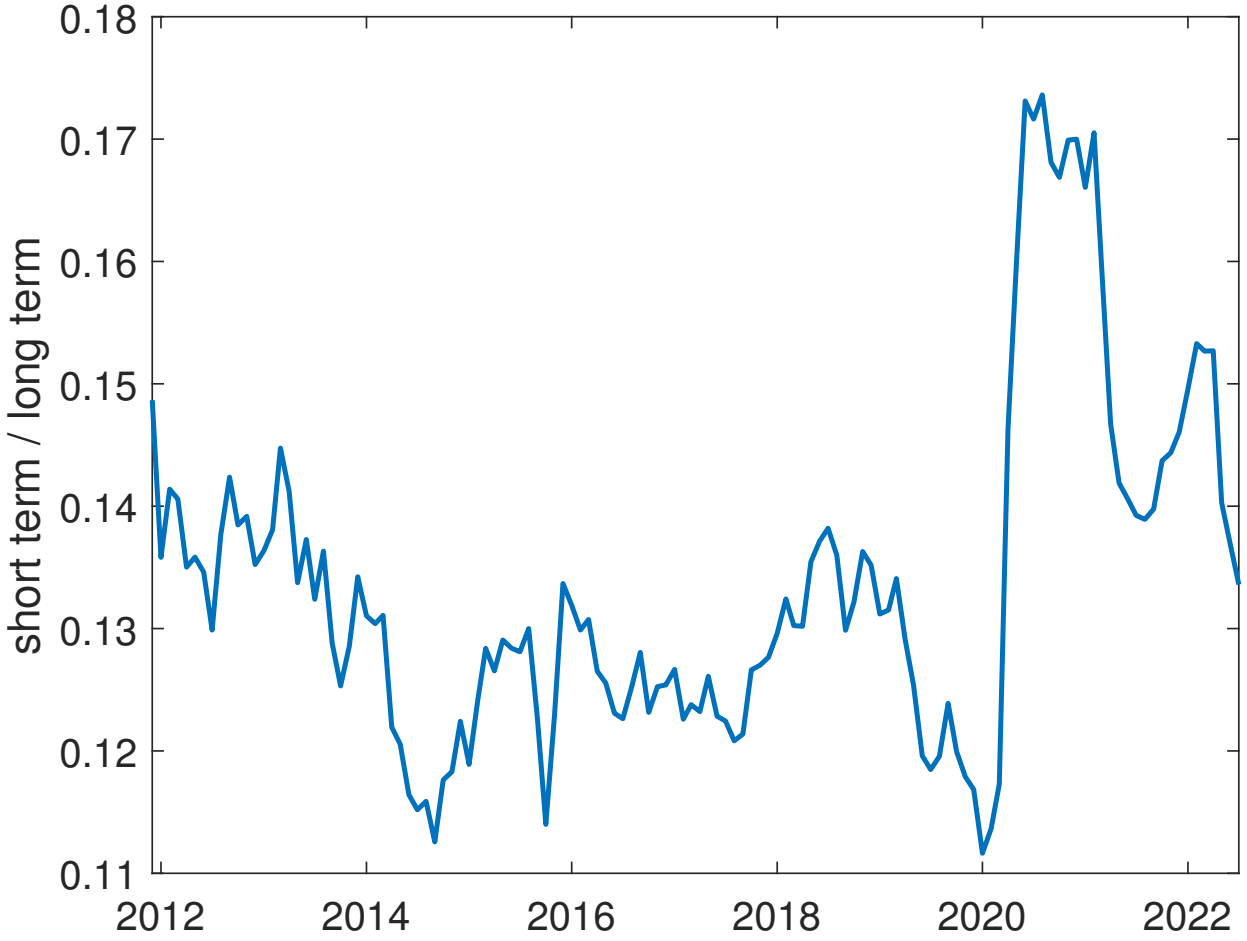
Maturity Breakdown for G7



Internationally-Issued Debt in 2022Q1

- Cross-country debt holdings are predominantly long-term

Maturity Breakdown for the U.S. Treasury



Foreign Holdings of Outstanding U.S. Treasury

- Foreign holdings are predominantly long-term bonds

Summary

- Countries engage in international bond market in various degrees
- Cross-country debt holdings are predominantly long-term

What We Do?

