Risky Banks and MacroPrudential Policy for Emerging economies
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The views expressed here are personal and do not reflect those of the ECB.

Overview

Motivation

- Cross-border banking flows to EME (not only) have been very volatile in financial crisis
  - Contagion, "sudden stop" / capital inflow reversal
  - Evidence that countries with macropru policies weather gyrations in banking inflows better

Explanation

- Financial frictions in domestic and international banking, incomplete markets
- Pecuniary/collateral externality: Agents do not internalize effects of their choices on asset prices
- Laissez-faire equilibrium: Fire sales of risky EME bank liabilities

Policy message

- Macroprudential levy/subsidy on EME banks foreign borrowing raises welfare

General reaction

- New formulation of time-honored idea
  - Constrained inefficiency of competitive equilibria when markets are incomplete
  - Hart (1975), Geanakoplos and Polemarchakis (1986), Newbery-Stiglitz (1984)
- More recently: substantial research advocating macroprudential measures (MPP) / capital controls (CC)
  - *Pecuniary externalities*: Bianchi (2011), Benigno et al. (2011), Bianchi and Mendoza (2012), Caballero-Krishnamurthy (2001), Jeanne and Korinek (2011), Mendoza (2010)...
  - *Price and wage rigidities*: Farhi and Werning (2012, 2013), Schmitt-Grohe and Uribe (2012,2013)
- **This paper neat contributions**
  - Pecuniary externalities (collateral constraints, incomplete markets) motivate MPP/CC in 2-country IRBC model

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- **This paper neat contributions**
  - Pecuniary externalities (collateral constraints, incomplete markets) motivate MPP/CC in 2-country IRBC model
  - Loss-absorbing "outside equity" in EME banks targeted as foreign ("non-core") bank liabilities, even with no mismatch

My comments

1. Special model of foreign non-core banking liabilities, capital flows and bank asset growth — EME lending booms financed with foreign non-core liabilities (Lane-McQuade 2014)
2. Possibly different cross-border banking flows with maturity and currency mismatch — US role in global banking system (Shin 2011)
3. More sophisticated (constrained efficient) policies: MPP vs CC, Price (market-based) vs Quantity (regulatory) tools — Paper mainly about residency-based tools (Korinek-Sandri 2014)

Model: Key ingredients

- Dynamic two-country model
  - Two goods: Cobb-Douglas technology, capital and labor
  - Each country specializes in one good
  - Final output for consumption, investment CES aggregate of goods — imperfect substitutes
- Free trade of goods, but not of capital
  - Only banks in each country can sell capital to firms, subject to agency problem and incomplete markets
  - Banks in one country (AE) can buy claim in capital in the other country (EME), subject to agency problem

The mechanism in a nutshell

- Banking integration makes credit spreads correlated across countries:
  - AE bank: Expected domestic return – risk free = spread
  - AE bank: Expected EME bank return – risk free = interbank spread
  - EME bank: Expected domestic return – risk free = spread*
- Destruction of AE capital (Symmetry with EME shocks?)
  - Lower domestic price of capital, higher spread
  - Improved terms of trade (ToT) provide partial insurance
  - With capital mobility disinvestment abroad to smooth consumption
- But under banking integration leverage and amplification
  - Excessive movements in ToT and EME price of capital (fire sales externality)
  - Too much capital reallocated to AE from EME, deep recession in EME
  - Not internalized by agents, overborrowing

Model: EME bankers

- The bank's balance sheet is:

$$Q_t s_t = d_t + Q_{B,t} b_t + n_t$$

while an individual banker net worth evolves according to

$$n_{t+1} = R_{K,t+1} n_t + \left(R_{K,t+1} - R_{B,t+1}\right) Q_{B,t} b_t + \left(R_{K,t+1} - R_t\right) d_t$$

