Monetary Policy in Frontier Markets in the Face of the Global Crisis: The Case of Zambia

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Motivation

- Understanding the impact of the crisis in low-income countries (LICs) is an important task.
- Provides insights about the structure of these economies and their exposure to external factors.
- Allows central banks (CBs) to learn from past decisions.
- Relatively “clean” experiment

“New Perspective”?

- Regular macro in LICs?
- Methodology
  - CBs use quantitative models (DSGEs) for this kind of exercise.
    - Useful for studying shocks and monetary policy.
    - Help structure thinking and organize the evidence.
  - The use of such models remains limited in LICs:
    - History of fiscal dominance and chronic inflation.
    - Unclear whether these models can be useful for LICs.
    - Role of monetary aggregates in policy is usually ignored.

Our paper

- We develop a DSGE model with a banking sector and money targeting rules.
  - Endogenous and exogenous movements in lending premia.
  - Allow shocks to lending constraints (quantity-based).
- We analyze the impact of the crisis in Zambia and the role of monetary policy.
- We assess its quantitative performance by comparing its predictions to Zambian data.
  - Model as a story-telling device...

Related literature

- Large and growing literature on the impact of the recent financial crisis:
  - Curdia and Woodford (2009), Woodford (2010), Adrian and Shin (2010), Gertler and Kiyotaki (2010).
  - Our modeling of the banking sector in an open economy is relatively simple.

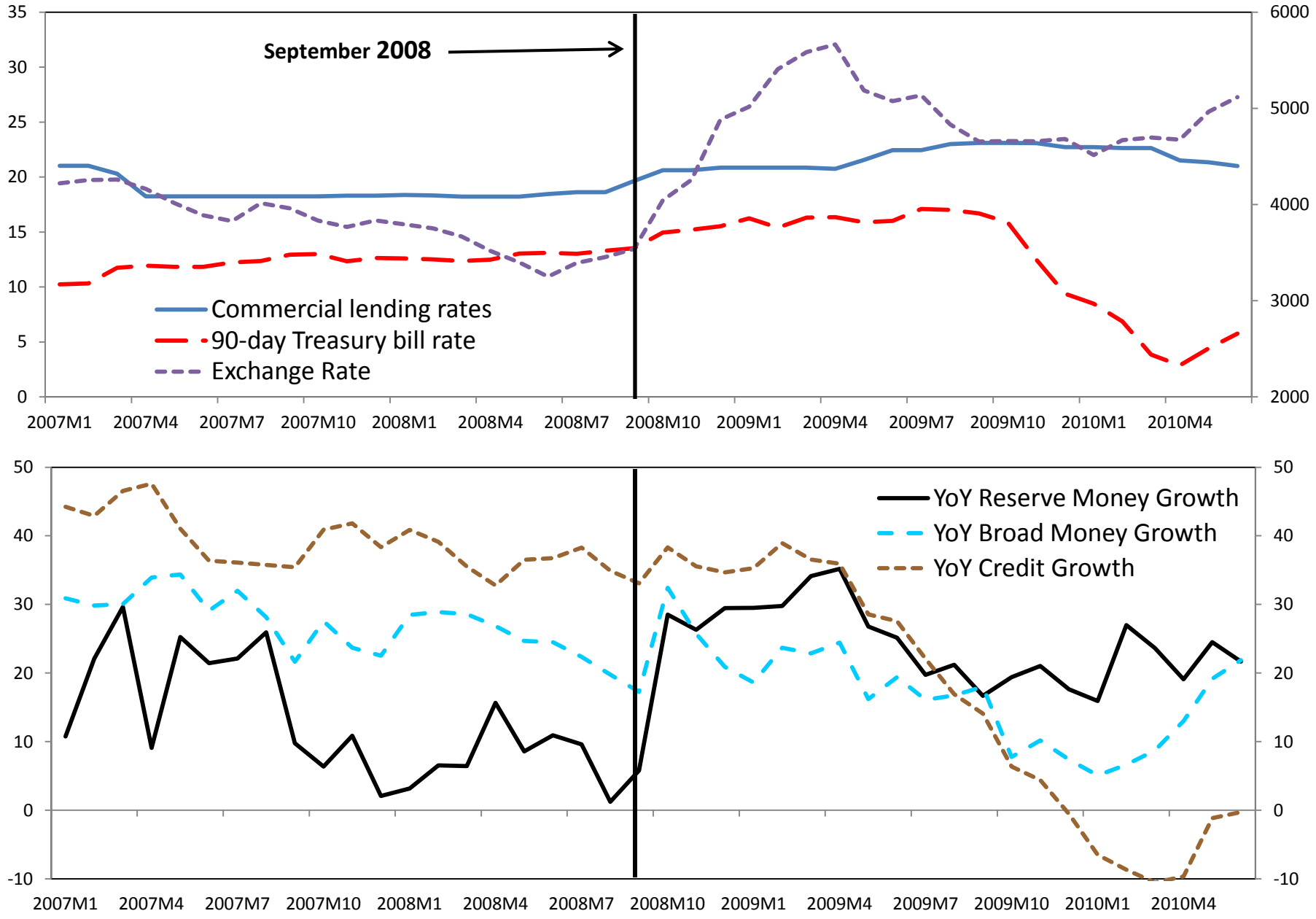
- Large literature on sudden stops and capital reversals:
  - Calvo (1998), Mendoza (2006), Chari, Kehoe and McGrattan (2005), Christiano, Gust and Roldos (2004).
  - Combination of shocks, no financial dollarization.

