Empirical Economic Modeling

Macro

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Lecture plan

Central research questions in macro:

1. Why are some countries poorer than others?

⇝ Why are there large GDP differences across countries? Total factor productivity (TFP)!

2. Why are some countries more productive than others?

⇝ Why are there large TFP differences across countries? Financial frictions?

Midrigan, Virgiliu and Daniel Yi Xu (2014). Finance and Misallocation: Evidence from Plant-Level Data. *American Economic Review* 104(2), 422-458.

Midrigan and Xu (2014 AER). Finance and Misallocation

Midrigan and Xu (2014 AER). Finance and Misallocation

Research question: How much of TFP differences are due to financial frictions?

Financial frictions reduce TFP in two key ways:

1. Entry and technology adoption

2. Capital misallocation

   Misallocation: the *social planner* could *feasibly* reallocate resources to increase the *welfare* of the *representative agent* (Klenow, 2020, link to video)

Midrigan and Xu (2014 AER). Finance and Misallocation

Research question: How much of TFP differences are due to financial frictions?

Traditional vs. modern sectors, everyone starts in traditional

Traditional sector: with permanent productivity z and transitory productivity e_t,

$$Y_t = \exp(z + e_t)^{1-\eta} L_t^{\eta}, \quad \eta < 1 \text{ (DRS)}$$

Producers maximize lifetime utility s.t. the budget constraint:

$$C_t = Y_t - wL_t - (1 - r)D_t + D_{t+1}$$

D_t: debt position; $D_{t+1} \leq 0$ (no borrowing)

Midrigan and Xu (2014 AER). Finance and Misallocation

Research question: How much of TFP differences are due to financial frictions?

Entry to the modern sector requires paying an upfront cost

Entering the modern sector: need to finance initial capital

$$D_{t+1} \leq \theta(K_{t+1} + \exp(z)\kappa)$$

K_{t+1}: physical capital, $\exp(z)\kappa$: intangible capital
$\theta \in [0, 1]$: strength of financial frictions (degree of financial development)

Budget constraint:

$$C_t + K_{t+1} + \exp(z)\kappa = Y_t - wL_t - (1 - r)D_t + D_{t+1} + \theta\chi(\text{price of future profits})_t$$

$\theta\chi$ ($\chi \in [0, 1]$): fraction of claims to future profits

Midrigan and Xu (2014 AER). Finance and Misallocation

Research question: How much of TFP differences are due to financial frictions?

Modern sector:

$$Y_t = \exp(z + e_t + \phi)^{1-\eta}(L_t^{\alpha} K_t^{1-\alpha})^{\eta}$$
$$\Pi_t = Y_t - wL_t - (r + \delta)K_t$$

ϕ: relative productivity of modern sector

Budget constraint:

$$C_t + K_{t+1} - (1 - \delta)K_t = Y_t - wL_t - (1 - r)D_t + D_{t+1} - \theta\chi\Pi_t$$

Midrigan and Xu (2014 AER). Finance and Misallocation

Research question: How much of TFP differences are due to financial frictions?

Rescale by $\exp(z)$, markets clear, balanced growth path (γ), ...

Total output in modern sector: given mass of producers M,

$$Y = \underbrace{\exp(\phi)^{1-\eta} \frac{\left(\int_{i\in M} \exp(e_i)(r+\delta+\mu_i)^{-\frac{(1-\alpha)\eta}{1-\eta}} di\right)^{1-\alpha\eta}}{\left(\int_{i\in M} \exp(e_i)(r+\delta+\mu_i)^{\frac{\alpha\eta-1}{1-\eta}} di\right)^{(1-\alpha)\eta}}}_{\text{TFP}} (L^{\alpha}K^{1-\alpha})^{\eta}$$

Midrigan and Xu (2014 AER). Finance and Misallocation

Research question: How much of TFP differences are due to financial frictions?

Recall: 1. entry and technology adoption, 2. capital misallocation

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Research question: How much of TFP differences are due to financial frictions?

Recall: 1. entry and technology adoption, 2. capital misallocation

2. Total output in modern sector if we can reallocate capital but M is fixed:

$$Y^{e2} = \underbrace{\exp(\phi)^{1-\eta}\left(\int_i \exp(e_i)\,di\right)^{1-\eta}}_{\text{TFP}^{e2}} (L^{\alpha}K^{1-\alpha})^{\eta}$$

TFP loss^2 $= \text{TFP}^{e2} - \text{TFP}$

With $(APK_i, e_i) \sim \log N$:

$$\text{TFP loss}^2 = \frac{(1-\alpha\eta)(1-\alpha)\eta}{2(1-\eta)}\,\text{var}(\log(APK_i))$$

In words: the more dispersed APK is, the larger is TFP loss

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Research question: How much of TFP differences are due to financial frictions?

Recall: 1. entry and technology adoption, 2. capital misallocation

1. Total output in both sectors if we can freely reallocate capital and labor:

$$Y^{e1} = \arg \max_{K,L,n_i^\tau,n_i^m} \left(\sum_i \exp(e_i) n_i^\tau \right)^{1-\eta} (1-L)^\eta + \left(\sum_i \exp(e_i + \phi) n_i^m \right)^{1-\eta} (L^\alpha K^{1-\alpha})^\eta$$
$$- \left(\delta + \frac{\gamma}{\beta} - 1 \right) K - \frac{\sum_i n_i^m}{\beta} (\gamma - 1)\kappa$$

$\Rightarrow$ TFP loss^1 $\supseteq$ TFP loss^2

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How important is 1. vs. 2. quantitatively?

I.e., is $\widehat{\text{TFP loss}}^1$ much larger than $\widehat{\text{TFP loss}}^2$?

Data: plant-level data on manufacturing firms in Korea, Colombia, China

- Korea: more developed + data from financial crisis

Findings form calibration: $\widehat{\text{TFP loss}}^1 \approx 40\%$, $\widehat{\text{TFP loss}}^2 \approx 5\%$

$\Rightarrow$ financial frictions yield large TFP differences but not due to misallocation

Frontiers of macro

Central research questions in macro:

- Why are some countries poorer/more productive than others?
- Midrigan and Xu (2014 AER): because financial frictions impede entry to modern sector
- Only one (albeit very influential) modern macro paper
- …

Other central questions:

- How does a richer notion of heterogeneity impact aggregate outcomes?
- How does the financial sector impact the real economy?
- What is the role of fiscal/monetary policy?
- What is the role of behavior components?
- …

Things we do not cover:

- Micro-to-macro (Adrien Couturier, Ben Moll and Rui Sousa's collection of papers)
- Asset pricing, optimal taxation (Nic Kozeniauskas and László Tétényi's syllabus)
- Uncertainty, information, polarization (Matthias Kehrig's syllabus)
- …

"Modern macro is applied micro"

Fede Huneeus' X thread