- The following sources of external finance are available to the EME banker:
  - Non-state contingent debt securities d_t, which pay a safe return R_t, sold to domestic HHs.
  - State-contingent claims, which have price $Q_{B,t}$, and pay a risky return $R_{B,t+1}$, sold to AE bankers b_t.
- External sources of finance are used to purchase s_t claims on the domestic capital stock, which have market value Q_t and yield

$$R_{K,t} = \Psi_t \frac{Z_t + (1-\delta) Q_t}{Q_{t-1}}.$$

Cross-border bank assets

- AE banks claims on EME banks also represent claims on the EME capital stock:

$$\begin{aligned} R_{B,t} &= \Psi_t \frac{Z_t + (1-\delta)\, Q_{B,t}}{Q_{B,t-1}}, \\ E_{t-1} R^{AE}_{B,t} &= E_{t-1} \frac{\varepsilon_t}{\varepsilon_{t-1}} R_{B,t} \simeq E_{t-1} R^{AE}_{K,t} \end{aligned}$$

  Loss absorbing claims akin to outside equity, no currency or maturity mismatch, contrary to domestic deposits.

- Banker subject to agency problem, requiring bank's franchise value to exceed the value of divertible assets:

$$V_t \geq \theta \left(Q_t s_t - \omega Q_{B,t} b_t \right)$$

  - The strength of the incentive effects associated with *foreign*/outside equity, as opposed to *domestic* debt financing captured by parameter $\omega \in [0, 1]$.

Cross-border capital markets frictions

- Broadly speaking, the banking literature has identified two effects of equity financing on bank incentives:
  - *Debt as a discipline device (ω low):* When bankers can divert funds, 'hard' debt claims 'hold management's feet to the fire' by committing them to return funds to creditors (Calomiris & Kahn (1991)).
  - *'Skin in the game' and risk-shifting (ω high):* An opposing view is that more equity capital provides banks with more 'skin in the game', making creditors more willing to supply funds to the bank.
- How does cross-border external finance shapes incentives, especially when provided by foreign banks?
  - Parameter ω controls divertibility/riskiness of AE investment in EME banks, but also affects EME banker's external finance choice.

EME bankers' problem

- Bankers choose the scale of operations and external finance mix to maximize the discounted value of their claim on the bank next period ($\sigma = 0$):

$$\begin{aligned} \max_{d_t, b_t} V_t &= E_t \Lambda_{t,t+1} n_{t+1} \\ s.t. V_t &\geq \theta \left(Q_t s_t - \omega Q_{B,t} b_t \right) = \theta \underbrace{\left(d_t + (1-\omega) Q_{B,t} b_t + n_t \right)}_{G_t} \end{aligned}$$

with FOC

$$\begin{aligned} (1+\lambda_t) \frac{\partial V_t}{\partial d_t} &= \theta \lambda_t \frac{\partial G_t}{\partial d_t} \\ (1+\lambda_t) \underbrace{E_t \Lambda_{t,t+1} \left(R_{K,t+1} - R_t \right)}_{\mu_t^{KD}} &= \theta \lambda_t \end{aligned}$$

$$\begin{aligned} (1+\lambda_t) \frac{\partial V_t}{\partial b_t} &= \theta \lambda_t \frac{\partial G_t}{\partial b_t} \\ (1+\lambda_t) \underbrace{E_t \Lambda_{t,t+1} \left(R_{K,t+1} - R_{B,t+1} \right)}_{\mu_t^{KB}} &= \theta (1-\omega) \lambda_t \end{aligned}$$

EME bankers' choice of external finance

- If domestic debt cheaper than foreign equity ($\omega > 0$), issuing a unit of debt more profitable than issuing a unit of equity. But outside equity issuance tightens the banks borrowing constraint at a slower rate $\theta(1-\omega)$.
  - The bank's optimal domestic debt-foreign equity mix trades-off these effects:

$$\begin{aligned} \theta &> \frac{\mu_t^{KB}}{(1-\omega)} = \mu_t^{KD} > 0 \\ \underbrace{E_t \Lambda_{t,t+1} \left(R_{B,t+1} - R_t\right)}_{\mu_{b,t}^*} &= \omega \underbrace{E_t \Lambda_{t,t+1} \left(R_{K,t+1} - R_t\right)}_{\mu_t^*} \\ d_t &= \frac{\nu_t^K - \theta}{\theta - \mu_t^{KB}} n_t - (1-\omega) Q_t^b b_t \end{aligned}$$

- When $\omega = 1$, marginal return on outside equity zero $\left(\mu_t^{KB} = 0\right)$, very expensive to issue it.

