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

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

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
  \[ N = Q. \] \hspace{1cm} (2)

Rental rate of capital, $r$, is marginal product of capital, i.e.
\[ r = \frac{\partial Y}{\partial N}. \] \hspace{1cm} (3)

- **Question:** Where does this come from?

- **My answer:** Maximizing present value of profit stream:
  \[ E_0 \int_0^\infty \left[ \frac{\Lambda_t}{\Lambda_0} \left( Y(N_t) - r_t N_t \right) \right] dt, \] \hspace{1cm} (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

  - 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. \[ \frac{\partial \ln Y}{\partial \ln Q} \] 
   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. \[ \frac{\partial \frac{Y}{Q}}{\partial \ln Q}. \]
   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

\[ N_{em} + N_d = Q_{em} + Q_d \]  \hspace{1cm} (7)

\[ y_{em}(N_{em}, \phi_{em}) = y_d(N_d, \phi_d) = r \]  \hspace{1cm} (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 $\phi_d$:

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

(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)]