Finance and Misallocation: Evidence from Plant-Level Data

Discussion

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Savings and Financial Underpinnings of Macro Models Workshop

Contribution

- Very nice paper!
- Mechanism suggested in devo literature (macro and micro):
- Collateral constraints $\Rightarrow$ capital misallocation $\Rightarrow$ TFP losses.

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  "Does this story get its feet off the ground quantitatively?"

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- Collateral constraints $\Rightarrow$ capital misallocation $\Rightarrow$ TFP losses.
- Paper uses model + micro (plant-level) panel data to ask:

  "Does this story get its feet off the ground quantitatively?"
- Their answer: No. Reason:

  (1) Data imply that permanent component of individual productivity relatively large.

  (2) Given (1), model implies high productivity entrepreneurs quickly save themselves out of constraints.

Key Mechanism: Internal Financing

- Individual Euler equations:

$$C_{it}^{-\gamma} = \beta \mathbb{E}[C_{it+1}^{-\gamma}(1 + r + \lambda \mu_{it+1})]$$

$$\mu_{it+1} = \max\{F_K(A_{it+1}, K_{it+1}, L_{it+1}) - r - \delta, 0\}$$

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- Extreme 1: fixed productivities

$$\left(\frac{C_{it+1}}{C_{it}}\right)^{\gamma} = \beta(1 + r + \lambda \mu_{it+1})$$

- Constrained $\Rightarrow$ higher return $\Rightarrow$ higher consumption growth $\Leftrightarrow$ faster wealth accumulation $\Rightarrow$ no TFP losses as $t \longrightarrow \infty$.

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- Constrained $\Rightarrow$ higher return $\Rightarrow$ higher consumption growth $\Leftrightarrow$ faster wealth accumulation $\Rightarrow$ no TFP losses as $t \to \infty$.
- Extreme 2: iid shocks. Don't know A_{it+1} when choosing B_{it+1}

$$\Rightarrow \quad B_{it} \perp\!\!\!\perp A_{it} \quad \text{all } t.$$

- No internal financing $\Rightarrow$ large TFP losses.

Key Mechanism: Internal Financing

- Paper argues: we're much closer to extreme 1 (fixed prod.)!
- Stochastic process for productivity:

$$\log A_{it} = Z_i + \tilde{a}_{it}$$

$$\exp(Z_i) \sim \text{Pareto}, \quad \tilde{a}_{it} = \rho \tilde{a}_{it-1} + \sigma \varepsilon_{it}$$

- Calibration to Korean data: permanent component, Z_i, accounts for $2/3$ of cross-sectional variance of $\log A_{it}$.

Why Need Permanent Component?

- Three key moments:
  - (1) Dispersion in output growth rates: modest.
  - (2) Autocorr. of output: fairly high.
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- Without permanent component: two parameters (ρ, σ) for three moments.
- Get modest σ from (1), fairly high ρ from (2).
- But then (3) $\approx \frac{\sigma^2}{1-\rho^2}$ too low!
- Cannot match simultaneously $\Rightarrow$ need permanent comp.

Most Illuminating: Worst Case Losses

- Efficient allocation:

$$L_{it}, K_{it} \propto A_{it} = \exp(Z_i + \tilde{a}_{it})$$

- MX "worst case":

$$L_{it}, K_{it} \perp\!\!\!\perp \tilde{a}_{it}$$

- Benchmark calibration: worst-case losses $= 8.6\%$.

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- Sidenote 2: US-Colombia TFP gap $\approx 35\%$ (Fig. 1).
  Get $5.4\%/35\% \approx 15\%$ of it. Not that small after all...

Comparison to Literature

- Literature $\equiv$ Buera and Shin (2010); Buera, Kaboski and Shin (2010). (Obviously, many others.)
- Paper written as: "We take exactly the same model as in literature and when parameterized to match plant-level data, it predicts much smaller TFP losses than literature."

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- Details matter!

Partial vs. General Equilibrium

- PE vs GE can make big diff. for TFP losses (Goldberg, 2010).
- PE (paper): r fixed. GE (lit.): $r(\lambda)$ with $r'(\lambda) < 0$.
- Worse credit markets, $\lambda \downarrow \Rightarrow$ demand for credit $\downarrow \Rightarrow r \downarrow$.

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(2) Dynamic effect: lower r discourages internal financing.

$$C_{it}^{-\gamma} = \beta \mathbb{E}[C_{it+1}^{-\gamma}(1 + r + \lambda \mu_{it+1})]$$

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- GE $\Rightarrow$ TFP losses amplified! Goldberg: more than double.

Partial vs. General Equilibrium

- Not a criticism of the assumption.
- Not clear whether PE or GE more relevant: Colombia, say, may be better thought of as small open economy.
- But doesn't help to understand where the difference to literature comes from.

Partial vs. General Equilibrium: K/Y Ratio

- Paper: large effect of λ on K/Y ratio, small effect on TFP.
- Lit.: opposite.
- Conjecture: this is also due to PE vs. GE.
- Suppose constraint is $K_i \leq \lambda B_i$ (slightly different from paper, more on that momentarily).
- Then know this for sure (Moll, 2010; Buera and Moll, 2011).