Zambia: a representative LIC

- Dependent on commodity exports (copper).
- Financially underdeveloped (bank-dominated).
- Bank of Zambia targets monetary aggregates under a floating exchange rate regime.
- Fiscal developments pose a challenge for monetary policy (aggregate demand and credit allocation)

Impact of the global crisis

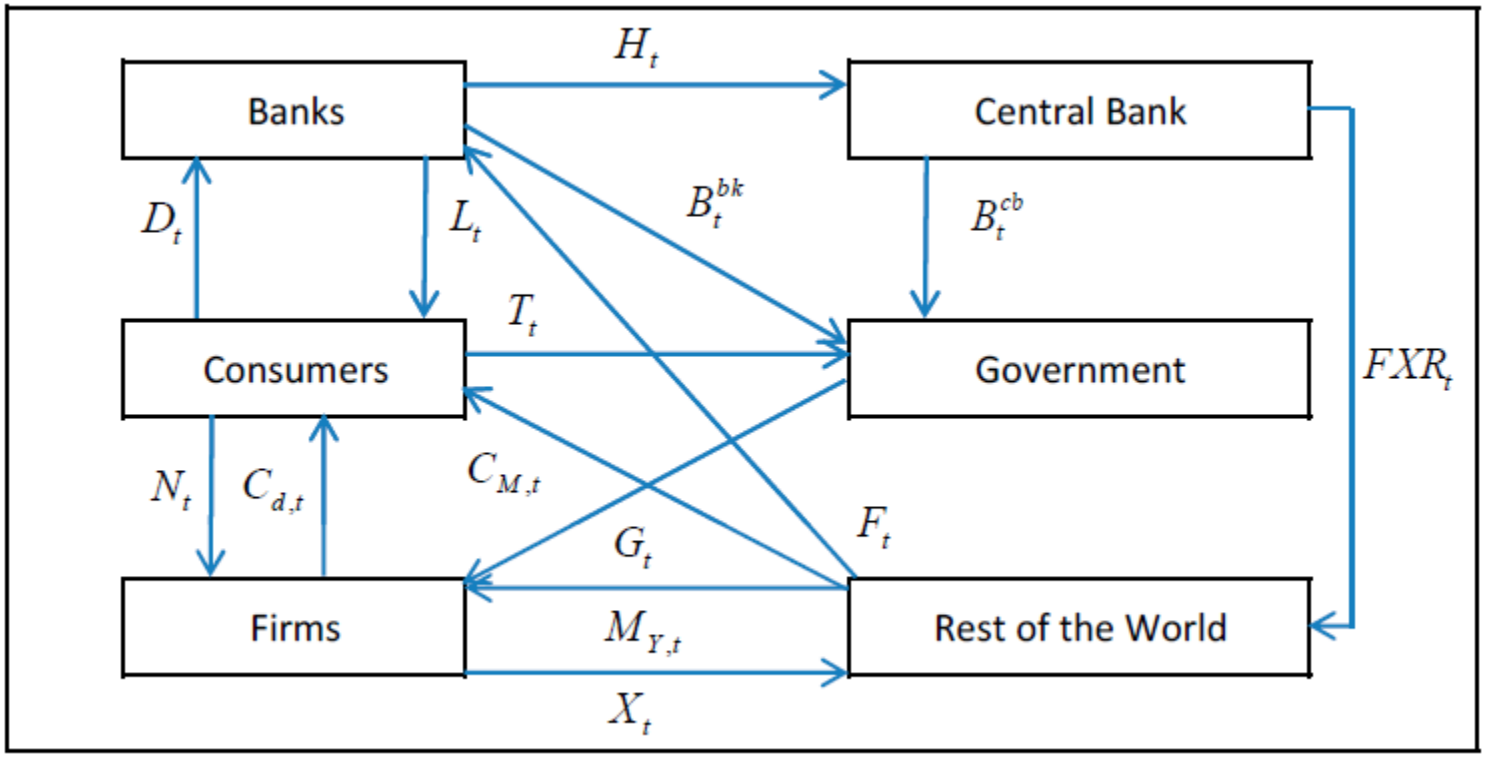
- Lending rates high
- Short-term rates way down, money supply growth strong
- What is going on?
  - Maybe a financial accelerator plus a country risk premium?


