

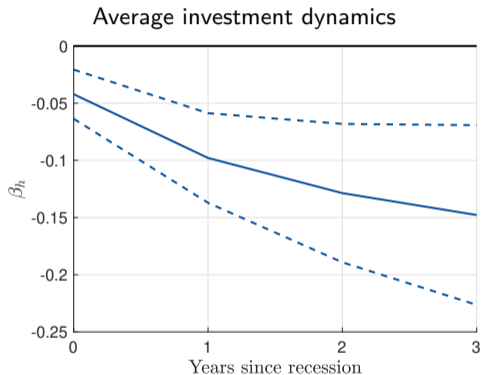
# Discussion of “Monetary Policy and Firm Dynamics: The Financial Channel”

by Aruoba, Fernández, Lopez-Martin, Lu, and Saffie

Pablo Ottonello  
Michigan & NBER

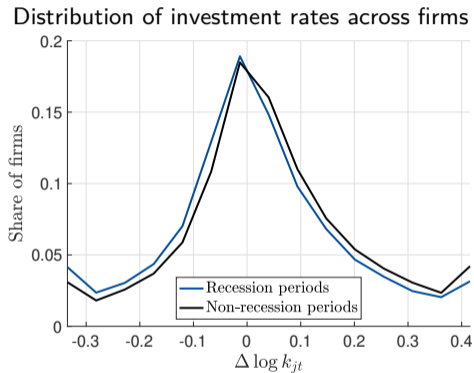
*XXV Annual Conference of the Central Bank of Chile:  
“Heterogeneity in Macroeconomics: Implications for Monetary Policy”  
Santiago, Chile, November 22, 2022*

# Motivation: Firms' Investment During U.S. Recessions



$$\log k_{jt+h} - \log k_{jt-1} = \alpha_{jh} + \beta_h \text{recession}_t + e_{jt}$$

Data source: Compustat



# Paper Summary

- **Question:** how do firms with different financial positions respond to monetary policy?
  - ▶ Answer is theoretically ambiguous
- Most existing evidence comes from publicly traded, large firms
- Paper addresses question using **unique dataset**: universe of firms, monthly frequency, real and financial variables
- **Findings:**
  1. Response to monetary policy shocks is driven by firms with access to debt markets
  2. Risky firms increase their investment by less in response to monetary expansions and contract their investment by more in response to monetary contractions

⇒ Financial positions matter for investment response to changes in monetary policy
- **Discussion:** sources of financial heterogeneity and model mechanisms

# Types of Firms Studied

- **Firms with access to debt markets**
- Firms without access to debt markets
  - ▶ Firms that never borrowed
  - ▶ Firms excluded following default

# The Response of Firms With Access to Debt Markets

- Consider a version of the model with
  - ▶  $\omega = 0$ ,  $\underline{v}(\cdot) = 0$ , capital price  $q_{k,t}$  instead of adjustment costs  $g(x, k)$
  - ▶ GE effects of monetary policy: prices  $w_t, q_{k,t}$
- Optimal investment choice:

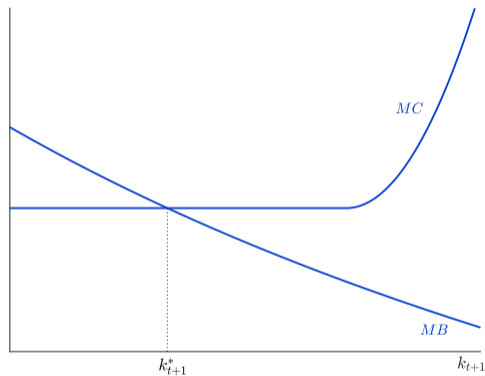
$$\text{Flow-of-funds constraint : } \underbrace{q_{k,t}x}_{\text{investment}} = \underbrace{\pi_t(z, k) - div}_{\text{earnings net of dividends}} + \underbrace{q_t(z, k', b')b' - b}_{\text{borrowing}}$$

$$\text{Euler : } \left( q_{k,t} - \varepsilon_{Q,k'} \frac{q_t b'}{k'} \right) \frac{R_t^{\text{SP}}(z, k', b')}{1 - \varepsilon_{R,b'}} = \frac{1}{R_t} \left( \mathbb{E}_t [\text{MRPK}_{t+1}(z', k')] + \frac{\text{Cov}_t(\text{MRPK}_{t+1}(z', k'), \lambda_{t+1}(z', k', b'))}{\mathbb{E}_t[\lambda_{t+1}(z', k', b')]} \right)$$

$$\text{where } \text{MRPK}_{t+1}(z', k') = \frac{\partial \pi_{t+1}(z', k')}{\partial k'} + q_{t+1}(1 - \delta)$$

