Monetary Policy and Employment: Do Financial Constraints Matter?

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Wake Forest Empirical Macro Workshop

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Summary

- Question: do constrained firms react (adjust employment) more or less in response to monetary policy shock?
- Approach: combine administrative data on Canadian SMEs with survey asking subset of firms about their credit use
  - Predict denial of credit in survey data
  - Use fitted value as proxy for constraint in full data
- Results: constraints **amplify** monetary policy
  - Indirect effect (via constraints) is **29%** of employment response

Evaluation

- Overall approach is great
  - Trying to infer financial constraints from firm characteristics or financial conditions is difficult (see e.g., Kaplan and Zingales 1997)
  - Directly measuring constraints via survey is a big improvement
  - Using fitted values on a larger data set seems right to me
- I think that the share of constrained firms may be biased down
  - Survey question only catches denials, but there are other ways to be constrained
  - Underestimate consistent with some puzzling quantitative results

Basic idea

- When choosing how much to borrow, firms set

$$MB(b) = MC(b) = r + \eta$$

  where b is the amount of debt, MB is marginal benefit, and MC is marginal cost

- Marginal cost of financing is the interest rate r plus a wedge η
- Example: debt B cannot exceed some constraint $\bar{B}$
  - Unconstrained firms: $MB(b^*) = r$ implies $b^* = MB^{-1}(r)$
  - Constrained firms: $b^* = \bar{b}$
  - Which firm reacts more is **ambiguous** ($\bar{b}'(r)$ vs. $(MB^{-1})'(r)$)

Survey implementation

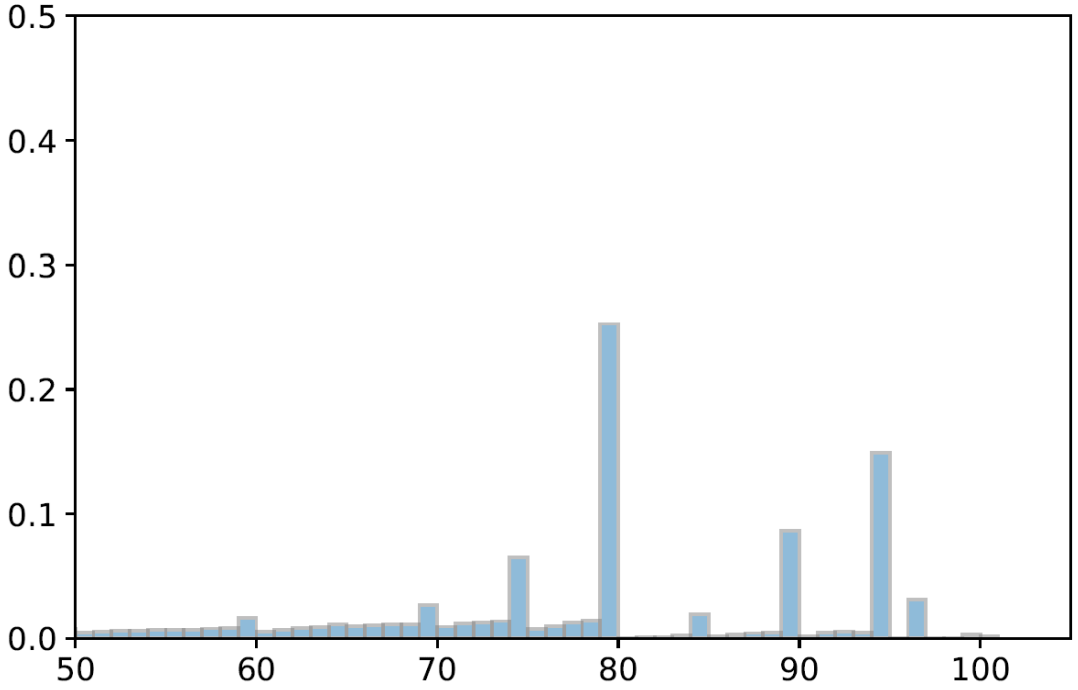
- We want to know if the wedge η exists (or if b at $\bar{b}$)
- Survey not a perfect match for what we need
- What we have:
  - *Did you apply for credit?*
  - *Why did you not apply?*
  - *Were you denied?*
  - *Why were you denied?*
- The ideal question:
  - *If offered additional credit at rate r, would you have taken it?*

Measuring constraints

- Being denied credit seems sufficient for being constrained
  - But potentially not necessary
- **If credit limits are known, then borrowers can go right up to the limit without being denied**
  - These firms are constrained, but would not count toward p

