A Macroeconomist’s Wish List of Financial Data

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Systemic Crises and Data

- Systemic crises manifest themselves first in financial markets.
- Financial crises matter in large part because of effects on nonfinancial sectors.
- How models and data can help:
  - To design policies intended to reduce crisis likelihood.
  - To design policies during crises.
Bottom Line __________________________________________

• What data do we need?
  ○ Financial statements of nonfinancial firms

• Where is the data available?
  ○ Compustat, IRS, banks, and other lenders

• How would this data help?
  ○ Academics develop models
  ○ Policymakers can use real time data
What Data Do We Have and What Do We Need?

- Financial statements of public firms
- Have flow of funds data on all firms
- Need financial statements of nonpublic firms
Why Isn’t Flow of Funds in the Aggregate Enough? _________

- Critique representative firm models of financial frictions

- Focus on models where financial frictions affect investment decisions of firms

- Argue reallocation models more promising
Critique

- How important is access to financial markets for representative firms’ investment decisions?
  - Not very
Importance of Financial Market Access
A Popular View of Business Cycles

- Disturbances to financial system key source of business cycles
  - Bank runs (Diamond-Dybvig)
  - Unexpected deflation with nominal debt (Irving Fisher)
  - Excessive risk-taking due to deposit insurance
A Popular View of Business Cycles

• Some shock hits
  ○ Sunspot (multiple equilibria, bank runs)
  ○ Unexpected deflation (Irving Fisher)

• Investment falls

• Aggregate output falls
Key Ingredients in Representative Firm Models

- Typical firm needs external funds to finance investment
- Agency costs induce wedge between internal and external funds
- Binding collateral constraints
- Fluctuations in wedge/constraint affect investment in a big way
Critique of Representative Firm Models

- Standard representative household

$$\max \sum \beta^t u(c_t, l_t)$$

subject to

$$c_t + k_{t+1} + b_{t+1} \leq w_t l_t + d_t + (1 + r_t) b_t$$

$$b_t \geq -B$$
• Firm’s problem

\[ \max E \sum m_t d_t \]

subject to

- \[ d_t + x_t \leq z_t F(h_t, l_t) - w_t l_t + b_{t+1} - (1 + r_t) b_t \]
- \[ k_{t+1} - b_{t+1} \geq \lambda_t \]
- \[ d_t \geq 0 \]
- \[ k_{t+1} = (1 - \delta) k_t + x_t \]
• Proposition 1: Suppose the enforcement constraint is binding at $t$. Then $d_t = 0$.

• Next, will say financial frictions matter at $t$ if

$$E \frac{m_{t+1}}{m_t} [z_{t+1} F_{k_{t+1}} + 1 - \delta] > 1$$
Critique of Representative Firm Models ________________

• Enforcement constraint given by

\[ H(k_t, k_{t+1}, l_t, b_{t+1}, b_t, S_t) \geq 0 \]

with \( H \) increasing in \( k_{t+1} \)

• Proposition 2. Suppose \( d_t > 0 \). Then financial frictions do not matter at \( t \).
Critique of Representative Firm Models

• What does data say?

• Dividends (in the aggregate) positive and large

• Dividend/corporate GDP = 4%

• Gross investment/corporate GDP = 15%
Figure 1: Net Dividends, U.S. Non-Financial Corporations

Note: See text for description of data.
• Financial friction models working through investment channel
Big issue

- Financial friction models working through investment channel

Model

- Pipes get clogged
Big issue

- Financial friction models working through investment channel

Data

Households/F.I.s  Pipes  Investment flows  Firms

- Problem: In data, flows go other way
Does Typical Firm Borrow to Finance Investment?
Does Typical Firm Borrow to Finance Investment?

No
Does Typical Firm Use External Funds to Finance Investment?

- Use data from Flow of Funds for all nonfinancial corporations

- Available Funds (AF) = Revenues – Wages – Materials
  – Interest payments – Taxes

- In Flow of Funds, AF = Internal funds + Dividends
  Alternatively, AF = Retained earnings + Dividends
  + Depreciation

- In Flow of Funds use Gross Investment for Capital expenditure
Does Typical Firm Use External Funds to Finance Investment?

- Available Funds \(-\text{Dividends} + \text{Net new debt issue} + \text{Net new equity issue}\) = Capital expenditure

- Suppose \(\text{Net new debt issue} = 0\)
  \(\text{Net new equity issue} = 0\)

- That is, firms lose access to financial markets

- Can they finance all investment internally?
Figure 2: Available Funds and Gross Investment, U.S. Non-Financial Corporations

Note: See text for description of data.
Figure 3: Available Funds and Gross Investment by Asset Class

Note: See Appendix for description of data.
Does Typical Firm Use External Funds to Finance Investment?

- No, for aggregate of U.S. corporations

- Financial markets may play a big role in reallocating funds from cash-rich, project-poor firms to cash-poor, project-rich firms

- Use disaggregated data to analyze reallocation
Does Typical Firm Use External Funds to Finance Investment?

