

THE ANATOMY OF THE US MANUFACTURING PRODUCTIVITY SLOWDOWN: FIRMS AND INDUSTRIES

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US manufacturing productivity has stalled (BLS)

- labor productivity: $\approx 3.5\%/yr$ (1987–2007) $\rightarrow \approx 0$ (2010–2022)
- TFP: $\approx 1.3\%/yr \rightarrow \approx 0$

Two lenses on the same slowdown

- **macro:** BLS detailed-industry productivity accounts (NAICS 4-digit)
- **micro:** Compustat manufacturing firms, 1987–2022

THREE QUESTIONS

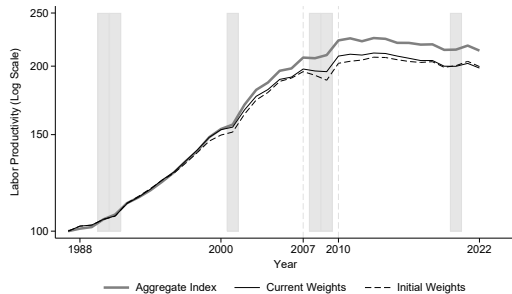
We link Compustat firms to BLS industries to ask:

1. Do the micro (firm) and macro (industry/aggregate) align?
2. How broad-based is the slowdown across firms and industries?
3. Is R&D expenditure or effectiveness slowing down?

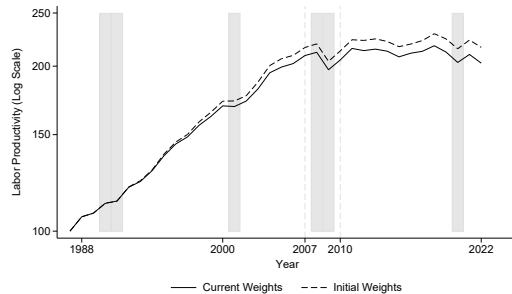
DO MICRO AND MACRO ALIGN?

- **Industry:** BLS NAICS 4-digit LP and TFP indices (2017=100), hours, output, deflators
- **Firm:** Compustat — revenue, employment, PP&E, R&D, COGS
- **Bridge:** firm $\rightarrow$ industry (employment / revenue shares) $\rightarrow$ aggregate (hours / output shares)
- **Measures:** labor productivity (output per hour/ real revenue per worker), TFP (productivity net inputs and capital), and R&D intensity (R&D per worker)

LABOR PRODUCTIVITY: BOTH FIRMS AND INDUSTRIES SLOWING DOWN

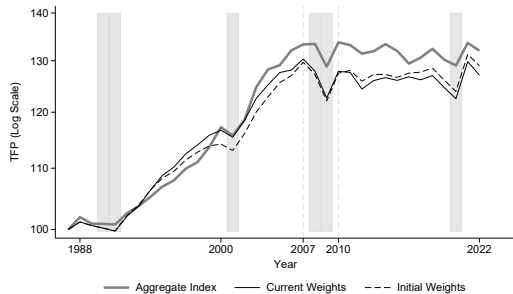


(A) BLS INDUSTRY ACCOUNTS

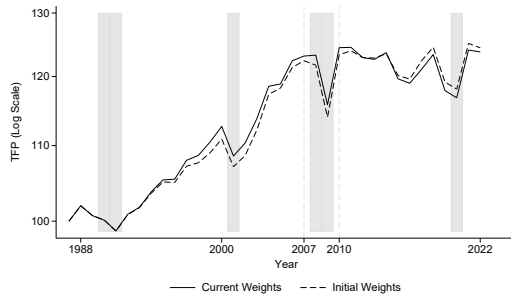


(B) COMPUSTAT FIRMS

TFP: BOTH FIRMS AND INDUSTRIES SLOWING DOWN



(A) BLS INDUSTRY ACCOUNTS



(B) COMPUSTAT FIRMS

THE SLOWDOWN BY GROUP

Annualized Growth	1987-2007	2010-2022	Slowdown
Labor Productivity (BLS)	3.46	-0.42	-3.88
Labor Productivity (Compustat)	3.98	-0.07	-4.05
Total Factor Productivity (BLS)	1.33	-0.05	-1.38
Total Factor Productivity (Compustat)	1.05	-0.04	-1.09

Annualized log growth (%/yr); slowdown = post – pre.

HOW BROAD-BASED IS THE SLOWDOWN?

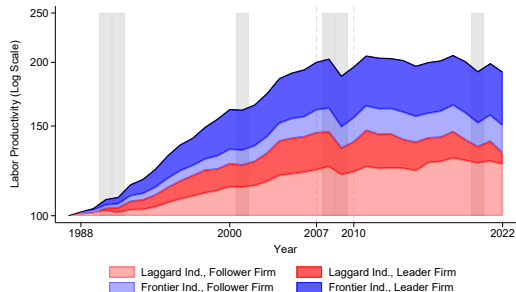
THE FOUR-GROUP SPLIT

We cut aggregate manufacturing productivity into four groups and ask which slow down:

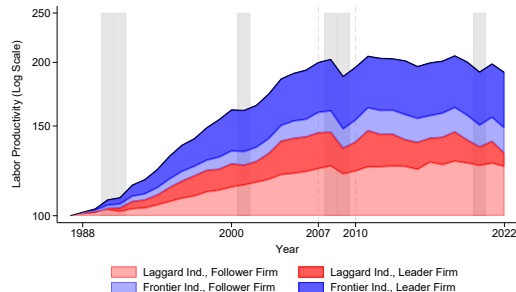
	Frontier industry (NAICS 313, 334, 335, 336)	Laggard industry (rest of mfg.)
Leader firm	$L \times F$	$L \times R$
Follower firm	$f \times F$	$f \times R$