EME bank (de)leveraging and foreign financing

- The macro-level cyclicality of bank leverage and foreign funding will be driven by banks' micro-level incentives to equate the profitability of domestic and foreign funding at the margin:

$$Q_t s_t = \frac{\theta - \mu_t^{KD}}{\nu_t^K} n_t + \omega Q_t^b b_t$$

  - On the one hand, AE capital destruction transpires into an EME recession and deleveraging through capital outflows.
  - On the other hand, not clear that other shocks that lower expected future returns (raising Q_t) should result in relatively more foreign equity funding, rather than in bank asset growth fueled by cheaper domestic deposits.

- Is EME bank deleveraging in the model driven by capital outflows for all shocks? What are the implications for MacroPru policy? Is it always about managing capital flows? Or about making leverage less procyclical as for AE capital shocks?

Modeling EME bankers' external finance

- Different ways of modelling AE bank funding of EME, introducing some mismatches
- Currency mismatch: Payoff indexed to AE real exchange rate

$$
\begin{aligned}
R_{B,t} &= \frac{\varepsilon_{t-1}}{\varepsilon_t}\Psi_t \frac{Z_t + (1-\delta)\,\frac{\varepsilon_t}{\varepsilon_{t-1}} Q_{B,t}}{Q_{B,t-1}} \\
R^{AE}_{B,t} &= \frac{\varepsilon_t}{\varepsilon_{t-1}} R_{B,t} = \Psi_t \frac{\varepsilon_{t-1} Z_t + (1-\delta)\,\varepsilon_t Q_{B,t}}{\varepsilon_{t-1} Q_{B,t-1}}
\end{aligned}
$$

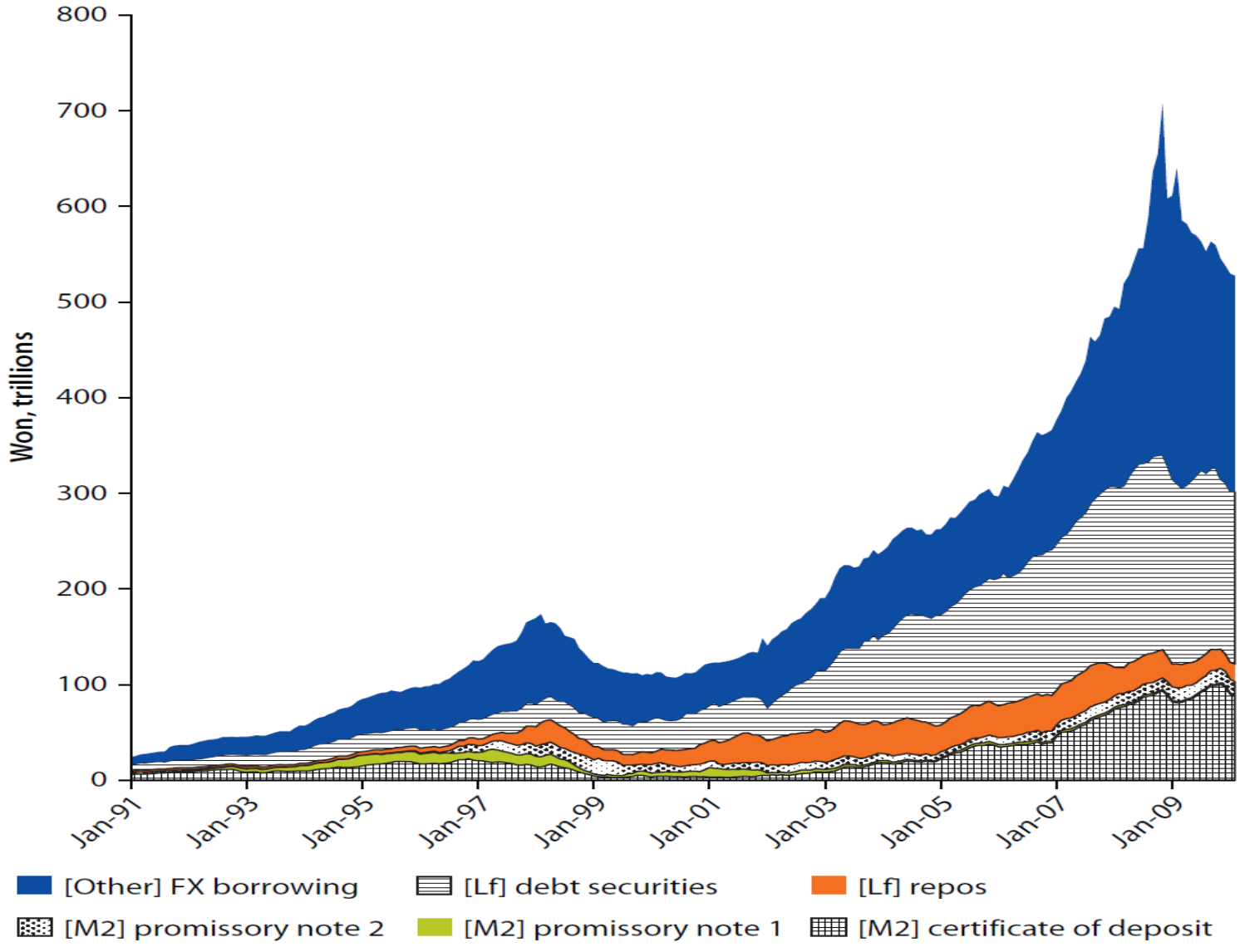
  - Maturity and currency mismatch: (Short-term $\delta = 1$) deposit indexed to AE real exchange rate:

