

Financial Intermediation, Resource Allocation, and Macroeconomic Interdependence

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Introduction

Following the inauguration of the euro, bank credit expanded massively in the periphery, which was fed by foreign borrowing of financial institutions (see Giavazzi and Spaventa, 2010). Taking Spain as the bellwether country among those in the periphery, domestic credit extended by Spanish credit institutions increased by approximately 100 percent between the years 2000-2008, with a major slice of the loans extended to non-financials being towards the non-traded sectors of the economy. This period also coincides with an asset price boom and a surge in unit labor costs that are more pronounced in non-traded sectors (i.e. construction and services) of the Spanish economy. The revelation of the Global Financial Crisis scandal alerted public opinions about the violation of rules by other deficit nations, and the loss of confidence led to outflows of private capital. Bank balance sheets shrank, investment and output collapsed, and credit spreads of non-financial firms rose steeply.

Interpretations

- Optimism about the future state of the economy (Blanchard, 2006, Blanchard and Giavazzi, 2002, Constancio, 2005)
 - Investment and output boom
 - Large current account deficits financed by bank lending
- Increase in the value of non-financials starting from 1998 (Bris, Koskinen, and Nilsson, 2009, 2012)
- The Global Financial Crisis raised suspicions (Eichengreen, 2010, Giavazzi and Spaventa, 2010, Merler and Pisani-Ferry, 2012)
 - Capital flow reversals, collapse of bank lending and output

Questions

1. What is the role of the financial sector in affecting domestic resource allocation and cross-border capital flows?
2. Does domestic allocation of foreign borrowing matter for the current account?
3. What are the implications of unconventional policy when the economy is suffering from sudden reversals of capital flows?

What I Do

- Developing a two-country quantitative macro model with a financial sector, in which intermediaries lend funds to be invested in traded or non-traded sector capital, and borrow from households in both countries
 - Distinguishing between goods produced in each country
 - Incomplete international financial markets (deposits)
 - Asset heterogeneity within an economy
 - Occasionally binding endogenous leverage constraints
- (Benigno and Thoenissen, 2008, Corsetti, Dedola, and Leduc, 2008, Gertler and Karadi, 2011, Gertler and Kiyotaki, 2010)

- Conducting experiments when agents are optimistic about future value of capital and capturing non-traded-sector-led boom-bust cycles (similar to formulation in Beaudry and Portier, 2006, Christiano et al., 2010)
 - Anticipations about higher value of assets (capital): Borrowing and credit expansion
 - News turn out to be incorrect: Collapse in investment, bank lending, output; jump in credit spreads
- Non-fundamental fluctuations (Pigou, 1927, Keynes, 1936; Abreu and Brunnermeier, 2012, Brunnermeier and Oehmke, 2013)
- Studying unconventional monetary policy (UMP) conducted by a common central bank: Direct asset purchases and liquidity facilities
 - In response to unfulfilled expectations
 - Toward sector-specific conditions
 - Funded by interest-bearing reserves

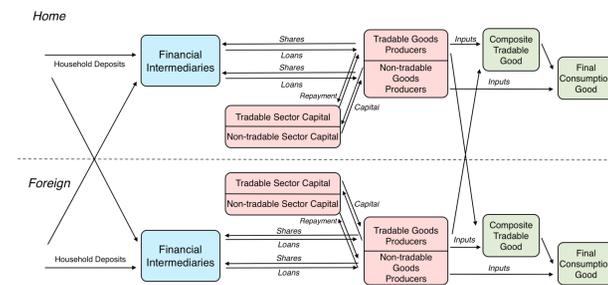


Figure 1: Model Architecture

Financial Intermediaries

Balance sheet:

$$Q_{T,t}S_{T,t}(j) + Q_{NT,t}S_{NT,t}(j) = B_{t+1}(j) + B_{t+1}^*(j) + N_t(j) \quad (1)$$

Evolution of net worth:

$$N_{t+1}(j) = (1 + r_{k,T,t+1})Q_{T,t}S_{T,t}(j) + (1 + r_{k,NT,t+1})Q_{NT,t}S_{NT,t}(j) - (1 + r_{t+1})(B_{t+1}(j) + B_{t+1}^*(j)) \quad (2)$$

Expected discounted value at the time:

$$\text{Max}_{S_{T,t}, B_{t+1}, B_{t+1}^*} V_t(j) = \mathbb{E}_t \beta \Lambda_{t+1} [(1 - \gamma)N_{t+1}(j) + \gamma V_{t+1}(j)]$$

s.to (1), (2), and (IC)

Incentive constraint (IC):

$$V_t(j) \geq \lambda_T Q_{T,t} S_{T,t}(j) + \lambda_{NT} Q_{NT,t} S_{NT,t}(j)$$

where $\Lambda_{t+1} = \frac{U_C(t+1)}{U_C(t)}$.