Leaders = top 10% within NAICS-4 $\times$ year; frontier = four fastest-growing NAICS-3 sectors over 1987–2007

LABOR PRODUCTIVITY: LEADERS AND FOLLOWERS BOTH SLOW DOWN

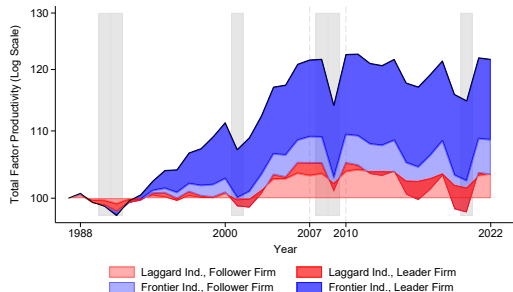


(A) LEADERS BY EMPLOYMENT

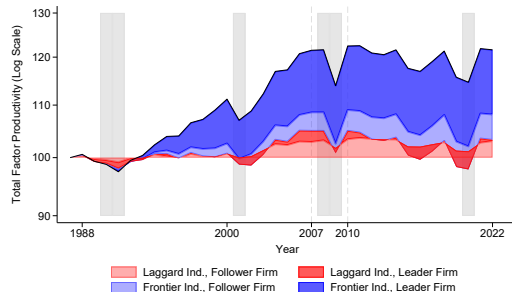


(B) LEADERS BY REVENUE

TFP: LEADERS AND FOLLOWERS BOTH SLOW DOWN



(A) LEADERS BY EMPLOYMENT



(B) LEADERS BY REVENUE

WITHIN-GROUP GROWTH: SLOWDOWN ACROSS ALL GROUPS

PANEL A: LABOR PRODUCTIVITY (%/YR)

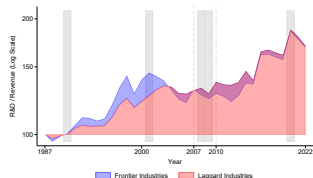
Annualized Growth	1987-2007	2010-2022	Slowdown
Leader Industries: Leader Firms	7.15	0.24	-6.91
Leader Industries: Follower Firms	6.97	1.49	-5.48
Follower Industries: Leader Firms	2.39	-1.21	-3.60
Follower Industries: Follower Firms	2.94	1.04	-1.90

PANEL B: TFP (%/YR)

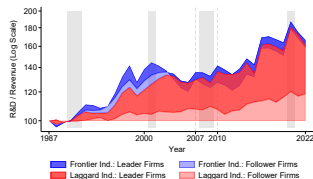
Annualized Growth	1987-2007	2010-2022	Slowdown
Leader Industries: Leader Firms	2.58	-0.31	-2.90
Leader Industries: Follower Firms	2.68	0.63	-2.06
Follower Industries: Leader Firms	0.16	-0.28	-0.45
Follower Industries: Follower Firms	0.45	-0.08	-0.54

INNOVATION DYNAMICS

R&D INTENSITY RISING AMONGST ALL GROUPS



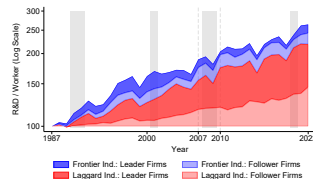
(A) BEA: R&D / GROSS OUTPUT



(C) COMPUSTAT: R&D / REVENUE



(B) BEA: R&D / WORKER



(D) COMPUSTAT: R&D / WORKER

In standard growth theory, R&D is the engine of productivity

- spending today funds the research that raises productivity in later years
- this takes time, so we focus on 4-year periods in a dynamic system

Study: compare full periods to pre-periods to ask about relative effectiveness

THE R&D PAYOFF HAS WEAKENED

	Pre	Full	Pre	Full	Pre	Full	Pre	Full
$\hat{\beta}$	0.728 (0.046)	0.705 (0.035)	0.730 (0.034)	0.714 (0.034)	0.717 (0.041)	0.679 (0.040)	0.737 (0.047)	0.714 (0.036)
$\hat{\alpha}$	0.0183 (0.0096)	0.0132 (0.0059)	0.0144 (0.0056)	0.0075 (0.0053)	0.0267 (0.0134)	0.0131 (0.0092)	0.0258 (0.0107)	0.0122 (0.0069)
Obs	318	619	318	619	318	619	318	619
Weighted					X	X	X	X
Time FE			X	X			X	X
AR(1)	0.024	0.000	0.303	0.000	0.477	0.033	0.967	0.054
AR(2)	0.410	0.644	0.310	0.223	0.851	0.313	0.265	0.099
Sargan	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Hansen	0.000	0.004	0.179	0.026	0.000	0.014	0.203	0.230

Standard errors in parentheses

System GMM (Arellano–Bond 1991; Blundell–Bond 1998) on $\ln Z_{i,t+1} = \alpha \ln R_{it} + \phi \ln Z_{it} + \eta_i + u_{it}$; NAICS 4-digit industries, BLS TFP index. Standard errors in parentheses.

CONCLUSION

- The slowdown is broad-based: leaders and followers, frontier and laggard
- R&D intensity rose, but its translation to productivity fell
- Capacity of firm-level data to enrich macroeconomic questions

Open questions:

- What about services?
- What about the effects of AI?