Modeling of financial intermediation... or the lack of it

- Economic (macro) development: financial intermediaries reallocate capital across heterogeneous producers
Simple Theoretical Framework

Entrepreneurs’ problem

\[ v_t^E(k, b, z) = \max_{c, l, k', d'} u(c) + \beta E \left[ \max\{v_{t+1}^E(k', d', z'), v_{t+1}^W(d', z')\} \right] \]
\[ c + k' + b' = zf(k, l) - w_t l + (1 - \delta)k + (1 + r_t)b \]
\[ -b' \leq \phi_t k' \]

Worker’s problem

\[ v_t^W(b, z) = \max_{c, k', b'} u(c) + \beta E \left[ \max\{v_{t+1}^E(k', d', z'), v_{t+1}^W(d', z')\} \right] \]
\[ c + k' + b' = w_t + (1 + r_t)b \]
\[ -b' \leq \phi_t k' \]

Occupational choice: \( o(k, b, z) \in \{E, W\} \)
Competitive Equilibrium

Given an initial joint distribution $G_0(k, b, z)$, a competitive equilibrium is given by sequences of joint distributions $\{G_{t+1}(k, b, z)\}_{t=1}^{\infty}$, allocations... and prices $\{w_t, r_r\}_{t=0}^{\infty}$ such that:

- given prices, allocations solve individual’s problems (Bellman equations in the previous slide)
- markets clear all $t$

$$\int bG_t(dk, db, dz) = 0 \ldots$$

- the joint distribution $G_t(k, b, z)$ evolves according to the equilibrium mapping...
Relationship to the Flow of Funds

- Business sector
  
  - Assets

  \[
  \int_{o=E} kG_t(dk, db, dz) \quad \text{(nonfin. assets)}
  \]

  - Liabilities

  \[
  - \int_{b \leq 0} bG_t(dk, db, dz) \quad \text{(debt)}
  \]

  \[
  \int_{o=E} kG_t(dk, db, dz) + \int_{b \leq 0} bG_t(dk, db, dz) \quad \text{(equity)}
  \]
Relationship to the Flow of Funds (cont’d)

- Household sector
  - Assets
    \[
    \int_{b \geq 0} bG_t(dk, db, dz) \quad \text{(bonds)}
    \]
    \[
    \int_{o=E} kG_t(dk, db, dz) + \int_{b \leq 0} bG_t(dk, db, dz) \quad \text{(equity)}
    \]
  - Liabilities
    \[
    0
    \]
Interesting Questions

- What is the contribution of financial intermediation to economic development?

- What are the consequences of financial crisis?
Private Credit to GDP vs. Per-Capita Income

Private Credit to GDP

USA
KEN
IND BRA
FRA
GRE

per-capita income (US$, PPP)
Per-Capita GDP and TFP

per-capita GDP vs. external finance, model and data

TFP vs. external finance, model and data
US History: The Role of Regulations and Crisis

Private Credit to GDP

years

1900 1920 1940 1960 1980 2000

0 0.5 1 1.5 2 2.5
Credit Crunch in a Model Economy

![Graph showing credit / capital from 2008 to 2016. The graph compares data and model predictions.](image_url)
Broader Quantitative Macro Literature

- Consumer unsecured credit: Athreya et al. (2012), Chatterjee et al. (2007), Livshits et al. (2007), Sanchez (2010)
- Household mortgages: Kiyotaki et al. (2010),...
- Corporate savings: Armenter and Hnatkovska (2011),...
Quantitative Theory and Flow of Funds?

• Theory way ahead of measurement...

• ...although there are significant computational bottlenecks.