# Firms' Optimal Investment

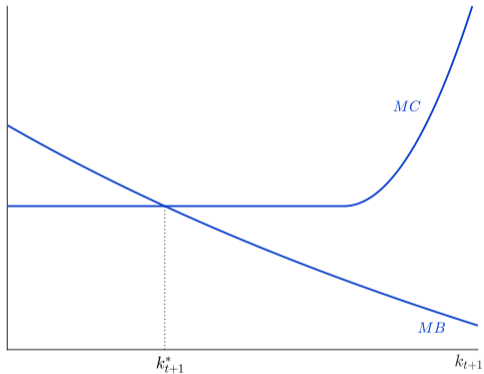
(a) Risk-free Firms



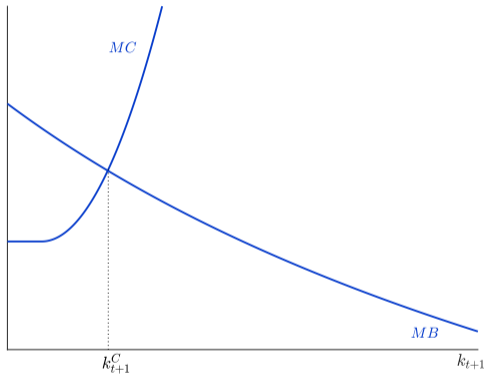
$$q_{k,t} = \frac{1}{R_t} \left( \mathbb{E}_t [\text{MRPK}_{t+1}(z', k')] + \frac{\text{Cov}_t(\text{MRPK}_{t+1}(z', k'), \lambda_{t+1}(z', k', b'))}{\mathbb{E}_t[\lambda_{t+1}(z', k', b')]} \right)$$

# Firms' Optimal Investment

(a) Risk-free Firms



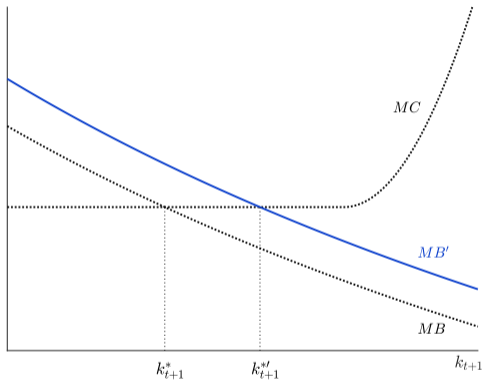
(b) Risky Firms



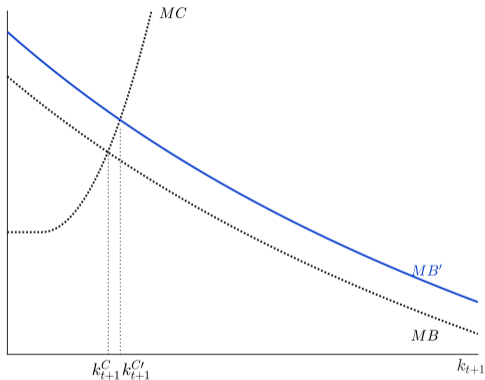
$$\left( q_{k,t} - \varepsilon_{R,k'} \frac{q_t b'}{k'} \right) \frac{R_t^{\text{sp}}(z, k', b')}{1 - \varepsilon_{R,b'}} = \frac{1}{R_t} \left( \mathbb{E}_t [\text{MRPK}_{t+1}(z', k')] + \frac{\text{Cov}_t(\text{MRPK}_{t+1}(z', k'), \lambda_{t+1}(z', k', b'))}{\mathbb{E}_t[\lambda_{t+1}(z', k', b')]} \right)$$

# Firms' Differential Response: Decrease in Risk-free Rates

(a) Risk-free Firms



(b) Risky Firms

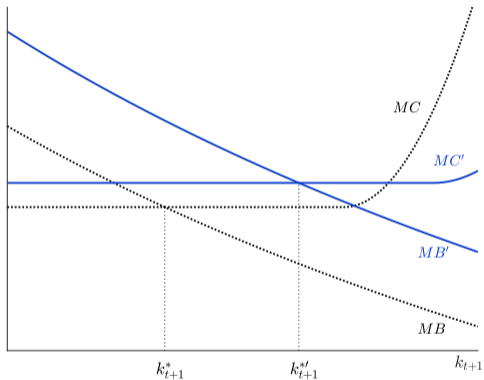


- Model is **consistent with empirical evidence** that within firms with access to debt markets, risky firms' investment is less responsive to monetary expansions