Two-country New Keynesian model with financial integration:

- key feature: allow cross-country holdings of long-term bonds
- study how financial integration affects MP transmission
- inspect the key features of financial integration
- study how it interacts with trade openness

A Two-Country New Keynesian Model

Model Ingredients

Financial market

- financial intermediaries can hold foreign-issued long-term bonds
- segmented markets between short- and long-term bonds

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Financial market

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The rest of the model

- principal actors in each country: households (HH), production sector, financial intermediaries (FIs), and fiscal and monetary authorities ▸ HH
- standard real and nominal frictions
- producer currency pricing (PCP)

Market Segmentation

- Households save via one-period risk-free deposits
- Firms (governments) issue long-term bonds
  - firms face a loan-in-advance constraint that propagates financial friction into the real economy

Market Segmentation

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- Firms (governments) issue long-term bonds
  - firms face a loan-in-advance constraint that propagates financial friction into the real economy
- FIs perform maturity transformation
  - subject to a costly enforcement constraint
  - resulting in excess returns of long-term bonds over the risk-free rate
- FIs can hold both domestic and foreign long-term bonds
  - subject to a transaction cost for holding foreign bonds

Financial Intermediary

FI can hold domestic and foreign long-term bonds, $B_{H,t}^{P,FI}$ and $B_{F,t}^{P,FI}$

The balance sheet condition

$$Q_t^P B_{H,t}^{P,FI} + Q_t^{P*} B_{F,t}^{P,FI} \mathcal{E}_t + RE_t = D_t + N_t$$

where RE_t: domestic central bank reserves, D_t: domestic HH's deposits, N_t: net worth

In the case of financial autarky: $B_{F,t}^{P,FI} = 0$

Financial Intermediary

Entering period t, the FI's beginning balance is

$$\begin{aligned}\mathcal{B}_t =& R^d_{t-1} N_{t-1} + \left(R^{re}_{t-1} - R^d_{t-1}\right) RE_{t-1} + \left(R^P_t - R^d_{t-1}\right) Q^P_{t-1} B^{P,FI}_{H,t-1} \\ &+ \left(R^{P*}_t \frac{\mathcal{E}_t}{\mathcal{E}_{t-1}} \left[1 - \omega/2(b^{P,FI}_{F,t-1}/b^{P,FI}_F - 1)^2\right] - R^d_{t-1}\right) Q^{P*}_{t-1} B^{P,FI}_{F,t-1} \mathcal{E}_{t-1}\end{aligned}$$

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In each period, FI

- pays out $1 - \sigma$ fraction of its beginning balance to the HH
- receives a new liquidity injection of X in real terms from the HH

Its net worth is

$$N_t = \sigma \mathcal{B}_t + P_t X$$

Financial Intermediary

FI maximizes the dividends to the HH

$$V_t = \max \ (1-\sigma)\mathbb{E}_t \sum_{j=1}^{\infty} \Lambda_{t,t+j} b_{t+j}$$

subject to the enforcement constraint

$$V_t \geq \theta \left[Q_t^P b_{H,t}^{P,FI} + Q_t^{P*} b_{F,t}^{P,FI} \mathcal{Q}_t \right]$$

FOC for domestic bond:

$$\frac{\lambda_t}{1+\lambda_t}\theta = \mathbb{E}_t \Lambda_{t,t+1} \Omega_{t+1} \Pi_{t+1}^{-1} \left(R_{t+1}^P - R_t^d \right)$$

Full FOCs

Monetary and Fiscal Authorities

Central bank

- sets a standard Taylor-type interest rate rule
- issues reserves to purchase long-term bonds