Example from the mortgage market

- Right: distribution of LTV ratios on Fannie Mae mortgages
- Most borrowers end up at some institutional limit
  - Appear constrained
- But none of these borrowers are denied



Measuring constraints

- Being denied credit seems sufficient for being constrained
  - But potentially not necessary
- If credit limits are known, then borrowers can go right up to the limit without being denied
- **Firms may be constrained by covenants**
  - Covenants on existing debt can effectively limit firm borrowing
  - And can potentially amplify MP transmission (Greenwald 2019)
  - Not clear what firm would answer on survey if this was the case

Covenants

- Below: evidence from Greenwald (2019) that transmission varies by covenant structure
  - Interest coverage covenants very sensitive to interest rates

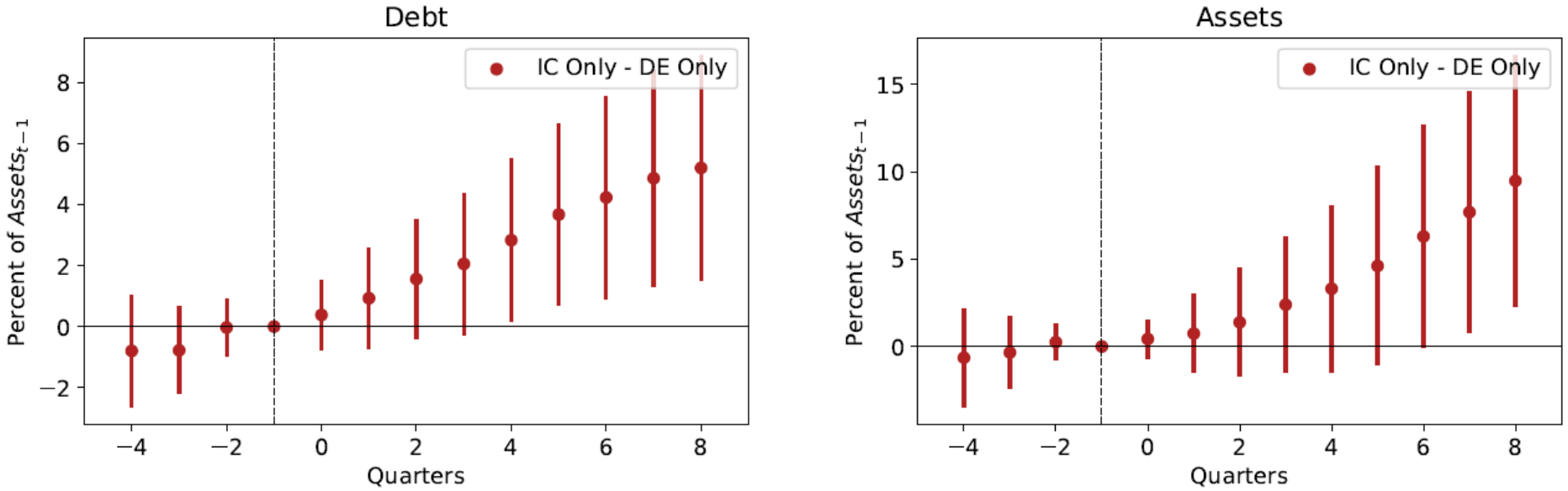


Figure 5: Estimated Response to Interest Rate ↓ 100bp by Covenant

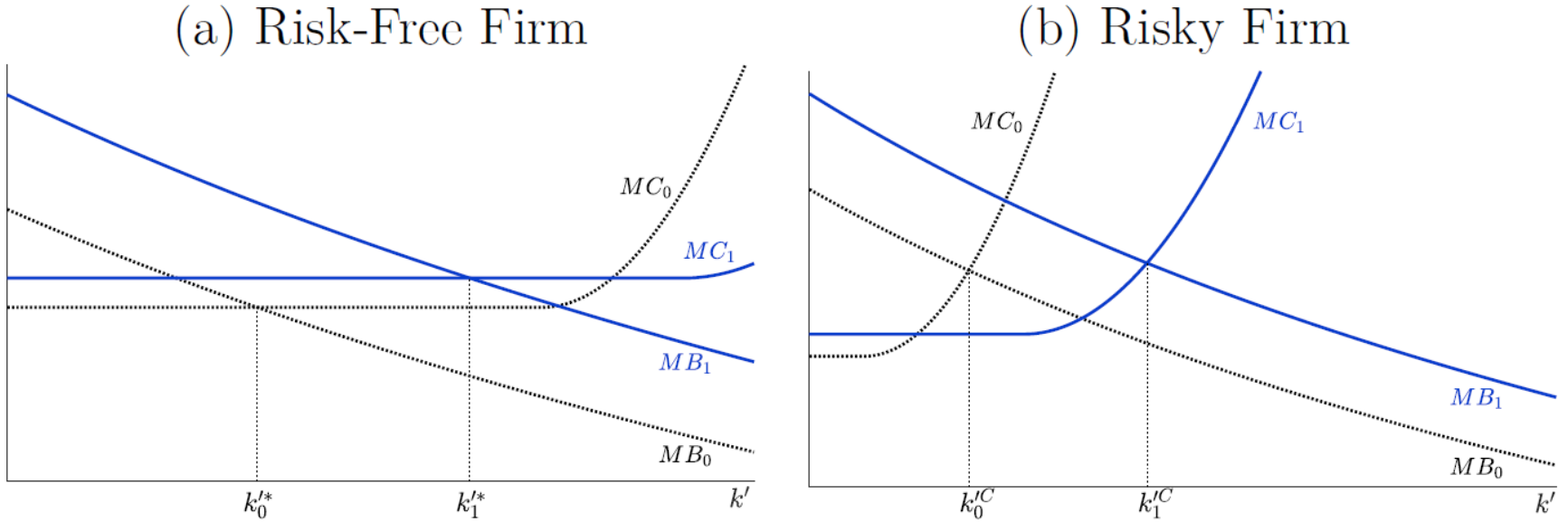
Measuring constraints

- Being denied credit seems sufficient for being constrained
  - But potentially not necessary
- If credit limits are known, then borrowers can go right up to the limit without being denied
- Firms may be constrained by covenants
- **Firms may face upward sloping interest rate schedule**
  - Mechanism in Ottonello and Winberry (2020), BGG (1999), etc.
  - Firm is not literally constrained on quantity, but stops borrowing because of rising spreads

Upward sloping supply

- Below: plot from Ottonello and Winberry (2020)
- Upward sloping credit supply (marginal cost) as firm levers up can behave like constraint (via η)

FIGURE 2: Response to Monetary Policy for Risk-Free and Risky Firms



Regression magnitudes

- Authors predict denial of credit using linear prediction model (OLS)
- Resulting fitted value $\hat{p}$ is the proxy for being financially constrained
- Missing values (firm is constrained but we measure $p = 0$) will attenuate coefficients