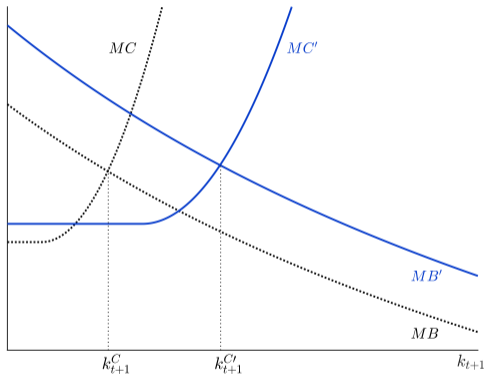


# Firms' Differential Response: GE Effects

(a) Risk-free Firms



(b) Risky Firms



- **Additional channels:** Demand, price of capital, cash flows, recovery values

# Types of Firms Studied

- Firms with access to debt markets
- **Firms without access to debt markets**
  - ▶ **Firms that never borrowed**
    - Finding:** Firms without debt exhibit little response to monetary policy shocks
  - ▶ Firms excluded following default

# The Response of Firms Without Access to Debt Markets

Optimal investment choice (conditional on not borrowing):

$$\text{Flow-of-funds constraint : } \underbrace{q_{k,t}x}_{\text{investment}} = \underbrace{\pi_t(z, k) - div}_{\text{earnings net of dividends}} + \underbrace{\left(-b + \frac{1}{R_{f,t}} b'\right)}_{\text{financing from liquid assets}}$$

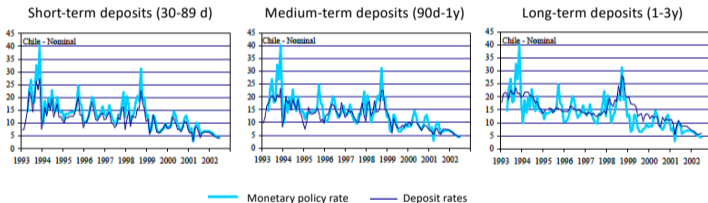
$$\text{Portfolio choice : } \mathbb{E}_t \left[ \frac{\lambda_{t+1}(z', k', b') \text{MRPK}_{t+1}(z', k')}{q_{k,t}} \right] = R_{f,t} \mathbb{E}_t [\lambda_{t+1}(z', k', b')] + \mu_t(z, k, b)$$

- Paper considers conditions that dampen response:
  1. **Interest rates** of firms' liquid assets do not change with monetary policy
  2. There are no **GE effects**

# Interest Rates in Chile

- What type of liquid assets do Chilean firms with no debt hold? What is their interest rate pass-through?
- Bank deposit rates track monetary policy rate

## Deposit Rates and Monetary Policy Rate



Source: Espinosa-Vega and Rebucci

- What level liquid assets do Chilean firms without debt hold?
  - ▶ Álvarez Sagner Valdivia (2012) report cash-to-asset above average for small firms Chilean firms

# The Response of Firms Without Access to Debt Markets

Optimal investment choice (conditional on not borrowing):

$$\text{Flow-of-funds constraint : } \underbrace{q_{k,t}x}_{\text{investment}} = \underbrace{\pi_t(z, k) - \text{div}}_{\text{earnings net of dividends}} + \underbrace{\left(-b + \frac{1}{R_{f,t}} b'\right)}_{\text{financing from liquid assets}}$$

$$\text{Portfolio choice : } \mathbb{E}_t \left[ \frac{\lambda_{t+1}(z', k', b') \text{MRPK}_{t+1}(z', k')}{q_{k,t}} \right] = R_{f,t} \mathbb{E}_t [\lambda_{t+1}(z', k', b')] + \mu_t(z, k, b)$$

- Paper considers conditions that dampen response:
  1. Interest rates of firms' liquid assets do not change with monetary policy
  2. There are no GE effects

⇒ Potentially need **additional frictions** to explain inaction of firms without debt

# Additional Sources of Financial Heterogeneity #1: Type of Debt Contract

- Model's mechanism highlights heterogeneity in **pass-through of firms' interest rates**
- Mechanism could be further linked to the data by studying heterogeneity in investment responses by type of interest rate: fixed, variable, mixed
- Are firms that borrow with flexible rates more responsive to monetary policy?  
(e.g, Ippolito Ozdagli Perez-Orive, 2018)
- Can (extended) model match differential investment responses by type of interest rate?

# Additional Sources of Financial Heterogeneity #2: Debt Currency Denomination

- Balance sheet effects from **currency mismatch** and **contractionary devaluations** are a central consideration for monetary policy in emerging markets

Aghion Bacchetta Banerjee 2001, Braggion Christiano Roldos, 2009, Ottonello 2015, Auclert Rognlie Souchier Straub 2021

- Chile has a small fraction of firms borrowing in foreign currency (12%)
- However, the empirical analysis could provide evidence on firms' heterogeneous investment responses by debt currency denomination
- Are firms with debt denominated in foreign currency **less responsive to monetary policy**?
  - ▶ Source of heterogeneity complementing current focus and valuable evidence for the field

# Conclusions

- Very interesting paper!
- Excellent data quality, which pushes the frontier for the evidence of firms' heterogeneous responses to monetary policy
- Would consider enriching the model to account for the lack of response of firms without debt and but with liquid assets
- Paper also has the potential to analyze other key sources of financial heterogeneity