$$Q_t^P B_t^{P,CB} = RE_t$$

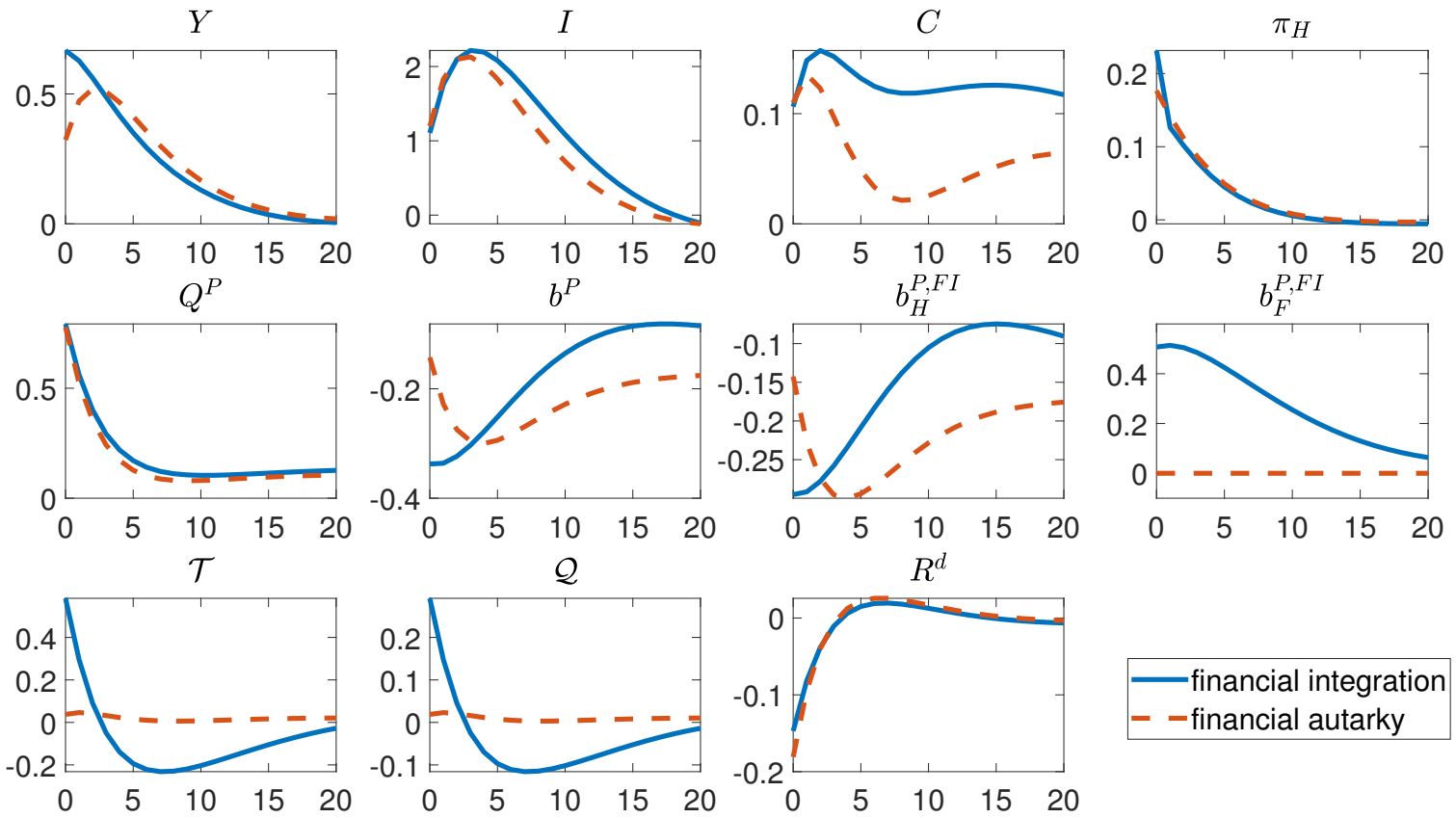
- changes its long-term domestic bond holdings (QE)

$$b_t^{P,CB} - b^{P,CB} = \rho_P \left(b_{t-1}^{P,CB} - b^{P,CB} \right) + s_P \varepsilon_t^{P,CB}$$