State-dependent Fluctuations

Banker problem's Lagrangian multiplier:

$$\mu_t = \text{max} \left\{ 1 - \left(\frac{\beta \mathbb{E}_t [A_{t,t+1} \Omega_{t+1} (1 + r_{t+1}) N_t]}{\lambda_T Q_{T,t} S_{T,t} + \lambda_{NT} Q_{NT,t} S_{NT,t}} \right), 0 \right\}$$

With $\mu_t = 0 \forall t$, banking is frictionless and $\Omega_t = 1$

With $\mu_t > 0$, IC is binding and the cost of capital is higher than in the frictionless case

Model Performance

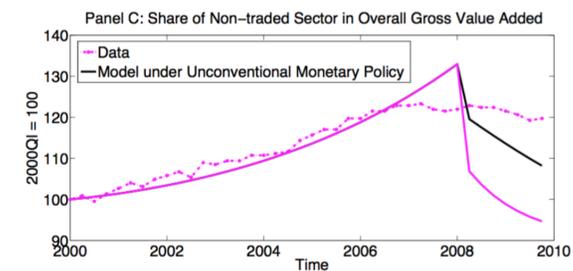
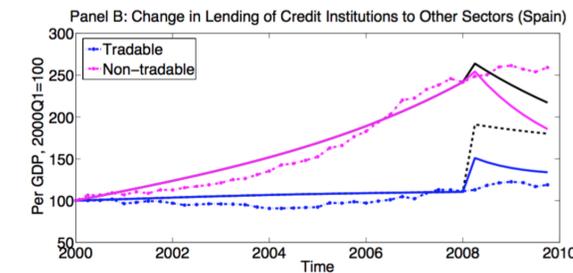
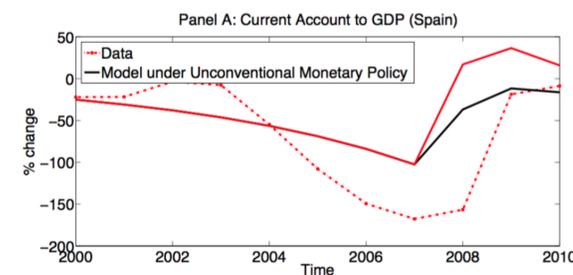


Figure 2: Model and Data, Spain (black lines indicate dynamics under unconventional policy)

Three Model Versions

- No banking, under financial autarky

$$RP_{H,t} C_{H,t}^* = \frac{RP_{F,t} C_{F,t}}{\xi_t}$$

- Domestic banking, under financial autarky

$$Q_{T,t}S_{T,t}(j) + Q_{NT,t}S_{NT,t}(j) = B_{t+1}(j) + N_t(j)$$

$$RP_{H,t} C_{H,t}^* = \frac{RP_{F,t} C_{F,t}}{\xi_t}$$

- International deposit market integration

$$Q_{T,t}S_{T,t}(j) + Q_{NT,t}S_{NT,t}(j) = B_{t+1}(j) + B_{t+1}^*(j) + N_t(j)$$

$$CA_t = \xi_t (B_{*,t+1} - B_{*,t}) - (B_{t+1}^* - B_t^*)$$

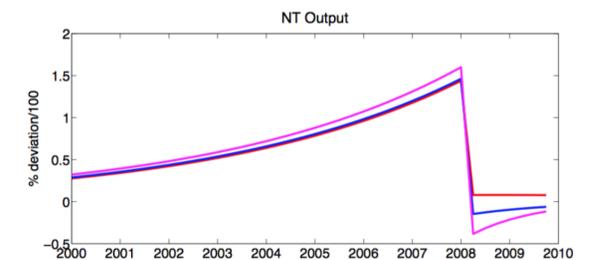
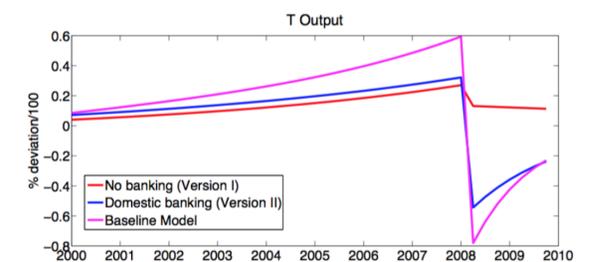


Figure 3: Three model versions

Bank balance sheets transmit fluctuations across sectors and spread the recession to the overall economy, although the boom regime was mainly driven by the non-traded sector. The collapse in non-traded portion of credit contributes to a fall in bank net worth, which further puts downward pressure to traded sector credit.

Key mechanism:

$$Q_{T,t}S_{T,t} + \frac{\lambda_{NT}}{\lambda_T} Q_{NT,t}S_{NT,t} = \frac{v_t}{\lambda_T} N_t$$

Conclusions

- The model is successful at producing a boom-bust cycle that is reminiscent of the recent situations in Spain
- Three main channels in explaining the mechanism:
 - Demand Channel
 - Bank Spillover Channel
 - International Deposit Market Channel
- ECB-type UMP is successful at mitigating the fall in bank lending and output
- A rigorous treatment of the consensus view of what caused the EZ Crisis (Baldwin and Giavazzi (2015))
 - “Capital flows fed non-traded portion of the economy, and the effects of sudden-reversals were amplified due to bank dominance”