- Use data from Compustat

- Compute available funds for each firm, each time period

- $AF_{it} = \text{Available funds for firm } i \text{ in period } t$

- $I_{it} = \text{Gross investment by firm } i \text{ in period } t$

- How much would $I_{it}$ fall if no firm can invest more than $AF_{it}$
Does Typical Firm Use External Funds to Finance Investment?

- Use of external funds to finance investment

\[ EF = \frac{1}{T} \sum_{t=1}^{T} \frac{\sum_{i} ((I_{it} - AF_{it}) \mid I_{it} > AF_{it})}{\sum_{i} I_{it}} \]

- In data, financial market constraints = 23% of investment financed by external funds

- Interpretation: If firms had no access to financial markets, investment would have fallen by 23%

- This is exceptionally extreme exercise
Figure 4: Available Funds and Gross Investment, COMPUSTAT Non-Financial Corporations

Note: See text for description of data.
Figure 5: External Funding Measure, COMPUSTAT Non-Financial Corporations

Note: See text for description of data.
Does Typical Firm Use External Funds to Finance Investment?

- No, for aggregate of U.S. corporations
- In disaggregated data
  - Publicly held firm: 77% of investment financed internally
  - Privately held firm: only 10% of investment financed internally
- Reallocation Channel promising for privately held firms. Needs models with heterogeneous firms
How do existing models handle problem? ________________

• Introduce adjustment costs

• Costly for firms to change dividends

• Costly for households to alter portfolios

• How do we discipline our measures of these costs?
A Simple Reallocation Model

- Continuum of entrepreneurs: \( \sum \beta_t \log c_t \)
- Workers supply labor, consumers labor income
- Idiosyncratic shocks to technology
  \( A_t F(h_t, l_t) \)
- Entrepreneurs can save using capital and “money”
- Stationary monetary and nonmonetary equilibria
A Simple Reallocation Model

• Entrepreneur’s problem

$$\max E \sum \beta^t \log c_t$$

subject to

○ $$c_t + k_{t+1} + m_{t+1} \leq A_t h_t^\alpha l_t^{1-\alpha} - wl_t + m_t$$

○ $$k_{t+1} \geq 0, m_{t+1} \geq 0$$

○ $$A_{t+1} = \overline{A}$$ with probability $$\pi$$ or 0 with probability $$1 - \pi$$. I.I.D. over time. Know $$A_{t+1}$$ in period $$t$$. 
A Simple Reallocation Model

- Let $W_t = (R(A_t) + 1 - \delta)h_t + m_t$

- Then get policy functions
  - $c_t = (1 - \beta)W_t$
  - $k_{t+1} + m_{t+1} = \beta W_t$

- If $A_{t+1} = \bar{A}$, save using capital only
- If $A_{t+1} = 0$, save using money only
A Simple Reallocation Model

- Constant returns to scale + labor = 1 implies output in stationary equilibrium

\[ Y = \frac{w}{1-\alpha} \]

- Need only to solve for wage rate to compare output in two equilibria

- Aggregate wealth satisfies

\[ \bar{W}_{t+1} = \pi(R(\bar{A}, w) + 1-\delta)\beta \bar{W}_t + (1-\pi)\beta \bar{W}_t \]

- Return on capital \( R(\bar{A}, w) \) given by

\[ R(\bar{A}, w) = \alpha \bar{A}^{\frac{1}{\alpha}} \left( \frac{1-\alpha}{w} \right)^{\frac{1-\alpha}{\alpha}} \]
A Simple Reallocation Model

- In nonmonetary equilibrium, can only save using capital

- So aggregate wealth evolution given by

\[ \bar{W}_{t+1} = \pi(R(\bar{A}, w) + (1 - \delta))\beta \bar{W}_t + (1 - \pi)(1 - \delta)\beta \bar{W}_t \]

- Same procedure to calculate wage rate
A Simple Reallocation Model

• How to calibrate $\pi$?

• Can use external finance measure

• Can show

$$EF = \frac{(1 - \pi)\beta}{\delta}$$

• So, if $EF = 0.23$ (Compustat), get 0.7% lower output in nonmonetary equilibrium

• If $EF = 0.9$ (Amadeus), get 3% lower output in nonmonetary equilibrium
A Simple Reallocation Model

- Kocherlakota’s interpretation of Kiyotaki-Moore
- Entrepreneurs hold “land,” intrinsically worthless
- Can borrow against “land”

\[ c_t + ph_{t+1} + b_{t+1} + x_t \leq R_t k_t + ph_t + (1 + r)b_t \]

- \[ b_{t+1} \geq ph_{t+1} \]

- With \( r = 0 \), two problems identical
• Representative firm model useless with financial friction

• Reallocate model promising

• Real action seems to be with privately held firms

• Let us follow Shourideh and Zetlin-Jones (2012)

• Need financial data (or at least $EF$) for privately held firms