Fiscal authority is fully passive

Quantitative Analyses

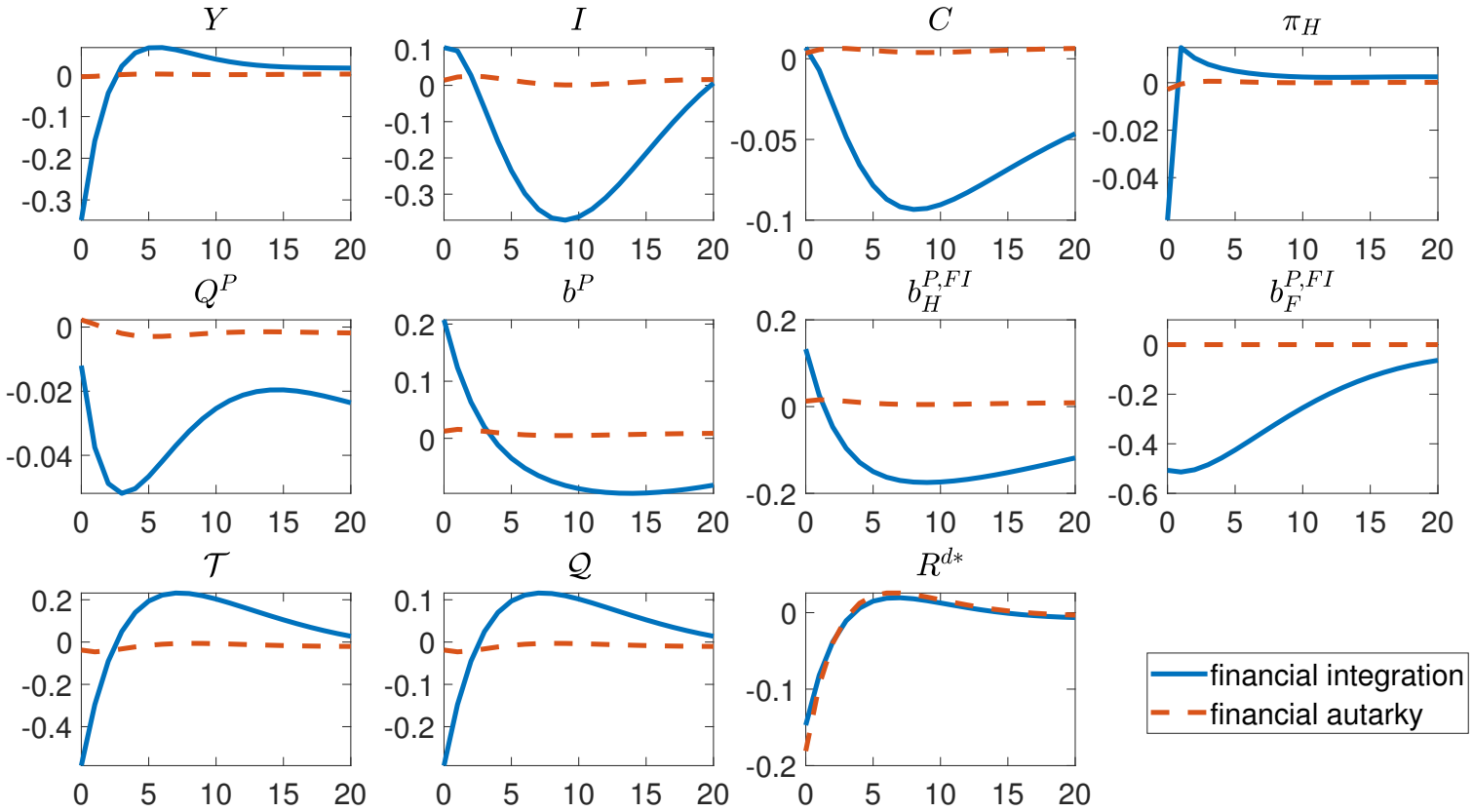
IRFs to a Home Monetary Policy Shock



IRFs to a 25 bp cut in the domestic policy rate

- Two channels: (i) consumption switching and (ii) direct financial

IRFs to a Foreign Monetary Policy Shock



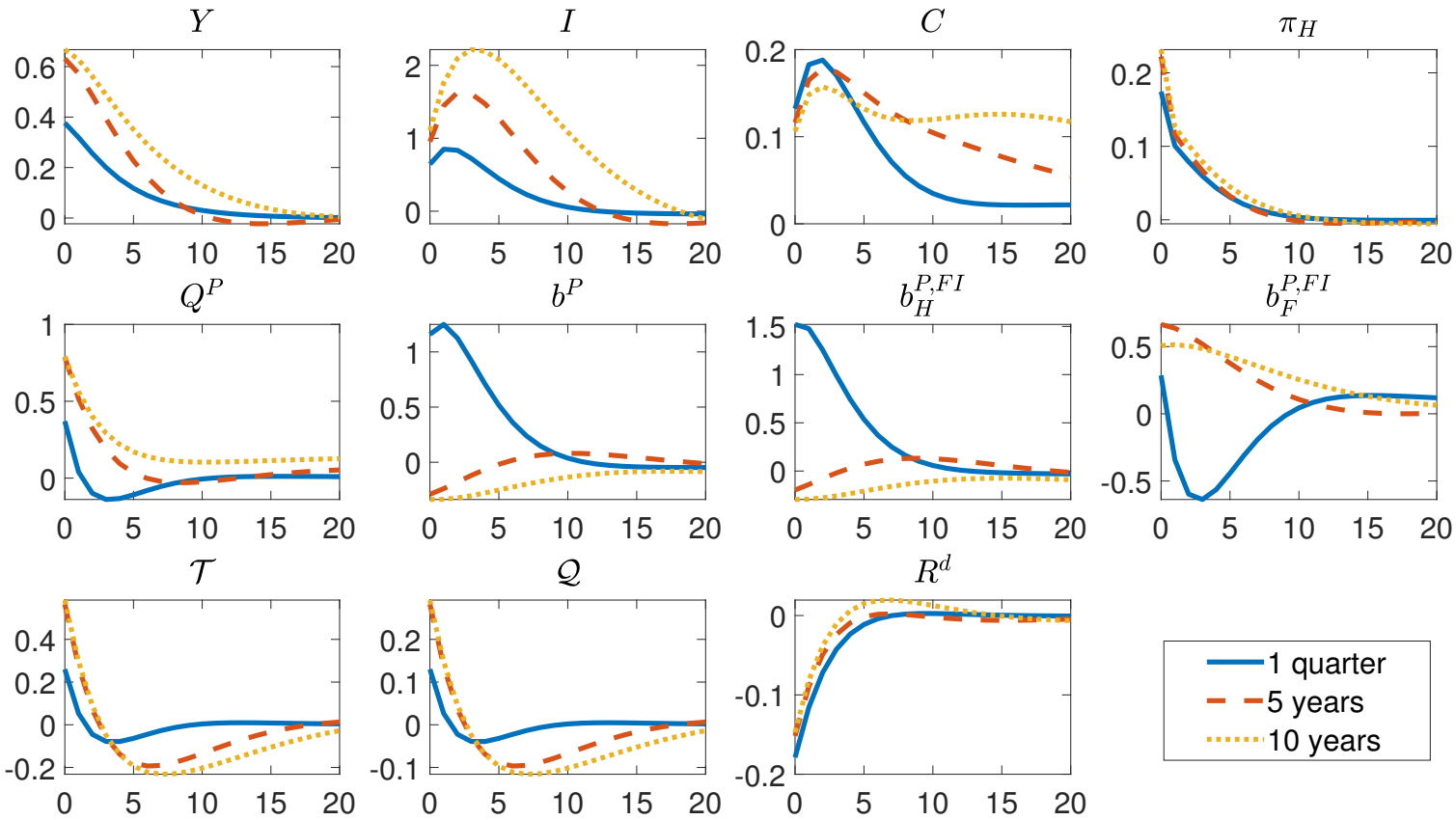
IRFs at home to a 25 bp cut in the foreign policy rate

