Financial Frictions and the Great Productivity Slowdown

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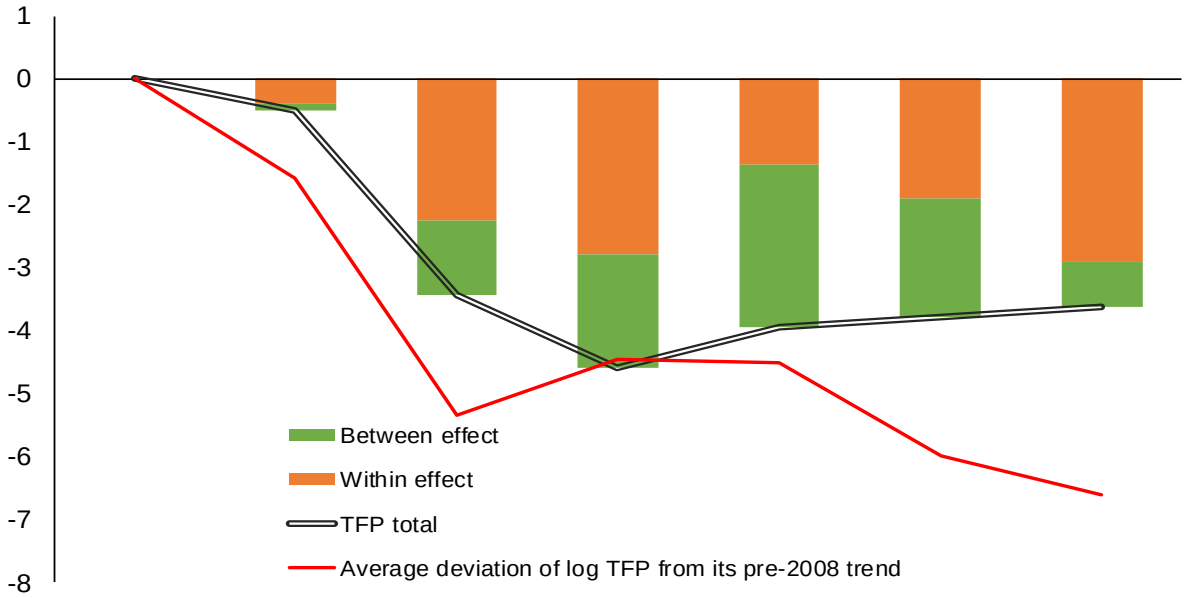
Major recessions seem to entail "TFP hysteresis" and the GFC has been no exception…

Decomposition of cyclically adjusted TFP response to major past deep recessions
(percent)



Sources: Penn World Tables 9.0; KLEMS; Blanchard, Cerutti, Summers (2015); Adler, Duval, Furceri, Kilic Celik, Koloskova and Poplawsi-Ribeiro, forthcoming.
Note: Dashed lines denote 90 percent confidence bands. The decomposition is based on McMillan and Rodrick (2011). *Within* effect refers to the contribution of sectoral productivity growth to aggregate productivity growth. *Between* effect refers to contribution of inter-sectoral reallocation of resources. The effects are estimated using local projections method (Jorda, 2005), controlling for past growth and lagged recessions, and including a bias correction suggested by Teulings and Zoubanov (2014). Average deviation of TFP from its pre-crisis trend is based on unadjusted TFP measures (from PWT 9.0).

Secular forces alone unlikely to account for magnitude and persistence of post-GFC TFP slowdown

(1) Secular headwinds:
Waning ICT boom and innovation, slowing technology diffusion, possible roles of global trade slowdown, slowdown in human capital, ageing, etc.

➔ Already at play prior to the GFC

(2) crisis-related setbacks:
Balance sheet vulnerabilities, tight credit conditions, weak aggregate demand, elevated policy uncertainty

➔ Could affect investment in a broad sense—in tangibles and intangibles—with adverse effects on TFP

This paper: focus on role of balance sheet vulnerabilities and credit conditions

Unresolved ongoing policy debate on role of credit conditions for productivity

- Contradictory views regarding impact on misallocation of capital *across firms*:
  - Easy credit conditions can *reduce* misallocation of capital by easing the impact of financial frictions, e.g. collateral constraints (Midrigan and Xu, 2013) …
  - …but easy credit conditions may *increase* misallocation of capital if financial intermediation is poor (Gopinath et al., 2015)…
  - …and lead to busts with further misallocation post-bust (Borio et al., 2015)
- Impact on *within-firm* productivity growth virtually unknown:
  - Tight credit conditions may lead financially vulnerable firms to cut R&D spending (Holmstrom and Tirole 1997; Aghion et al., 2012)

This paper: focus on role of balance sheet vulnerabilities and credit conditions for *within-firm* productivity growth

Key Question(s)

Q: What is the role of financial frictions in explaining *firm-level* TFP slowdown since the financial crisis?

