

# The Disturbing Interaction Between Countercyclical Capital Requirements and Systemic Risk

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# Motivation

- ▶ How does policy intervention in one dimension of systemic risk affect incentives in the other dimension? Interaction of countercyclicality and cross-sectional systemic risk.

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- ▶ Basel III: National counter-cyclical capital buffer (2.5% of risk weighted assets)

# Motivation

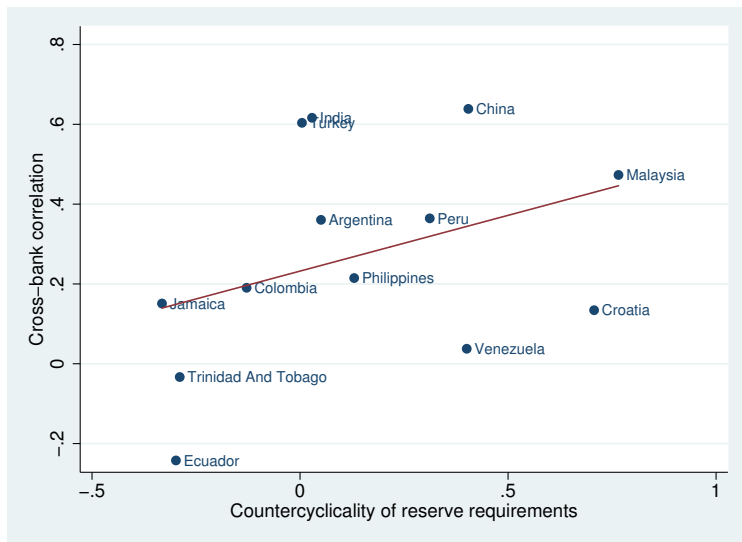


Figure 1: Data from Federico, Vegh and Vuletin (2012) and Datastream

# This paper

New insight: counter-cyclical macroprudential regulation insulates banks from sector-wide fluctuations, but not against idiosyncratic shocks  $\Rightarrow$  incentive to take correlated risk exposures

## Main results

- ▶ Systemic risk shifting
- ▶ Optimal capital regulation can achieve less correlated balance sheets by reducing countercyclicality
- ▶ Lack of credibility exacerbates the correlation-countercyclicality tradeoff

- ▶ Procyclicality
  - ▶ Procyclicality of capital (Blum and Hellwig (1995) and many others)
  - ▶ Haircuts and margining practices (CGFS (2010))
  - ▶ Loan-loss provisioning (Borio et al. (2001))
  - ▶ Interaction between the valuation of collateral and LTV (Kiyotaki and Moore (1997))
- ▶ Cross-sectional systemic risk
  - ▶ Herding (Rajan (1994), Acharya and Yorulmazer (2007), Wagner (2010), Farhi and Tirole (2012))
  - ▶ Contagion (Allen and Gale (2000))
- ▶ Counter-cyclical capital regulation
  - ▶ Kashyap and Stein (2004), Repullo and Suarez (2012)

# The model

- ▶ Two banks (A and B), fixed investment size, projects return  $R > 1$  with probability  $p > 0$  and zero otherwise. Monitoring increases  $p$  to  $p + \Delta p < 1$  at a (non-monetary) cost of monitoring  $c$  per project.
- ▶ Banks financed by deposit and equity. Banks pay a fair, risk insensitive deposit insurance fee  $f$ .  $\Rightarrow$  moral hazard: banks only monitor if  $k \geq \bar{k}$ . But capital is costly relative to deposits.
- ▶ Standard model so far...

# The model

Three additional elements:

- ▶ Capital cost  $\rho$  is uncertain (uniform, but the results hold for general distribution functions).  $\Rightarrow$  Countercyclical CR.
- ▶ Funding shock with probability  $p_F$  + assets can be sold to the surviving bank.  $\Rightarrow$  Systemic costs.
- ▶ Endogenous cross-bank correlation: each bank can either choose systemic funding (common to both banks) or alternative funding (bank-specific).
  - ▶ If both banks systemic, then both capital costs and funding shocks are perfectly correlated. Otherwise both are uncorrelated.
  - ▶ E.g. global vs regional capital markets



# The model

## Important features

- ▶ Credit crunch with probability  $p_F$  if both banks choose systemic funding and with probability  $p_F^2$  otherwise.
  - ▶ Social cost of systemic crises: forgone investments.
- ▶ Systemic capital costs  $\rho^S$ : key source of uncertainty – proxy for the aggregate state of the economy

# Timing and decision variables

1. Policy maker announces capital requirement rule.
  - ▶ Regulator cannot condition on bank specific variables  $(\rho^A, \rho^B)$ , only on the aggregate state  $(\rho^S)$ .
2. Banks choose funding type (correlation).
3. Capital costs and funding shocks materialise, then banks make the monitoring decision.