- Under financial integration, an expansionary foreign monetary shock leads to a home-country contraction

Key Aspects of Financial Integration

- Bond duration ▸ Bond Duration
  - plays a critical role
- Financial enforcement constraint ▸ No Enforcement
  - matters quantitatively but not qualitatively
- Financial integration vs households perfect risk sharing ▸ Risk Sharing
  - households risk sharing cannot replicate financial integration

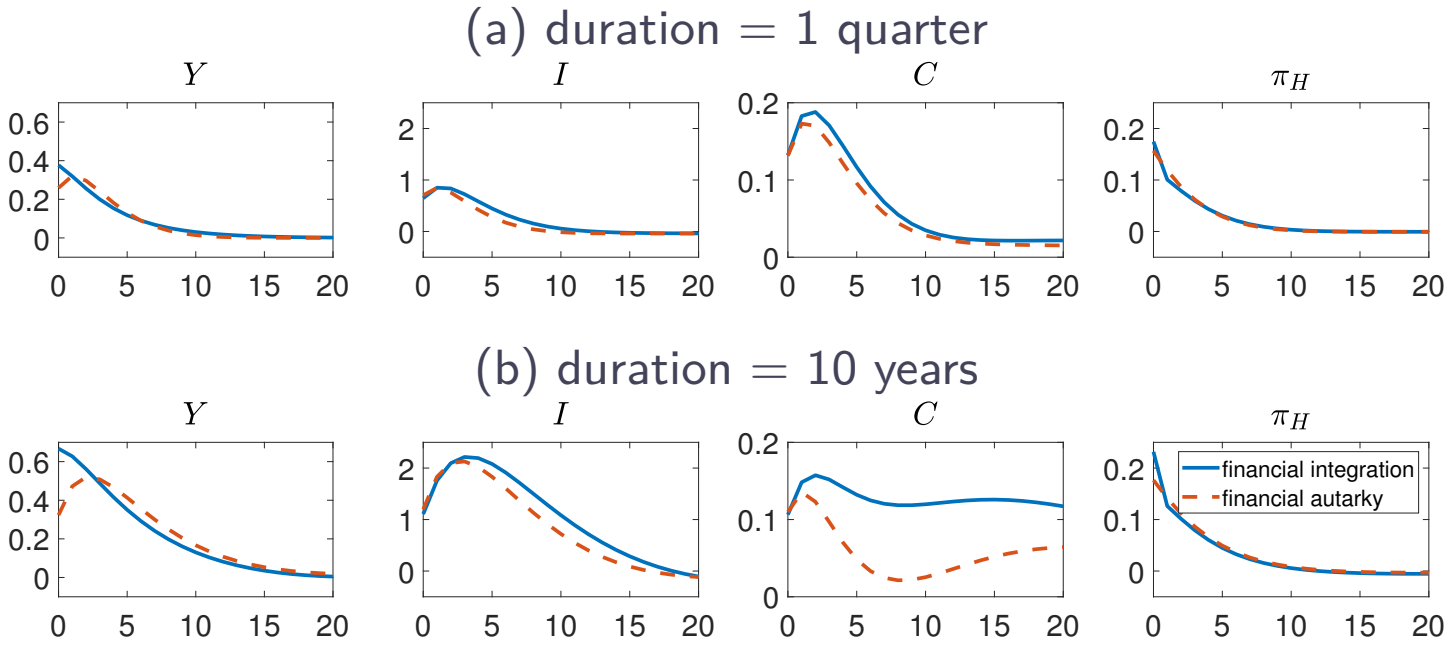
Different Bond Duration



