

Declining Business Dynamism in the US and the Productivity Growth Slowdown: Connecting the Trends

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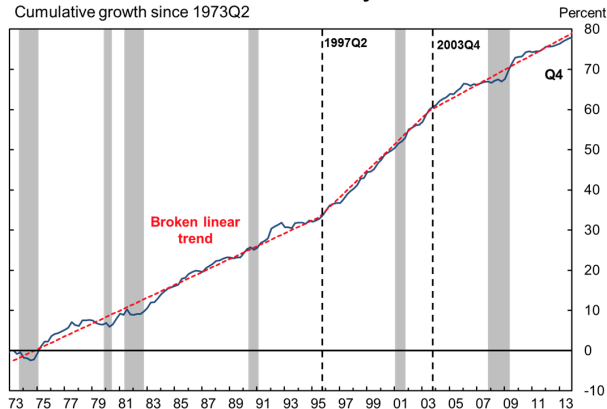
Structure of Talk

- Widespread slowdown of productivity growth in developed countries
 - ▶ It is real, not mis-measurement (Syverson 2016)
 - ▶ Why? Policies to reverse trend?
- Putting together a story based on other ongoing trends
 - ① Decline in business dynamism (Decker, Haltiwanger, Jarmin, Miranda 2016)
 - ② Structural transformation (Duernecker, Herrendorf, Valentinyi 2016)
 - ③ Ideas are getting harder to find (Bloom, Jones, Van Reenen Webb 2017)

Visualizing the Problem

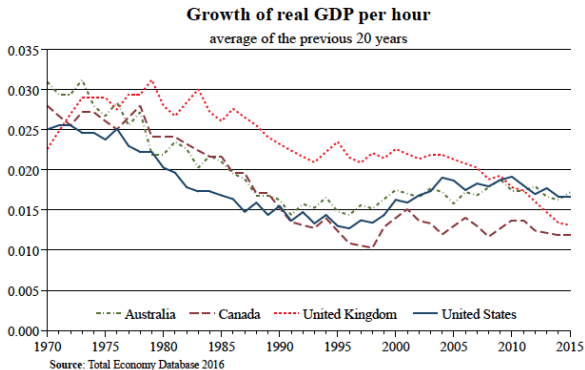
Business Sector Labor Productivity

Cumulative growth since 1973Q2



- \widehat{LP}_t growth slows from 2.8% yearly 1994-2004 to 1.3% afterwards
- Had it not happened, extra 23.5k per household in US!! (Syverson, 2016)

Visualizing the Problem



- Internationally widespread phenomena
- Slowdown goes all the way to post-war years, interrupted in 95-03

Recapping

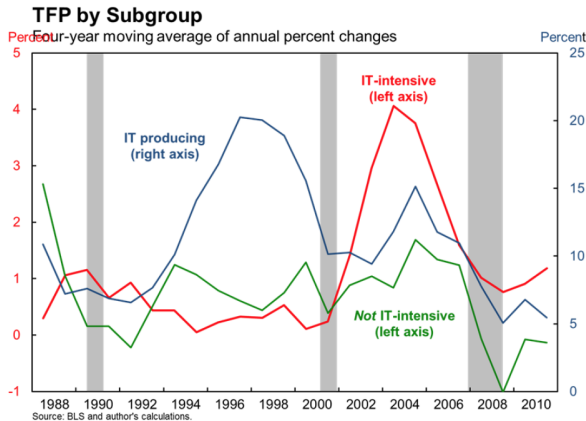
- Labor productivity growth has been slowing down since the 70s
- Similar trends in other developed countries
- Minor interruption to the trend between 1995-2003

Stories?

Why Could the Other Trends be Informative?

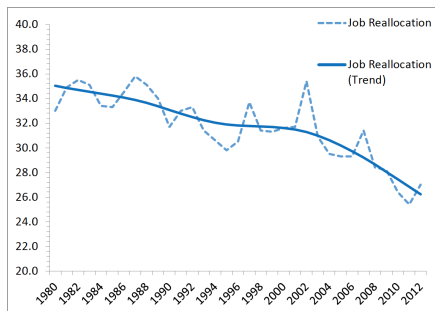
- Declining business dynamism consistent with lower gains from reallocation
 - ▶ Data since 80s, so can only talk about 95-04 surge and decline
 - ▶ challenge: consistent with accepted stories based on High-Tech sector?
- Timing of structural transformation and ideas getting harder to find consistent with longer term aspects of the slowdown
 - ▶ surge of service sector (slow productivity growth) coincides with start of aggregate slowdown
 - ▶ similar timing with decline in “Idea Production TFP”