$$
\begin{aligned}
R_{B,t} &= \frac{\varepsilon_{t-1}}{\varepsilon_t} \frac{z + (1-\delta)\,\frac{\varepsilon_t}{\varepsilon_{t-1}} Q_{B,t}}{Q_{B,t-1}} \\
R^{AE}_{B,t} &= \frac{\varepsilon_t}{\varepsilon_{t-1}} R_{B,t} = \frac{\varepsilon_{t-1} z + (1-\delta)\,\varepsilon_t Q_{B,t}}{\varepsilon_{t-1} Q_{B,t-1}}
\end{aligned}
$$

Core and non-core liabilities

- Outside equity (e.g. preferred stock) could even qualify as Additional Tier 1 capital under the Basel III regulatory definition.
  - But claims held by (foreign) banks, systemic risk/interconnectdness undermine loss absortion role?
- Different implications in terms of cyclicality of bank balance sheet risk, leverage and capital flows.
  - AE banks likely to retrench from EMEs anyway in response to capital quality shock?
- Some MacroPru tools geared especially toward these mismatches (levy on FX liabilities, Shin 2010).

Figure 1.13 Noncore Liabilities of the Korean Banking Sector



Source: Shin and Shin 2010.

Constrained efficient macroprudential policies?

- The presence of pecuniary externalities that affect financially constrained agents (banks) through their borrowing constraints means that the laissez-faire equilibrium in this model need not be constrained efficient.
  - By the theory of the second best, additional 'distortions' have the potential to improve welfare.
- We can think of a (second-best) allocation achieved by a constrained social planner, who faces the same market structure as the competitive economy, but, unlike the private agents, incorporates that individual decisions affect equilibrium prices.
  - See definitions in Davila et al. (2012) rather than e.g. Bianchi (2010) and Korinek (2011) — collateral and wealth externalities.

The planner's problem

- The planner would internalize both margins of external finance, to affect the size and composition of bank liabilities (simpler with $\sigma = 0$):

$$\begin{aligned}
\max_{d_t, b_t} V_t &= E_t \Lambda_{t,t+1} n_{t+1} \\
s.t. V_t &\geq \theta \left(Q_t s_t - \omega Q_{B,t} b_t \right) = \theta \underbrace{\left(d_t + (1-\omega) Q_{B,t} b_t + n_t \right)}_{G_t}
\end{aligned}$$

$$\begin{aligned}
\nu_t^K &> \theta > \frac{\mu_t^{KB}}{(1-\omega)} = \mu_t^{KD} > 0 \\
d_t &= \frac{\nu_t^K - \theta}{\theta - \mu_t^{KB}} n_t - (1-\omega) Q_{B,t} b_t,
\end{aligned}$$

$$\begin{aligned}
\frac{\partial V_t^{SO}}{\partial d_t} \Big/ \frac{\partial G_t^{SO}}{\partial d_t} &= \theta \frac{\lambda_t^{SO}}{1+\lambda_t^{SO}} \\
\frac{\partial V_t^{SO}}{\partial b_t} \Big/ \frac{\partial G_t^{SO}}{\partial b_t} &= \theta (1-\omega) \frac{\lambda_t^{SO}}{1+\lambda_t^{SO}}.
\end{aligned}$$