IRFs to a 25 bp cut in the domestic policy rate under financial integration

- The longer the duration, the stronger the effect

Different Duration: Financial Integration vs Financial Autarky

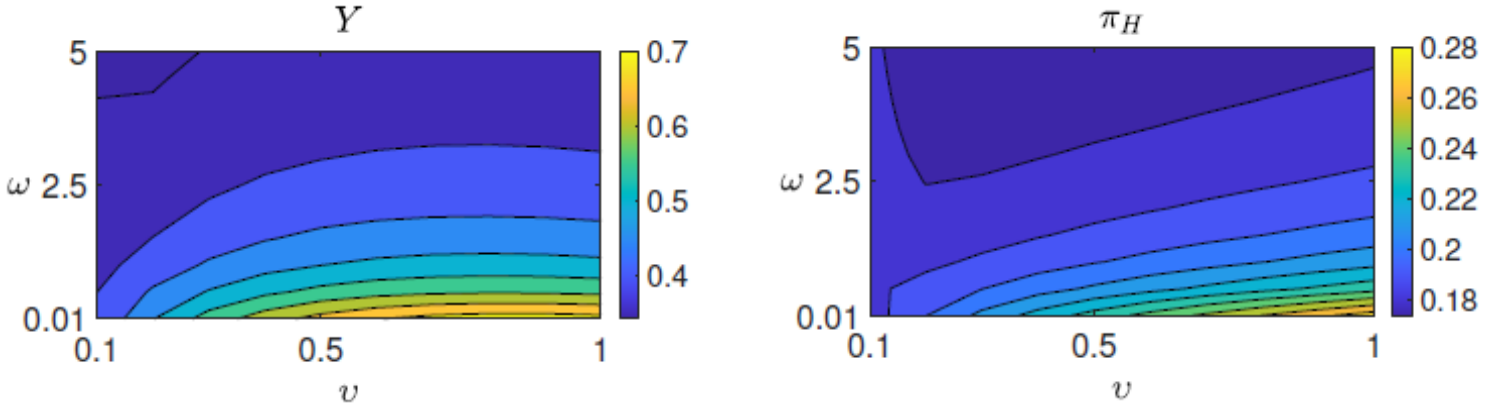


IRFs to a 25 bp cut in the domestic policy rate

- The differences become larger when the duration increases

Financial Integration and Trade Openness

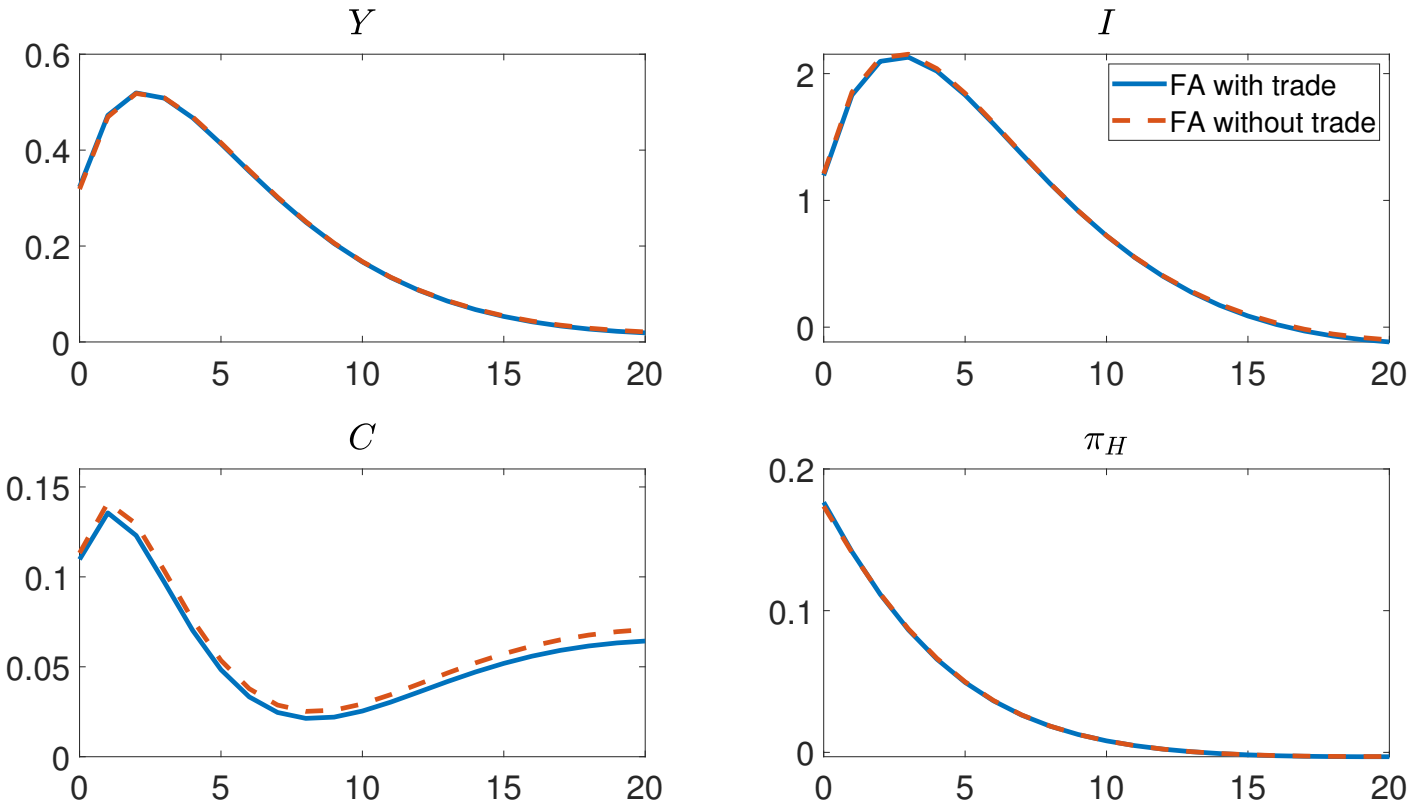
Interaction between Financial Integration and Trade Openness