Productivity Growth in IT Producing and IT-Intensive Industries

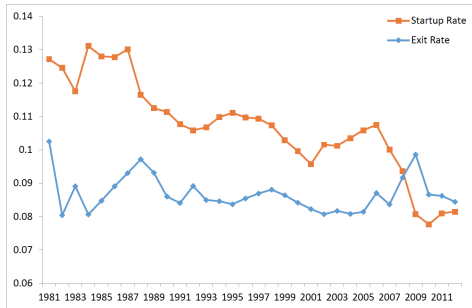


- Clear initial surge in productivity growth in IT production
- Subsequent spillover to users of IT (managerial reorganization, change in business model)

Meanwhile: Trends in Business Dynamism in US



Source: BDS



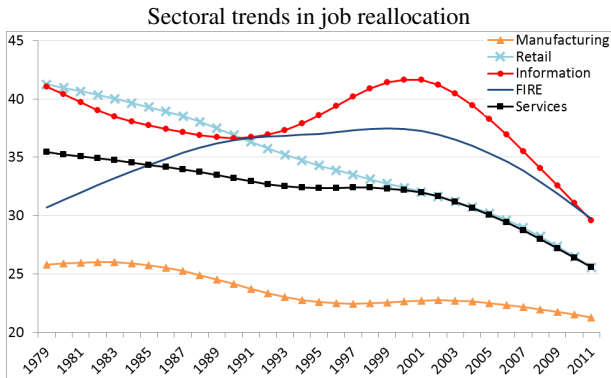
Source: BDS

- Fluid reallocation and firm turnover indicative of factors flowing to most efficient use.
- Persistent decline in these measures could explain aggregate slowdown

Connecting Trends: Business Dynamism and Productivity Slowdown

- Promising since turnover and reallocation key to productivity growth
- However, a few key challenges
 - ① Timing is not right: business dynamism was declining even in 95-04
 - ② What about reallocation and entrepreneurship in IT sectors?
 - ③ Reduction in turnover not a problem if productivity shocks are less volatile
 - ★ Must show that more frictions are hindering responsiveness
 - ④ Quantitative significance?
- Decker et.al. (2016) provide answers

Sectoral Data Address Points 1 and 2



- Sectoral heterogeneity in patterns of dynamism.
- Surge and decline in IT sector, consistent with LP growth pattern
- Decline in reallocation in retail was productivity enhancing (Walmart vs mom-pop)

Dispersion of TFP vs Responsiveness: Concepts

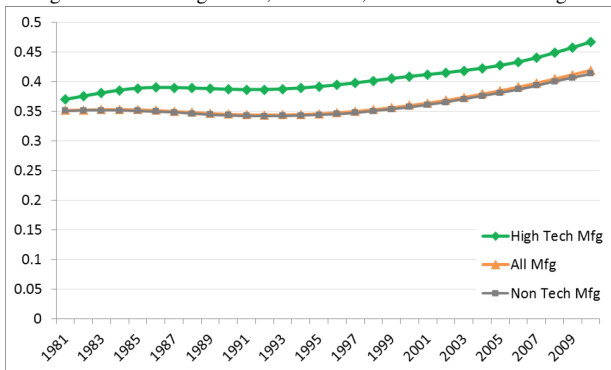
- Frictionless environment, $L_{d,i} K_{d,i} \propto A_i$ (equalization marginal returns)
- Frictions (adjustment costs) and distortions (credit constraints, taxes) break relationship between factor demand and firm TFP
- If we can measure dispersion in A_i , then combined with data on reallocation of L_i, K_i can infer trend in frictions and distortions

Hereafter, assume Decker et.al 's measure of A_i is accurate

Role of dispersion vs responsiveness in explaining declining dynamism?

Changes in Within-Industry Dispersion in TFP

SD log *TFP* within High-Tech, Non-Tech, and All Manufacturing sector



Decker et.al. (2016) figure A1

- Increasing dispersion with declining reallocation → must be responsiveness going down

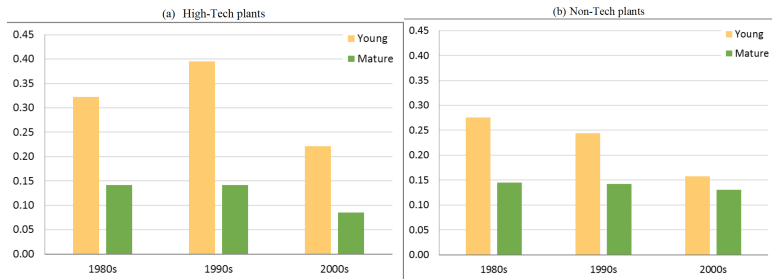
Measuring Responsiveness to TFP

- Regression:

$$\hat{L}_{i,t+1} = \lambda_{t+1} + \gamma * TFP_{i,t} + \gamma_1 * TFP_{i,t} * Trend_t + controls$$

