Felipe Meza, Sangeeta Pratap, Carlos Urrutia (2020). Credit and investment distortions: Evidence from Mexican manufacturing, EL 197, 109610

Carlos Lezama, Jesus Lopez
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Introduction

Motivation

The paper analyzes the influence of financial factors (credit flows and interest rates) on firms' investment decisions and capital accumulation through their effect on dynamic capital distortions (i.e., deviations from the optimal allocation of resources across sectors and over time).

The authors build a multi-industry model to measure labor and investment wedges using data for the Mexican manufacturing sector (for 2003–2012) and assess their importance in accounting for aggregate capital and TFP over time.

Main takeaways

The two results arise:

- Changes in dynamic capital distortions are important in accounting for the path of capital over time.
- Industry specific investment wedges (a wedge appears whenever firms deviate from the optimal choice) and credit conditions are correlated. Industries where the availability of credit falls and/or real interest rates increase experience an increase in their capital distortions.

Main contributions

- Contribute to the strand of literature on the positive effects of the finance sector to the real economy.
- Setup a production and investment model to measure the wedges for the Mexican manufacturing sector.
- Build upon the merged dataset of Meza *et al.* (2019), linking output, employment and investment with credit flows and interest rates for Mexican industries between 2003 - 2013.

The environment

The environment

- n industries, each one a representative firm, facing two distortions: static labor wedge and dynamic investment wedge.
- Technology: $Y_t^i = A_t^i (K_t^i)^{\alpha^i} (L_t^i)^{1-\alpha^i}$, where A^i is an industry specific shock.
- Firms own K and maximize expected PV of profits net of expenditures

  $\Pi^i =$
  $E_0 \sum_{t=0}^{\infty} (\frac{1}{1+\iota})^t \left\{ p_t^i Y_t^i - \theta_t^{L,i} w_t L_t^i - \theta_t^{K,i} \times [K_{t+1}^i - (1-\delta) K_t^i] \right\}.$

  where $\theta_t^{L,i} and \theta_t^{K,i}$ are stochastic industry-specific distortions that affect labor and investment, respectively. Total output is combined $Y_t = \Pi_{i=1}^n (Y_t^i)^{\omega^i}$, with ω^i constant expenditure share in each industry.

Model

- Static labor allocation L_t^i (3)
- Dynamic Euler equation Ψ^i
- Aggregation

The Meza *et al.* (2019) data set

Two sources:

- Survey: Encuesta Industrial Anual (EIA), INEGI. 7,000 manufacturing establishments with information on all 86 4-digit NAICS 2007 (rama) industries. (82 when excluding Oil and missings)
- Administrative data: Universe of commercial credit loans by banks reports (R04C), CNBV, aggregated annually to 4-digit NAICS 2007 (using a (probabilistic) crosswalk to match CNBV-NAICS classification).

Measuring labor wedges ($\theta_t^{L,i}$)

- Use US data for α^i (Hsieh and Klenow, 2009)
- Compute revenue productivity: $p_t^i A_t^i = \frac{p_t^i Y_t^i}{(K_t^i)^{\alpha^i}(L_t^i)^{1-\alpha^i}}$
- Estimate persistence parameter, ρ_A^i, for each 2-digit industry (sector) using Arellano-Bond estimator (for linear dynamic panel), recover Fixed Effect for each 4-digit industy (rama) to estimate steady-state (SS) values.
- The labor wedge is computed from 9.
- The persistence parameter ρ_L^i and its SS, are estimated analogously.
- Value added shres, ω^i are computed directly from the EIA

Measuring investment wedges ($\theta_t^{K,i}$)