Q1. Can firm-specific pre-crisis financial vulnerabilities account for some of the post-crisis TFP growth slowdown?

Q2. Did tighter credit conditions also play a role? If so, did they interact with corporate balance sheet vulnerabilities?

Q3. If answer to Q1 and/or Q2 is yes, what are the channels?

Empirical Approach

- DID framework: comparison between more and less vulnerable firms post- vs. pre-Crisis (5 years after vs. 5 years before), ORBIS data

- Vulnerability: (1) Average pre-crisis leverage (Debt/Total Assets) (Debt Overhang)
  (2) Debt maturing in 2008 (current liabilities in 2007) (Rollover Risk)

- Regression analysis:

$$\Delta TFP_{isc}^{growth} = \beta_1 Vulnerability_i^{pre} + \beta_2 Vulnerability_i^{pre} * \Delta(Credit\ conditions)_c + \alpha_{sc} + \varepsilon_{isc}$$

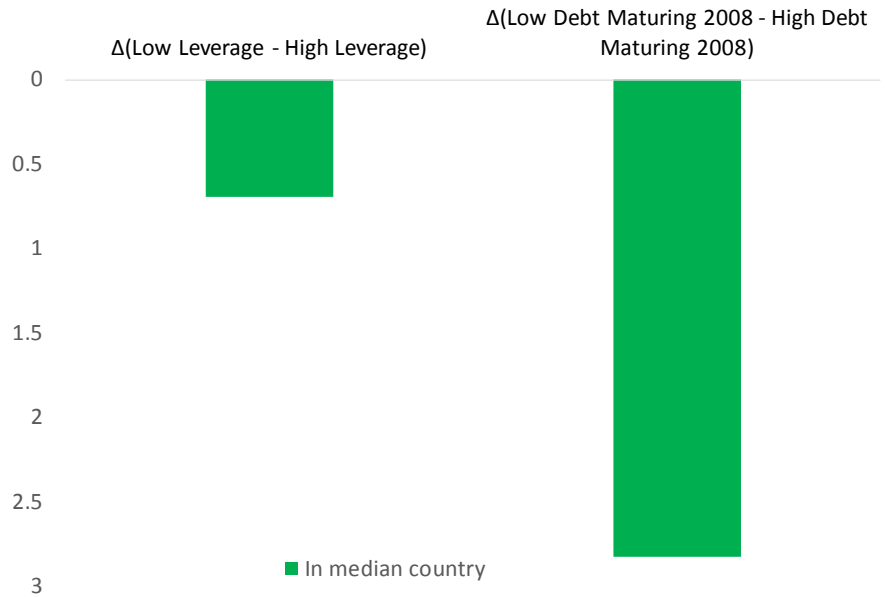
Where:

- Credit conditions = change in average bank CDS spread between 2008 H1 and H2 (hypothesis: banking systems that were more exposed to Lehman shock tightened credit conditions more, amplifying the adverse TFP impact of firm vulnerabilities)
- Country-sector fixed effects (α_{sc}) control for impact of unobserved country-sector factors (e.g. construction) ➔ Within country-sector comparison