September 2008
Commercial lending rates
90-day Treasury bill rate
Exchange Rate
YoY Reserve Money Growth
YoY Broad Money Growth
YoY Credit Growth
2007M1
2007M4
2007M7
2007M10
2008M1
2008M4
2008M7
2008M10
2009M1
2009M4
2009M7
2009M10
2010M1
2010M4

Impact of the global crisis in Zambia

- Three related shocks:
  - Terms of trade shock
  - An increase in the country risk premium
  - A decrease in banks' risk appetite
- Effects
  - Large nominal and real depreciation, current account reversal.
  - Large credit crunch, high spreads.
  - Decline in domestic demand, reduction in inflation.
  - Government revenues declines and debt increased.

The Model


Banks
Central Bank
Consumers
Government
Firms
Rest of the World
H_t
D_t
L_t
B_t^{bk}
B_t^{cb}
T_t
FXR_t
N_t
$C_{d,t}$
$C_{M,t}$
F_t
G_t
$M_{Y,t}$
X_t

Some relevant equations

- Households' Euler equation:

$$\lambda_t = E_t\left[\lambda_{t+1}\frac{\beta R_{L,t}}{\pi_{c,t+1}}\right] + u_{F,1,t}$$

  - Households may be constrained in their ability to borrow at the rate offered by banks ($R_{L,t}$).
  - Similar constraint in households' ability to purchase credit-financed imports with shock $u_{F,2,t}$

- Terms of trade:

$$Ln\ T_t = lnT_{t-1} + u_{T,t}$$

Banking sector

- Balance sheet: $L_t + H_t + B_{bk,t} = D_t + F_t$
- Some arbitrage conditions:

$$R_t = R_t^* E_t[\frac{S_{t+1}}{S_t}] + u_{R,t}$$

$$R_{L,t}^* = R_{B,t} + u_{F,3,t}$$

$$R_{B,t} = H(D_t, H_t) + u_{F,4,t}$$

- We model the decrease in banks' risk appetite as a simultaneous increase in $u_{F,i,t}$ for i = 1, 2, 3, 4.

$$u_{F,1,t} = u_{F,t}; u_{F,2,t} = \mu_2 u_{F,t}; u_{F,3,t} = \mu_3 u_{F,t}; u_{F,4,t} = \mu_4 u_{F,t}$$

- We chose u_i to improve the fit of the model.

Monetary Policy

- Rule:

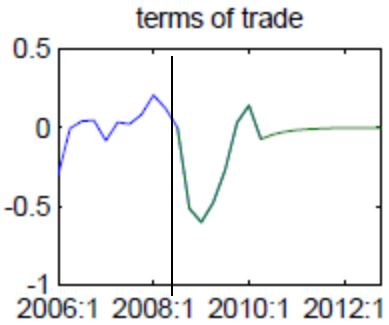
$$\frac{H_t}{H_{t-1}} = 1 - \kappa_{\pi,H}(\pi_{c,t+1} - 1) - \kappa_{D,H}(\frac{D_t}{D_{t-1}} - 1) - \kappa_{L,H}(\frac{L_t}{L_{t-1}} - 1) - u_{M,t}$$

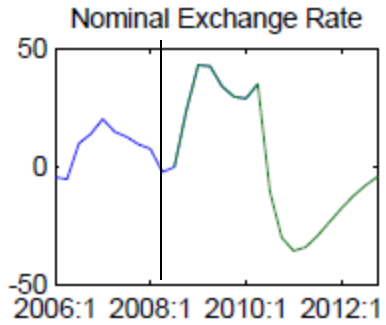
  - Various specifications:
    - Inflation targeting with reserve money growth (H) as instrument.
    - Broad-money targeting (D), credit (L) targeting.