Decentralization

- First, a system of taxes and subsidies could be designed so as to induce banks to choose the socially optimal external finance:

$$\begin{aligned}
\max_{d_t, b_t} V_t &= E_t \Lambda_{t,t+1} \left[\begin{array}{c} R_{K,t+1} n_t + (1 - \tau_{D,t}) (R_{K,t+1} - R_t) d_t + \\ + (1 - \tau_{B,t}) (R_{K,t+1} - R_{B,t+1}) Q_{B,t} b_t \end{array} \right] \\
s.t. V_t &\geq \theta (Q_t s_t - \omega Q_{B,t} b_t) = \theta \underbrace{(d_t + (1 - \omega) Q_{B,t} b_t + n_t)}_{G_t}
\end{aligned}$$

with FOC

$$\begin{aligned}
(1 - \tau_{D,t}) \mu_t^{KD} &= \theta \frac{\lambda_t}{1 + \lambda_t} \\
(1 - \tau_{B,t}) \mu_t^{KB} &= \theta (1 - \omega) \frac{\lambda_t}{1 + \lambda_t}
\end{aligned}$$

- Tax/subsidy can be picked with simple rule as in paper.
- But also interesting to replicate constrained efficient allocation:

$$\begin{aligned}
\frac{\partial V_t^{SO}}{\partial d_t} \Big/ \frac{\partial G_t^{SO}}{\partial d_t} &= \theta \frac{\lambda_t^{SO}}{1+\lambda_t^{SO}} = (1-\widehat{\tau}_{D,t})\,\widehat{\mu}_t^{KD} \\
\frac{\partial V_t^{SO}}{\partial b_t} \Big/ \frac{\partial G_t^{SO}}{\partial b_t} &= \frac{\theta\,(1-\omega)\,\lambda_t^{SO}}{1+\lambda_t^{SO}} = (1-\widehat{\tau}_{B,t})\,\widehat{\mu}_t^{KB}.
\end{aligned}$$

MacroPru quantity controls

- Second, the regulator could impose direct restrictions on the bank's balance sheet ratios, such as a capital requirement that binds on the bank's ratio of equity to assets:

$$\gamma_t Q_t s_t = n_t + Q_{B,t} b_t$$
$$=> d_t = \frac{1-\gamma_t}{\gamma_t} (n_t + Q_{B,t} b_t)$$

  which says that the capital ratio (inverse leverage ratio) must correspond to that set by the regulatory authority.
- The rationale for a leverage cap rests on the role of bank capital as a constraint on new lending rather than the (Basel) approach of bank capital as a buffer against loss.

Which macroprudential policies?

- Clearly we can now replicate only the ratio of the optimal tax/subsidy (or one of them):

$$\frac{\gamma_t \mu_t^{KB} + (1-\gamma_t)\,\mu_t^{KD}}{\gamma_t\,(1-\omega) + (1-\gamma_t)} = \frac{(1-\widehat{\tau}_{B,t})}{(1-\widehat{\tau}_{D,t})\,\widehat{\mu}_t^{KD}} \frac{\widehat{\mu}_t^{KB}}{1-\omega} = \theta \frac{\lambda_t^{SO}}{1+\lambda_t^{SO}}$$

- Paper looks at simple rule for setting rate on foreign borrowing $\tau_{B,t}$, welfare gains seems large — Also large distortions relative to first best?
  - Interesting to compare with capital ratios, gains from prudential tool vs capital controls?

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  - Interesting to compare with capital ratios, gains from prudential tool vs capital controls?
  - Efficient benchmark against simple rules responding to indicators.

Conclusions

- Neat paper on a very hot and important topic.
  - MPP could require capital flow management even when borrowing not in foreign currency.
- Very rich, many moving pieces, many issues to think about.
  - Especially better account of model properties, drivers of policy results (lower volatility,lower average distortions).
- This richness is not fully exploited yet.
  - Mismatches in bankig cross-border flows, theoretically sounder policies.