- Object of interest: time evolution of marginal effect of *TFP* on employment growth

Changes in Responsiveness to TFP Dispersion



Plant-level marginal effect of TFP on employment growth (Decker et.al 2016)

- Reduction in responsiveness due to change in age distribution
 - ▶ Recall decline in startup activity (i.e. reallocation towards mature)
- Decline in responsiveness within age groups since 2000 (earlier in non-tech)

Quantitative Significance of Decline in Business Dynamism Channel

- The story flows nicely. Does it matter quantitatively? Define

$$TFP_t = \sum \theta_{it} TFP_{it}$$

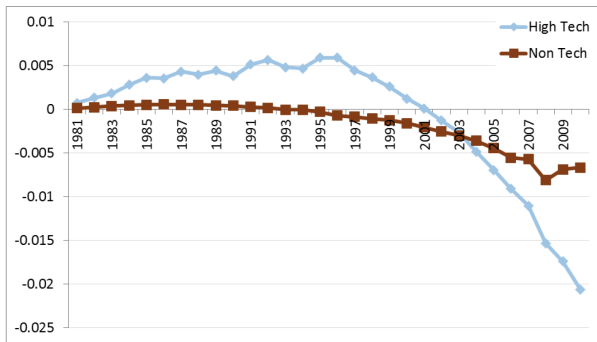
- ▶ $\theta_{i,t}$ employment share of plant i in the industry
- Let $\theta_{i,t+1}^c$ projected empl. from regression coefficient

$$TFP_{t+1}^C = \sum \theta_{i,t+1}^c TFP_{it}$$

- ▶ Notice that TFP_{it} is the same (only capture changes in shares)
- How much is the reallocation driven TFP growth?

$$\Delta_t^{t+1} = \left[TFP_{t+1}^{C,trend} - TFP_t \right] - \left[TFP_{t+1}^{C,no-trend} - TFP_t \right]$$

Quantitative Significance of Decline in Business Dynamism Channel (Decker et.al. 2016)



Counterfactual Reallocation-driven Industry TFP growth (Decker et.al. 2016)

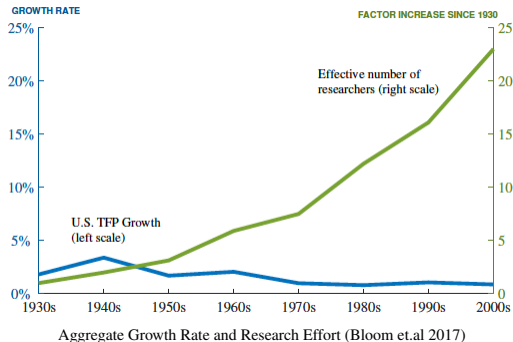
- Potentially sizable contribution to the aggregate slowdown

What About the Slowdown from 50-70s to 1995?

- We cannot measure business dynamism from that far back
- Candidates:
 - 1 Ideas getting harder to find (Bloom et.al. 2017)
 - 2 Structural Transformation (Duernecker et.al. 2016)

Ideas ARE Getting Harder to Find

$$\text{GrowthRate} = \text{Idea TFP} \times \text{Researchers}$$



- Growth and Idea TFP going down since 50s (flattening in 90s)
- Not only true in the aggregate but across industries a

Structural Transformation (ST) Based Productivity Slowdown

- ST is about reallocation from high to low productivity growth sectors
- VA share in services increased by factor of 4 between 2010 and 1950 relative to goods
- How much of the slowdown attributable to structural transformation?
- Assume sector shares of 1947 (i.e. shut down ST):
 - ▶ \hat{A} falls by 0.75% between 50-70 to 90-2010
 - ▶ It falls by 1% in actual data
 - ▶ ST accounts for 1/4 of overall slowdown

▶ ST-fig

Going Forward

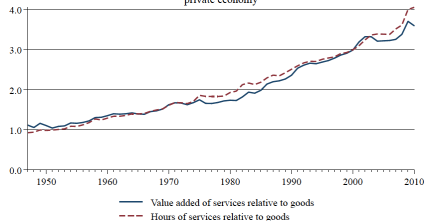
- Some stories for slowdown are based on “primitives”→ hard to come up with policy recommendations
 - ▶ What can be done about Idea TFP?
- The ST story can somewhat be connected to policy to the extent that productivity in services is endogenous
 - ▶ Investigate further the trend in service sector productivity. Heterogeneity within services?
- The connection between business dynamics and policies is tighter
 - ▶ Is doing business getting harder in US (entry costs, taxes, misallocation)?
 - ▶ Theory will be needed to explore quantitative power of tentative policies/distortions that are proposed
 - ★ accounting methods can only take you that far