The home country's initial responses to a 25 bp cut in the domestic policy rate

- The responses in output and domestic PPI inflation are highest when both the real economy and financial markets are open

Comparison between Financial Integration and Trade Openness



IRFs to a 25 bp cut in the domestic policy rate

- Conditional on FA, trade alone does not make a significant difference

Take-Aways

Financial integration

- amplifies the effect of a domestic monetary policy shock
  - stronger for QE than conventional interest rate policy
- turns an expansionary foreign shock into a domestic contraction

Key aspects of financial integration

- bond duration plays a critical role

Trade alone does not have an economically meaningful impact

Back-up Slides

Households Optimization Problem

The representative household maximizes its lifetime utility

$$\mathbb{E}_t \sum_{j=0}^{\infty} \beta^j \left[\frac{(C_{t+j} - bC_{t+j-1})^{1-\zeta} - 1}{1-\zeta} - \chi \frac{L_{t+j}^{1+\eta}}{1+\eta} \right]$$

s.t.

$$P_t C_t + D_t \leq MRS_t L_t + R_{t-1}^d D_{t-1} + DIV_t - P_t X - P_t T_t$$

Here

$$C_t \equiv \left[\nu^{\frac{1}{\vartheta}} C_{H,t}^{\frac{\vartheta-1}{\vartheta}} + (1-\nu)^{\frac{1}{\vartheta}} C_{F,t}^{\frac{\vartheta-1}{\vartheta}} \right]^{\frac{\vartheta}{\vartheta-1}},$$

where

- $\nu = 1 - (1-\gamma)\upsilon$: the HH's preference for home goods
- $\gamma \in [0,1]$: the home country population size; $\upsilon \in [0,1]$: the degree of trade openness

Similarly, the foreign country has a population size $1-\gamma$ and $\nu^* = \gamma\upsilon$

Back

Financial Intermediary

FOCs:

$$\frac{\lambda_t}{1+\lambda_t}\theta = \mathbb{E}_t \Lambda_{t,t+1} \Omega_{t+1} \Pi_{t+1}^{-1} \left(R_{t+1}^{P} - R_t^{d} \right) \tag{1}$$

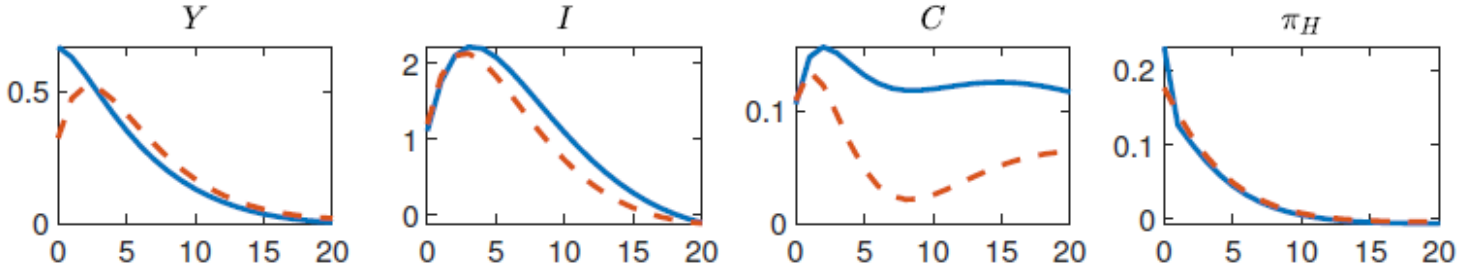
$$\frac{\lambda_t}{1+\lambda_t}\theta = \mathbb{E}_t \Lambda_{t,t+1} \Omega_{t+1} \Pi_{t+1}^{-1} \left\{ R_{t+1}^{P*} \frac{\mathcal{E}_{t+1}}{\mathcal{E}_t} \times \left[1 - \frac{1}{2}\omega(b_{F,t}^{P,FI}/b_F^{P,FI} - 1)(3b_{F,t}^{P,FI}/b_F^{P,FI} - 1) \right] - R_t^{d} \right\} \tag{2}$$

$$0 = \mathbb{E}_t \Lambda_{t,t+1} \Omega_{t+1} \Pi_{t+1}^{-1} \left(R_t^{re} - R_t^{d} \right) \tag{3}$$