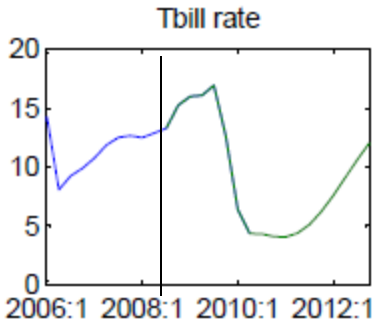
Replicating the crisis

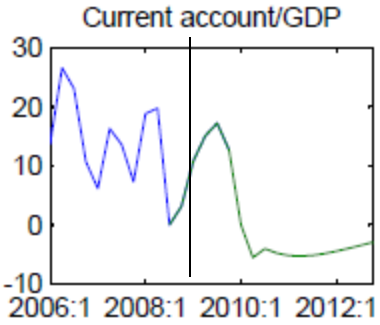
- Set shock to terms of trade $u_{T,t}$ to match Zambia's TOT during 2008:4 to 2010:2.
- Set shock to country's risk premium $u_{R,t}$ to replicate nominal exchange rate (same period).
- Set shock to banks' risk appetite to match the country's current account from 2008:4 to 2009:4.
- Set shocks to monetary policy to match T-bill rate.
  - "Stop and go" requires a discrete policy reversal...

Hard-tuned variables (to the data)