# First best policy

## Proposition 1

*The optimal policy rule is countercyclical:  $\text{Cov}(k^*, \rho^S) < 0$ .*

$$k^*(\rho^S) = \begin{cases} \bar{k} & \text{if } \rho^S \leq \hat{\rho}^* \\ 0 & \text{otherwise} \end{cases}$$

The reason: if capital costs are high (bad state), the cost of incentivising banks to monitor outweigh the benefits of it.

## Proposition 2

*Correlated funding is optimal if and only if  $p_F < p^{FB}$ .*

The optimal funding mix might entail high or low correlation depending on the relative costs of countercyclicity and systemic crises.

## Decentralized outcome I

By backward induction. Banks play the following Nash game:

|                   | Strategies of bank A |                   |
|-------------------|----------------------|-------------------|
|                   | Systemic (S)         | Idiosyncratic (I) |
| Systemic (S)      | $\pi^S$              | $(1 + p_F)\pi^I$  |
| Idiosyncratic (I) | $(1 + p_F)\pi^S$     | $(1 + p_F)\pi^I$  |

Table 1: Expected payoff matrix of Bank A conditional on surviving

$\pi^S$  and  $\pi^I$  are private per-project payoffs with systemic and idiosyncratic funding, respectively. Countercyclical rule  $k$  is still optimal. Hence:

$$\pi^S - \pi^I = -\text{Cov}(k, \rho^S) > 0$$

## Decentralized outcome II

### Proposition 3

*For a given policy, banks may choose correlated funding even though mixed funding (low correlation) is optimal.  $\Rightarrow$  The first best outcome may not be attainable.*

Why? Banks do not internalize the impact of choosing systemic funding on other banks' payoffs. Choosing systemic funding eliminates other banks' option to buy up a failing bank's assets, if they chose systemic funding.  $\Rightarrow$  negative systemic externality.

## Second best policy

The regulator chooses  $\hat{\rho}$ , describing the countercyclicality of the capital requirement rule.

### Proposition 4

*Presume the first best is not attainable. Then the second best policy can be characterised by*

$$\hat{\rho} = \begin{cases} \hat{\rho}^{\{S,S\}*} & \text{if } p_F < p^{SB} \\ \tilde{\rho} & \text{otherwise} \end{cases}$$

- ▶ If  $p_F < p^{SB}$  banks choose correlated funding. If  $p_F \geq p^{SB}$  banks choose mixed funding and hence, low correlation.
- ▶ The policy rule indexed by  $\tilde{\rho}$  is less countercyclical than the first best rule.

## Policy implications

- ▶ Asymmetry between countercyclical and ex ante cross-sectional policies. The latter reduce both types of risk, the former may be counterproductive. Ex ante measures improve the efficiency of ex post interventions.
- ▶ Could be a source of home-bias in an international setting.
- ▶ Results not confined to capital regulation. The same intuition holds for all kinds of counter-cyclical bank regulation based on aggregate triggers.

# Role of credibility

Note: we assumed that the regulator can commit.

## Proposition 5

*Lack of commitment changes the equilibrium if and only if the policy maker is constrained and finds it optimal to implement mixed funding under commitment. In this case the new equilibrium is given by the policy rule  $\hat{\rho}^{\{S,S\}^*}$  and banks choose correlated funding.*

Reason: *ex post* it is optimal to provide as much aggregate insurance as possible.

The **availability** of countercyclical policy tools may make things worse in the absence of sufficient credibility.



# Summary

- ▶ Procyclicality and systemic risk are inherently related.
- ▶ Counter-cyclical bank regulation might induce inefficient systemic risk shifting.
- ▶ Lack of credibility worsens the problem but it is not necessary for the results.