K/Y Undistorted in GE

- Result: In GE, model has undistorted Euler equation for aggregate of entrepreneurs. In steady state:

$$1/\beta \approx (1-\alpha)\frac{Y}{K} + 1 - \delta \quad \Rightarrow \quad \frac{K}{Y} \approx \frac{1-\alpha}{\beta^{-1} - 1 + \delta}$$

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- PE: individuals borrow less, lend more $\Rightarrow$ returns to wealth $\downarrow$.

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- GE: No borrowing in aggregate (capital market clears)

  $\Rightarrow$ agg. return to wealth $=$ agg. MPK.
- Again, not clear whether PE or GE equilibrium more relevant.
- Also: effect on output $=$ TFP $+$ K/Y, of course.

Constraint

- Paper:

$$WL + K \leq \lambda B \tag{1}$$

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- First thought: TFP losses larger with (1) bc/ also get labor misallocation $\Rightarrow$ they stack cards against themselves.
- But: λ calibrated to external-finance-to-GDP ratio.
- Not clear which way it goes.

Non-Convexities

- Clarification: Non-convexities interesting because not easily overcome by internal financing. Extensive margin misallocation persists (Buera, 2009; Banerjee and Moll, 2009).

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- Two forms of non-convexities: fixed cost and occ. choice.
- Paper: "exact form of non-convexity not important", TFP losses similar.
- Lit.: TFP losses with fixed costs (BKS) twice as large as with occ. choice (BS).
- Reason: "misallocation of talent" (BKS). Smart but poor can't cover fixed cost (see also Giné and Townsend, 2004; Jeong and Townsend, 2007, among others).

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- Conjecture: whether this effect is large depends on exact form of fixed cost, in combination with form of constraint.

Non-Convexities

- Paper: fixed cost paid in units of labor

$$Y = \begin{cases} F(A, K, L - f), & \text{if } L \geq f \\ 0, & \text{otherwise} \end{cases} \tag{1}$$

- Lit.: either in units of output (BKS), or capital

$$Y = F(A, K, L) - f, \quad \text{if } Y \geq f \tag{2}$$

$$Y = F(A, K - f, L), \quad \text{if } K \geq f \tag{3}$$

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- Constraint matters. To make point: suppose again

$$K \leq \lambda B.$$

- Case 1: can always pay f.
- Case 3: need $B \geq f/\lambda$.
- Case 2: need $B \geq \underline{B}(f, \lambda, A, L)$.

The Broader Picture

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- Does this imply that capital misallocation from financial frictions is unimportant?
- Clearly not! There could be capital misallocation from financial frictions through another mechanism.
- (Obviously, financial frictions could also matter for yet other reasons, e.g. innovation. But don't want to focus on that.)

Some Empirical Evidence

(1) Very high borrowing rates in developing countries, no high default rates. Large dispersion in interest rates.

- Banerjee (2003); Banerjee and Duflo (2005, 2010) and references therein. E.g. smaller firms borrow at 50%, 80% per year or even higher.

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(2) High levels and large dispersion of marginal products of capital within developing countries.

- Direct estimates of marginal products: Udry and Anagol (2006); de Mel, McKenzie and Woodruff (2008, 2009); Banerjee and Duflo (2008). E.g. return on investing in pineapple cultivation in Ghana: 250% on average.
- Production functions fitted to firm-level data: Hsieh and Klenow (2009); Pawasutipaisit and Townsend (2011)

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- (1)+(2) strongly suggest: financial frictions are important, and channel through which they operate is capital misallocation!
- $\Rightarrow$ Another way of looking at the paper:
- Why do we see so much capital misallocation from financial frictions in the data? What do our models miss?

What Do Our Models Miss?

- Striking feature of data: dispersion in interest rates.
- Model: one common interest rate for all entrepreneurs.

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- Model: one common interest rate for all entrepreneurs.
- Exogenous dispersion (MX conclusion): access to cheap credit for some (e.g subsidies from state-owned banks), but not for others (Restuccia-Rogerson, 2008; Hsieh-Klenow, 2010).
- Endogenous dispersion. Question: why do lenders charge the interest rates they do? "Bank/moneylender IO".
  - Candidate: fixed cost of administering a loan.

(1) Small loans for poor borrowers + high interest rate on small loans (need to cover fixed cost) $\Rightarrow$ poor pay higher interest rates.

(2) Feedback to borrowers: high interest rate $\Rightarrow$ repayment less likely $\Rightarrow$ smaller loan. Multiplier! See Banerjee-Duflo, 2010.

What Do Our Models Miss? (cont'd)

- Key mechanism: internal financing. Model has neoclassical theory of savings $\Rightarrow$ fast convergence.
- Some internal financing observed in the data (Banerjee and Munshi, 2004; Pawasutipaisit and Townsend, 2011).
- But how strong is this? Want speed of convergence (half lives). Need balance sheet data like Rob's.

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- But how strong is this? Want speed of convergence (half lives). Need balance sheet data like Rob's.
- Is neoclassical theory the right theory?
- Potential barriers to internal financing: self-control, time inconsistency,...

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- But strength at the same time! Focus on very specific mechanism and bound quantitative importance.
- Direction if we conclude that mechanism in paper quantitatively unimportant: build alternative model, and use micro data to quantify in the same spirit MX did.
- Needed:
  - Theories of dispersion in interest rates (moneylender IO).
  - More and better balance sheet data for firms in developing countries. Preferably, countrywide (like manufacturing census)!
  - More evidence on non-convexities, fixed costs *and others* (McKenzie-Woodruff,2006; BanerjeeDufloGlennersterKinnan,2010).

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