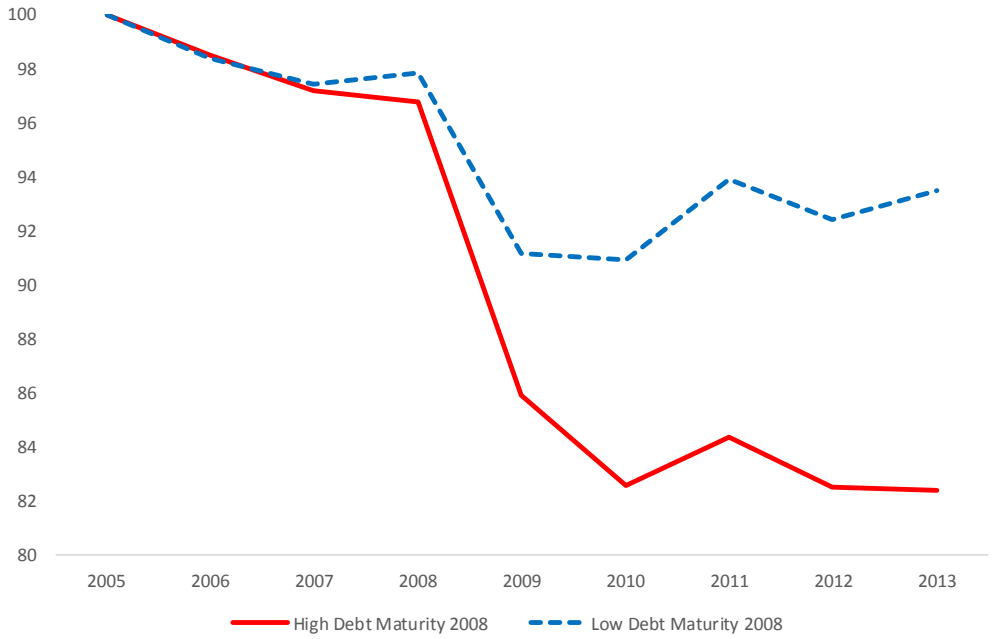
Main Findings (1)

Q1. Can firm-specific pre-crisis financial vulnerabilities account for some of the post-crisis TFP growth slowdown? YES

A. TFP Slowdown after the crisis



B. TFP Growth Trajectory by Debt Maturing 2008



Main Findings (1)

Table: Baseline

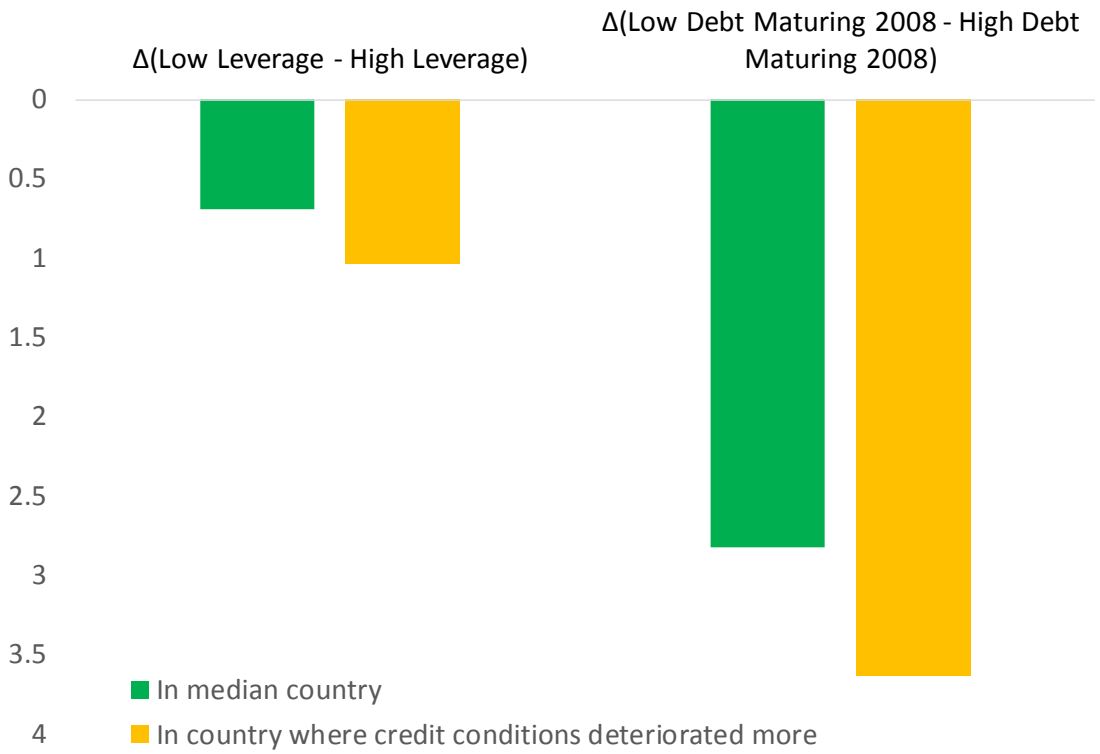
	(1)	(2)	(3)
		ΔTFP Growth	
Leverage Pre-Crisis	-0.0323***		-0.0211***
	(0.007)		(0.006)
Debt Maturing 2008		-0.0834***	-0.0819***
		(0.010)	(0.010)
R-squared	0.148	0.151	0.151
N	163163	163163	163163
Country*Sector FE	Yes	Yes	Yes