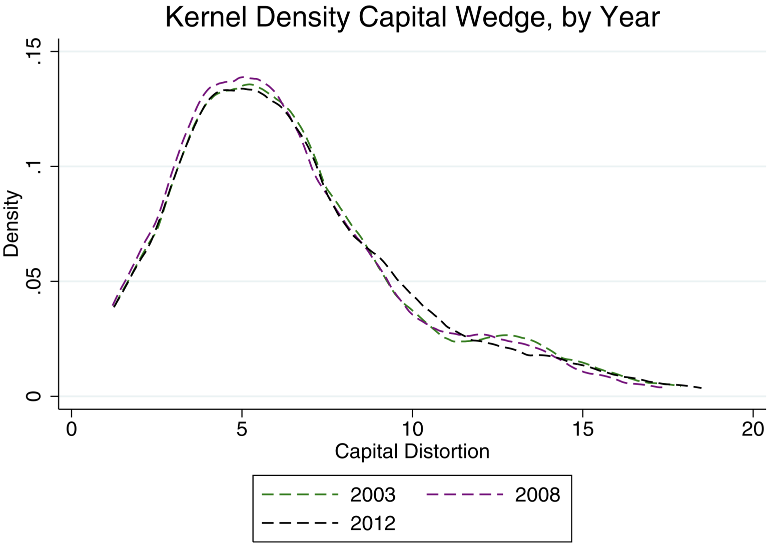
Iterative procedure 1. Given ρ_A^i and ρ_L^i, set initial guess for ρ_K^i and the initial SS values $\theta^{\bar{K},i}$ and $\bar{K}^i$, and compute the investment wedge with 9

Results

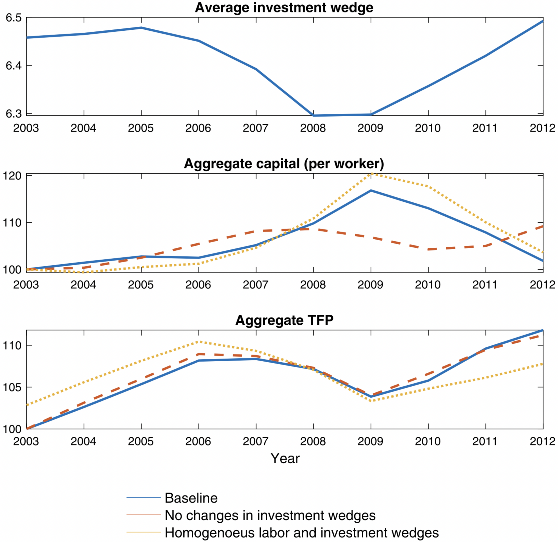
Descriptive Statistics for the Capital and Labor Distortions

	2003-05	2005-08	2008-09	2009-12
Investment Wedge ($\theta_t^{K,i}$)				
- Mean	6.46	6.38	6.30	6.39
- C.V. (std. deviation/mean)	0.60	0.59	0.60	0.60
- Correlation with Employment (L_t^i)	-0.03	-0.03	-0.01	-0.03
- Correlation with Productivity ($p_t^i A_t^i$)	0.19	0.12	0.14	0.16
Labor Wedge ($\theta_t^{L,i}$)				
- Mean	1.00	1.00	1.00	1.00
- C.V. (std. deviation/mean)	1.17	1.19	1.18	1.19
- Correlation with Employment (L_t^i)	0.00	-0.00	-0.01	-0.02
- Correlation with Productivity ($p_t^i A_t^i$)	0.59	0.56	0.57	0.50
Correlation between distortions	0.55	0.58	0.57	0.57

Estimated Kernel densities for investment wedges



Aggregate capital, TFP and average investment wedges



Investment wedges and credit conditions

Correlations			
	Total credit	Credit/value added	Interest rate
$\theta_t^{K,i}$	−0.089	−0.159	0.068
$\overline{\theta^{K,i}}$	−0.097	−0.190	0.121

Regressions: Dependent variable $\theta_t^{K,i}$				
	(1)	(2)	(3)	(4)
Credit/value added	−0.738*	−0.712*		
	0.159	0.158		
Interest rate			0.187*	0.168*
			0.078	0.078
Time dummies	Yes	Yes	Yes	Yes
2-digit industry effects	No	Yes	No	Yes

Note: Standard errors below coefficients.

*Denotes significance at the 5% level.

Conclusion

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This study suggests that,