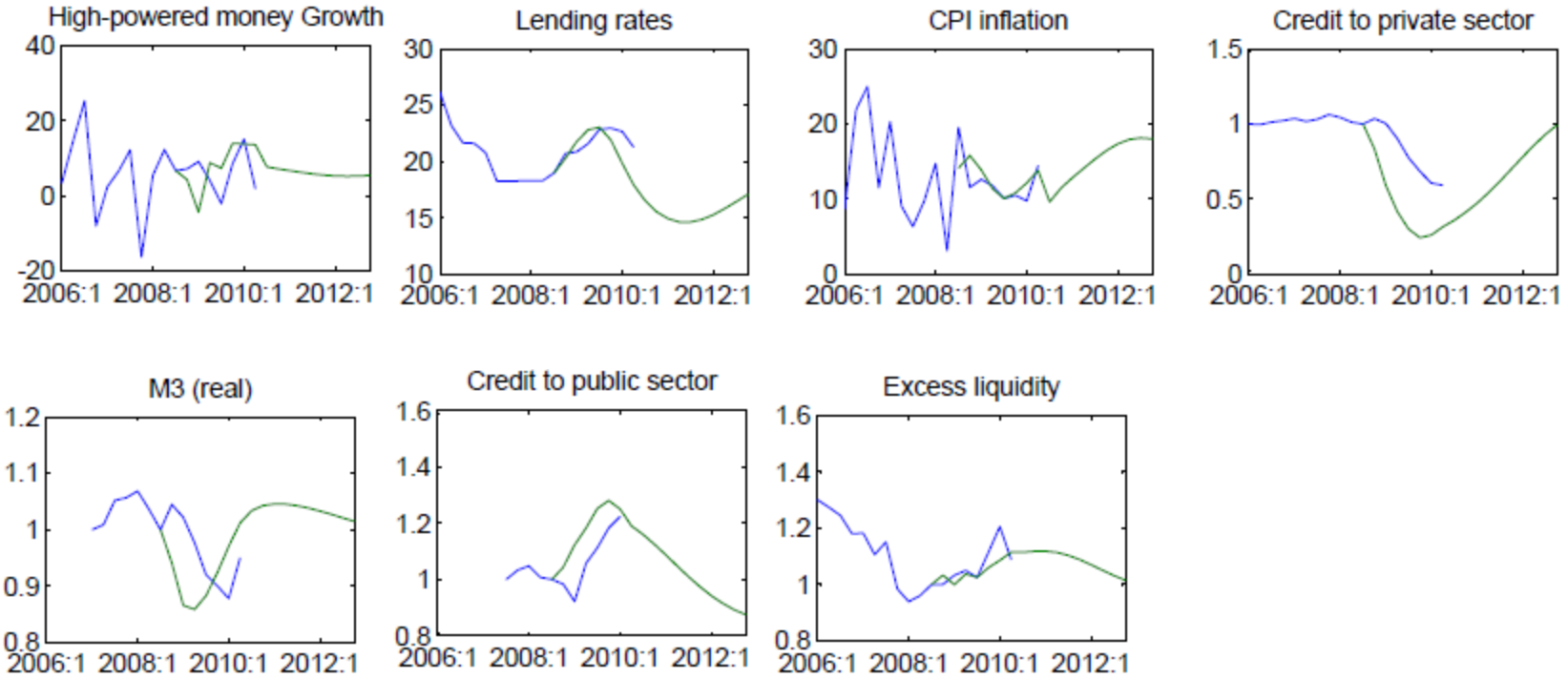






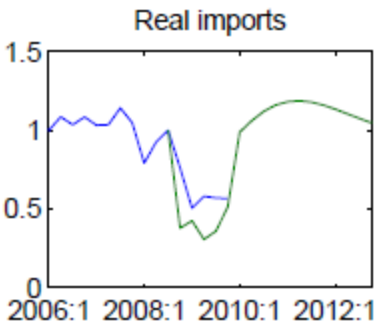
- By construction these variables replicate their empirical counterparts.

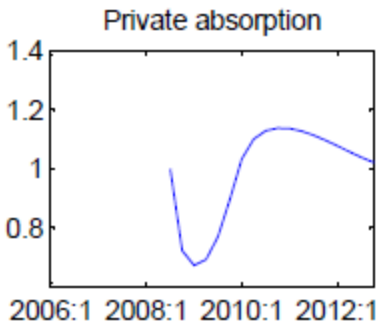
Credit, money, rates and inflation

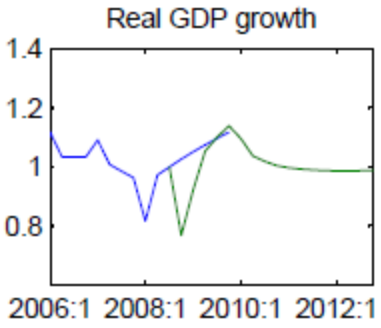


- The model performs well quantitatively.
  - Sometimes the model predicts movements before they happen in the data.

Real sector







- Model correctly predicts a contraction in imports (and private absorption) yet GDP does not fall.
  - Part of the divergence may be explained by shocks to the supply side of the economy.
  - Mismeasurement could also be an issue.

The monetary policy response

- Can be characterized as “Stop and go”:
  - T-bill rates increased by 400 bps (end-2008 to mid-2009).
  - T-bill rates then fell by 1000 bps (mid 2009). Liquidity increased.

- Possible reasons behind “stop”:
  - Responding to past shocks (food and fuel crisis).
  - Concern about nominal depreciation.
  - Concern about excess liquidity, missed money targets.

The role of the monetary policy response

- Implications of alternative policy rules for private spending, inflation and nominal depreciation in the model:

Monetary Policy	Neutral	Loose	Broad Money Targeting	Credit Growth Targeting	Taylor Rule
Private Spending	2.8	5.4	3.4	5.5	4.1
Inflation	3.0	6.2	3.3	7.3	6.1
Nominal depreciation	12.4	24.0	14.7	31.8	29.6

Table 2: Model performance across alternative monetary policy responses

Each row indicates the average difference between the alternative monetary policy regime and the baseline, in percent of that variable's steady state value, in 2009.

- More accommodating policies would have resulted in a smaller contraction, at the cost of higher inflation.

Results from our model

- Pick shocks to replicate the crisis.
  - When policy is modeled as “stop and go”, the model reproduces most other variables (not GDP).
- A financial accelerator is not enough—we need a banking system risk shock
- “Stop and go” was counterproductive:
  - Contributed to the contraction in aggregate demand.
  - An accommodating policy would have helped stabilize the economy earlier, at the cost of higher depreciation.

Lessons for Monetary Policy in LICs

- Monetary policy should be forward-looking
  - Don’t respond to current effects of past shocks.
- CBs should avoid paying excessive attention to banks liquidity—reserve money.
  - “Excess” liquidity may reflect growing risk aversion in the banking system, not loose policy.
  - CBs should monitor developments in the banking sector.
- Monetary policy is limited in its ability to offset large external shocks…

Conclusion

- A DSGE model—fitted to the specifics of LICs—helps understand country experience. In this case,
  - Useful to model the crisis as a combination of shocks.
  - Importance of banking sector in transmission of crisis.