*Note: The dependent variable `ΔTFP Growth' is the difference in the TFP growth rate post vs. pre-crisis. `Leverage Pre-Crisis' is the average pre-crisis debt over assets ratio. `Debt Maturing 2008' is the amount of debt maturing in 2008 divided by average total sales pre-crisis. Post-crisis starts in 2008. Standard errors in parentheses. Standard errors are clustered at the country-sector level. *: significant at 10% level; **: significant at 5% level; ***: significant at 1% level.*

Main Findings (2)

Q2. Did tighter credit conditions also play a role in within-firm TFP slowdown? YES

Magnitude of TFP Slowdown After the Financial Crisis (Percentage Points)



Main Findings (2)

Table: Banks' Lehman Exposure

	(1)	(2)	(3)
	ΔTFP Growth		
Leverage Pre-Crisis	-0.0451***		-0.0317***
	(0.007)		(0.007)
Leverage Pre-Crisis * ΔCDS	-0.0760***		-0.0584***
	(0.020)		(0.020)
Debt Maturing 2008		-0.110***	-0.108***
		(0.009)	(0.009)
Debt Maturing 2008 * ΔCDS		-0.119***	-0.115***
		(0.018)	(0.018)
R-squared	0.169	0.174	0.174
N	129049	129049	129049
Country*Sector FE	Yes	Yes	Yes

*Note: The dependent variable `ΔTFP Growth' is the difference in the TFP growth rate post vs. pre-crisis. `Leverage Pre-Crisis' is the average pre-crisis debt over assets ratio. `Debt Maturing 2008' is the amount of debt maturing in 2008 divided by average total sales pre-crisis. Post-crisis starts in 2008. `ΔCDS' is the difference in the average CDS spread of banks in each country two quarters before and two quarters after the Lehman bankruptcy. Standard errors in parentheses. Standard errors are clustered at the country-sector level. *: significant at 10% level; **: significant at 5% level; ***: significant at 1% level.*

Putting (1) & (2) together…

- Firms with higher debt-to-assets (leverage) ratios pre-crisis experienced larger drop in productivity growth than less leveraged counterparts (Debt Overhang)
- Firms with more debt maturing in 2008 experienced larger drop in productivity growth than firms with less debt maturing in 2008 (Rollover Risk)
- Both relationships stronger in countries where credit conditions tightened more in immediate aftermath of Lehman
- No systematic difference pre-crisis, and absence of any such effects during 2000 recession, are suggestive of causal relationship

Was the GFC different from past recessions? Placebo Test: Was 2000 different from 2008?

Table: Placebo

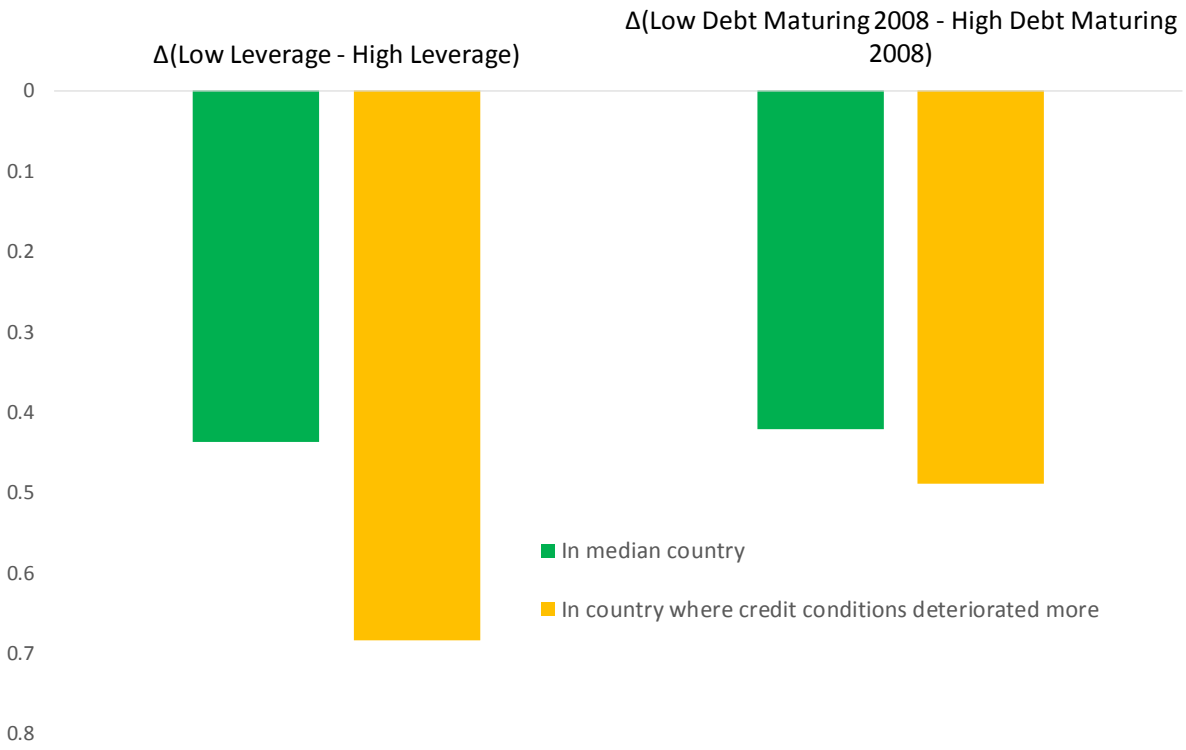
	(1)	(2)	(3)
		ΔTFP Growth	
Leverage Pre-Crisis	-0.00383		0.00620
	(0.015)		(0.017)
Debt Maturing 2000		-0.0657	-0.0690
		(0.046)	(0.050)
R-squared	0.157	0.157	0.157
N	53200	53200	53200
Country*Sector FE	Yes	Yes	Yes