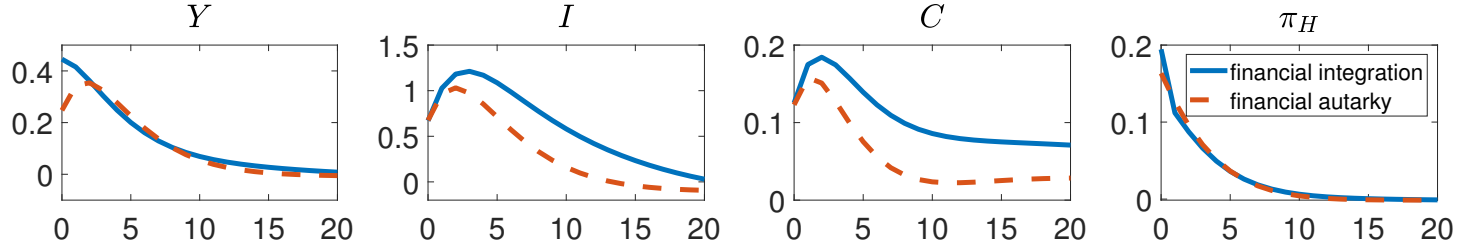
Back

The Role of Enforcement Constraint

Binding Enforcement Constraint



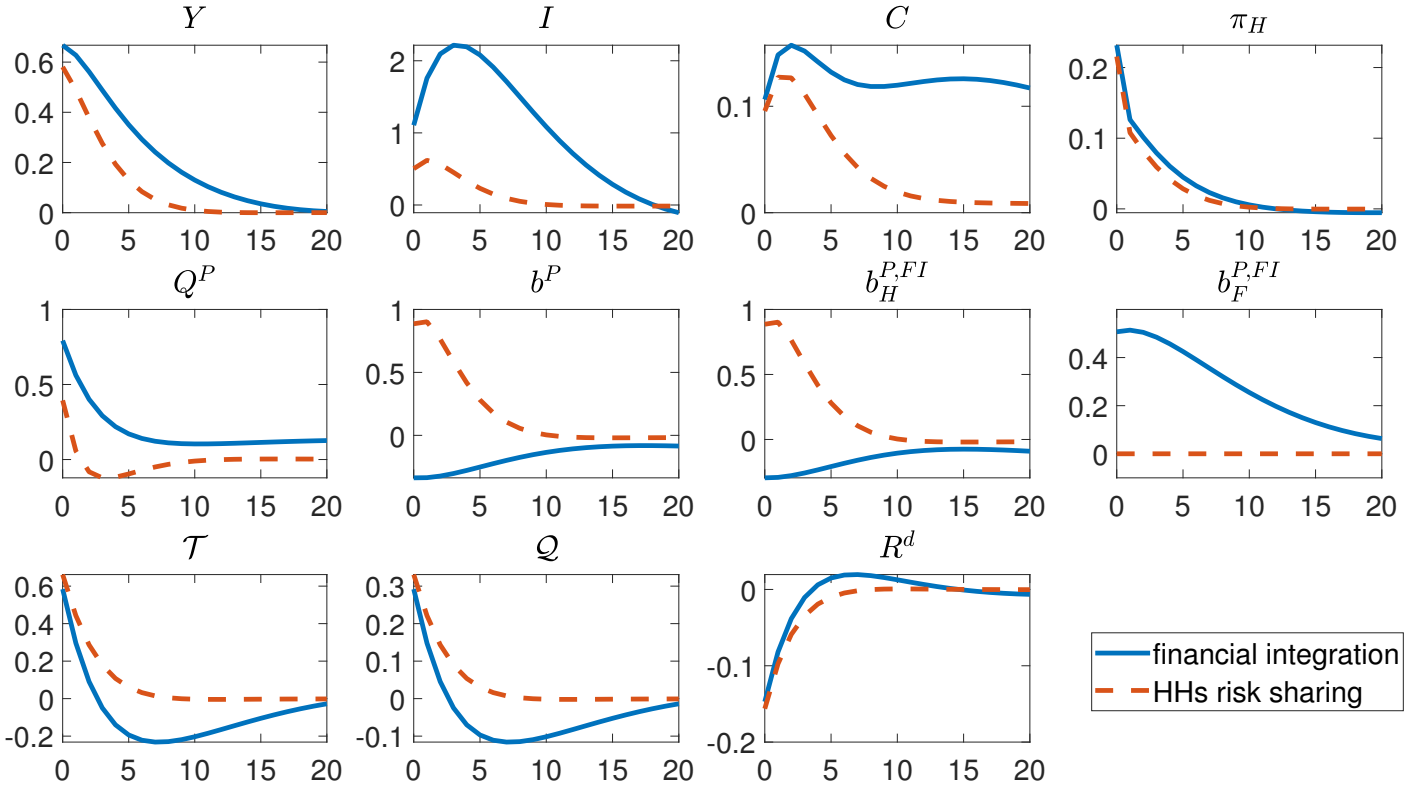
Non-Binding Enforcement Constraint



IRFs to a 25 bp cut in the domestic policy rate

- The difference becomes larger for I and smaller for C Back
  - the former goes through the direct financial channel
  - the latter works via the consumption switching channel

Financial Integration vs Households Perfect Risk Sharing



IRFs to a 25 bp cut in the domestic policy rate

- Large differences in real variables: output, investment, and consumption

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