Table 6: Determinants of credit constraints

Predictive variables	Coefficient	Standard error
Total liabilities	0.0136***	0.0026
Current liabilities	0.0058**	0.0025
Total assets	−0.0112***	0.0031
Current assets	−0.0061**	0.0026
Revenue	−0.0236***	0.0073
Expense	0.0138*	0.0070
Age	−0.0080***	0.0020
Constant	0.0387***	0.0018

Regression magnitudes

- Regression magnitudes seem consistent with underestimate of constrained share (or else are puzzling)
- Example: let's double firm debt
  - Typical firm has ~50% leverage, so this is a big deal
  - Equivalent to adding 0.69 to log liabilities
  - Increases $\hat{p}$ by $0.0136 \times 0.69 = 0.94\%$
  - For average firm, increases $\hat{p}$ from 2.1% to just 3.04%
- Impact seems attenuated, possibly because truly constrained firms are appearing as zeros on the LHS

Monetary policy magnitudes

- Main regression (simplified):

$$\bar{l}_{i,t} = \mu_{j,m} + \cdots + \underbrace{\beta_d \varepsilon_t + \theta_d' z_{i,t} \varepsilon_t}_{\text{direct effect}} + \underbrace{\beta_{id} \hat{p}_{i,t} \varepsilon_t}_{\text{indirect effect}} + u_t$$

- Employment response: direct effect (71%), indirect effect (29%)
- Back of the envelope math (let's say employment moves by 1%)
  - Indirect effect of 0.29% is $\bar{p}$ x (response if constrained)
  - $\bar{p}$ is small (2.1%), so conditional response is huge
  - Constrained firms cut employment by extra **13.8%** after 25bp shock

Conclusion

- Great methodology for measuring effect of financial constraints
  - Instead of guessing, let's ask firms!
  - Then create index for non-surveyed firms
- Survey design probably leads to **underestimates of constrained**
  - Index still seems valuable (similar to e.g., Whited-Wu)
  - But other magnitudes affected by bias (e.g., employment response of constrained to monetary policy)
- No reason to stop at monetary policy
  - Lots of interesting (and more powerful) shocks to investigate using this great data set!