*Note: The placebo post-crisis covers 2000 until 2005. The dependent variable `ΔTFP Growth' is the difference in the TFP growth rate post vs. pre-crisis. `Leverage Pre-Crisis' is the average pre-crisis debt over assets ratio. `Debt Maturing 2000' is the amount of debt maturing in 2008 divided by average total sales pre-crisis. Standard errors in parentheses. Standard errors are clustered at the country-sector level. *: significant at 10% level; **: significant at 5% level; ***: significant at 1% level.*

Main Findings (3)

Q3. What are the channels? Slowdown in productivity-enhancing investment in intangibles (including R&D) seems to be one

Reduction in Intangible Investment After the Financial Crisis (Percentage Points of Value Added)



Main Findings (3)

Table 5: Investment in Intangible Assets

	(1)	(2)	(3)
	Δ Investment in Intangible Assets		
Leverage Pre-Crisis	-0.0218***		-0.0200***
	(0.003)		(0.003)
Leverage Pre-Crisis * ΔCDS	-0.0363***		-0.0353***
	(0.007)		(0.007)
Debt Maturing 2008		-0.0173***	-0.0161***
		(0.001)	(0.001)
Debt Maturing 2008* ΔCDS		-0.0123***	-0.00965***
		(0.003)	(0.003)
R-squared	0.169	0.174	0.174
N	129049	129049	129049
Country*Sector FE	Yes	Yes	Yes

*Note: The dependent variable `Δ Investment in Intangible Assets' is the difference in the investment in intangible assets as a ratio of value added post vs. pre-crisis. `Leverage Pre-Crisis' is the average pre-crisis debt over assets ratio. `Debt Maturing 2008' is the amount of debt maturing in 2008 divided by average total sales pre-crisis. Post-crisis starts in 2008. `ΔCDS' is the difference in the average CDS spread of banks in each country two quarters before and two quarters after the Lehman bankruptcy. Standard errors in parentheses. Standard errors are clustered at the country-sector level. *: significant at 10% level; **: significant at 5% level; ***: significant at 1% level.*

Take aways

- More vulnerable (*not* necessarily low-productivity) firms experienced larger drop in TFP growth post-GFC, with weaker intangible investment being one channel

- Stronger relationships in countries where banking sector was hit harder by GFC

- Effects seem economically large: taken at face value, coefficients imply that up to a third of productivity slowdown in this sample of firms can be explained.

Supplementary Slides

How much of the productivity slowdown can financial frictions explain?

Difficult to assess due to diff-and-diff methodology…

Back-of-the-envelope calculation

- Loss of Aggregate Productivity Growth (Unweighted): 6.37 percent

- A hypothetical firm without financial frictions and no credit constraints: 2.29 percentage point less than an average firm with financial frictions and credit constraint

- About one third (~ 2.29/6.37) of productivity loss post-Crisis from financial vulnerabilities and credit tightening