

# Financial Distortions and the Distribution of Global Volatility

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# Outline

- Big Picture: Real frictions, not financial frictions?
  - Contrast with finance literature
- First proposition (one country world): output more volatile in more distorted economy, average productivity more sensitive to liquidity supply shocks in less distorted economies.
- Integrated, two – country world
- Weakness in financial system in developed country can lead to amplification of negative shocks
  - Contrast with finance literature

# Model: Exogenous production friction

- Construction of production function
  1. Two projects to choose from: good and bad
    - good project, output of 3
    - bad project, output of 1
    -

$$g(n) = \begin{cases} 3 & n = B \\ 1 & n = G \end{cases} \quad (1)$$

2. A project requires one unit of WC (working capital) to implement. If implemented produces  $Ag(n) > 0$ , where
  - $A$  is aggregate productivity
  - $N$ , total amount of WC available
  - Which projects to implement and to how to allocate  $N$  across projects?
3. No 'financial' distortions: implement the good project, and allocate the maximum possible WC to it.
4. 'Financial' distortion index  $\phi$ , larger  $\phi \rightarrow$  more distortion. Implement the wrong project with probability  $\phi$ .
5. **Question:** Is this really a financial distortion? It looks like an exogenous production distortion?

## Model: further details

- Capital is supplied inelastically by households. Suppose supply is  $Q$ .  
In equilibrium

$$N = Q. \quad (2)$$

Rental rate of capital,  $r$ , is marginal product of capital, i.e.

$$r = \frac{\partial Y}{\partial N}. \quad (3)$$

- **Question:** Where does this come from?
- **My answer:** Maximizing present value of profit stream:

$$E_0 \int_0^{\infty} \left[ \frac{\Lambda_t}{\Lambda_0} (Y(N_t) - r_t N_t) \right] dt, \quad (4)$$

where  $\Lambda$  is some stochastic discount factor.

- In this model, there is no role for the impact of financial frictions on  $\Lambda$
- Only frictions are on the real side

## Alternatives views of financial frictions

- Market incompleteness caused by portfolio constraints [Pavlova and Rigobon (2007, 2008), Hnatkowska (2007), Bhamra (2009), Couerdacier and Guibaud (2009)]
  - This impacts SDF,  $\Lambda$ , changing the NPV rule.
- With market incompleteness, we don't even know whether maximizing value of profit stream is the correct objective function [Carceles-Poveda (2004)]

## First proposition

1.

$$\frac{\partial \ln Y}{\partial \ln Q} \quad (5)$$

is higher in more distorted economy.

$Q = N$ . As we increase  $N$  by 1 percent, percentage increase in output will positive. In the more distorted economy, the percentage increase in log output will be larger.

2.

$$\frac{\partial \frac{Y}{Q}}{\partial \ln Q} \quad (6)$$

is higher in *less* distorted economy. Sensitivity of average productivity to percentage changes in capital is lower in a less distorted economy.

- Nice intuition in paper: Figure 1.
- **Question:** How do the above results relate to those on marginal and average  $q$ , and the impact of production frictions?

## Model: Two Country Extension

- Two regions, *emerging market* and *developed*
- Sole source of heterogeneity: level of distortion – emerging market more distorted
- Autarky: as before
- Integrated world

$$N_{em} + N_d = Q_{em} + Q_d \quad (7)$$

$$y_{em}(N_{em}, \phi_{em}) = y_d(N_d, \phi_d) = r \quad (8)$$

- Additional state variable:  $\frac{A_d}{A_{em}}$
- Integration increases differences in vol of log output and log capital across regions – additional state variable. Nice intuition in paper: Figure 2

## Endogenous level of distortion in developed region

- Banks choose  $\phi_d$ :

$$\max_{\phi_d \in \{\phi_d^i, \phi_d^w\}, N_d} \int_0^{N_d} y(N', \phi_d) dN' - rN_d - \lambda(\phi_d = \phi_d^i) \quad (9)$$

- choosing the higher lower level of distortion,  $\phi_d^i$  over over the lower level  $\phi_d^w$  is costly
- Fourth Proposition: if  $r$  is sufficiently low, then banks choose a higher level of distortion (weaker financial system)
- Fifth Proposition: Working capital in developed region is higher under endogenous weakening of the financial system
- Lemma: endogenous weakening of the financial system leads to lower world output
- Sixth Proposition: endogenous weakening of the financial system amplifies output response in developed world to large negative shocks to world  $Q$ .



## Link to subprime crisis

- Weakening of the developed region's financial system leads to:
  1. inflows of capital (higher MP of capital)
  2. increase in the developed region's output
- Negative shock to technology or supply of capital leads to larger drop in output than under autarky.
- Financial integration acts an amplification mechanism for bad shocks.
- Finance literature looks at how completing markets (more integration) can lead to amplification of exogenous shocks to cash flows in stock returns [Bhamra & Uppal (2009)]