BACKUP SLIDES

Structural Transformation

Relative nominal value added and hours

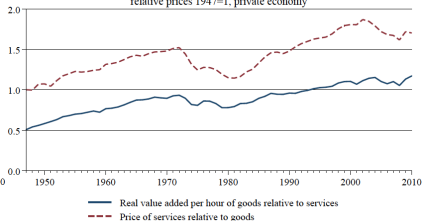
private economy



Source: WORLD KLEMS

Relative productivities and prices

relative prices 1947=1, private economy



Source: WORLD KLEMS

► ST

Definition High-Tech Sector

Table A.1: High-Technology Industries

NAICS Code	Industry
<i>Information and Communications Technology (ICT) High-Tech</i>	
3341	Computer and peripheral equipment manufacturing
3342	Communications equipment manufacturing
3344	Semiconductor and other electronic component manufacturing
3345	Navigational, measuring, electromedical, and control instruments manufacturing
5112	Software publishers
5161	Internet publishing and broadcasting
5179	Other telecommunications
5181	Internet service providers and Web search portals
5182	Data processing, hosting, and related services
5415	Computer systems design and related services
<i>Miscellaneous High-Tech</i>	
3254	Pharmaceutical and medicine manufacturing
3364	Aerospace product and parts manufacturing
5413	Architectural, engineering, and related services
5417	Scientific research-and-development services

Source: Bureau of Labor Statistics, Hecker (2005)

Definition of Information Sector (Fernald 2014)

Appendix Table A-1

BLS industries, and definitions of sub-groups used in the paper.

		Res. est. Nat. Res.	IT-sect. Com. FIRE	Non-IT-sect. (m (20))	Non-IT-sect. (m (21))	Non-IT-sect. (m (22))	Non-IT-sect. (m (23))	Non-IT-sect. (m (24))	Non-IT-sect. (m (25))	Non-IT-sect. (m (26))	Non-IT-sect. (m (27))	Non-IT-sect. (m (28))
	NACS	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
1 Manufacturing	44-49											
2 Non-durable goods	44											
3 Food, beverage and tobacco product manufacturing	511,512	x		x			x	x				
4 Textile and textile product mills	513,514	x		x			x	x				
5 Apparel, leather, and allied product manufacturing	515,516	x		x			x	x				
6 Paper manufacturing	522	x		x			x	x				
7 Printing and related support activities	523	x		x			x	x				
8 Petroleum and coal products manufacturing	534	x		x			x	x				
9 Chemical manufacturing	525	x		x			x	x				
10 Plastics and rubber products manufacturing	526	x		x			x	x				
11 Durable goods	44											
12 Wood product manufacturing	521	x		x			x	x				
13 Nonmetallic mineral product manufacturing	527	x		x			x	x				
14 Primary metal manufacturing	531	x		x			x	x				
15 Fabricated metal product manufacturing	532	x		x			x	x				
16 Machinery manufacturing	533	x		x			x	x				
17 Computer and electronic product manufacturing	534	x		x			x	x				
18 Electrical equipment, appliances, and component manufacturing	535	x		x			x	x				
19 Transportation equipment manufacturing	536	x		x			x	x				
20 Furniture and related product manufacturing	537	x		x			x	x				
21 Miscellaneous manufacturing	539	x		x			x	x				
22 Agriculture, forestry, fishing, and hunting	11											
23 Farms	111,112											
24 Forestry, fishing, hunting, and related activities	113-115											
25 Mining	21											
26 Oil and gas extraction	211											
27 Mining, except oil and gas	212											
28 Support activities for mining	213											
29 Utilities	22	x		x				x	x			
30 Construction	23											
31 Trade	42-44,45											
32 Wholesale trade	42	x		x			x	x				
33 Retail trade	44-45	x		x			x	x				
34 Transportation and warehousing	48-49											
35 Air transportation	481	x		x				x	x			
36 Rail transportation	482	x		x			x	x	x			
37 Water transportation	483	x		x			x	x	x			
38 Truck transportation	484	x		x			x	x	x			
39 Transit and ground passenger transportation	485	x		x			x	x	x			
40 Pipeline transportation	488	x		x			x	x	x			
41 Other transportation and support activities	487,488,490	x		x			x	x	x			
42 Warehousing and storage	483	x		x			x	x	x			
43 Information	51											
44 Publishing (incl. software)	511,518	x		x								
45 Motion picture and sound recording industries	512	x		x								x
46 Broadcasting and telecommunications	515,517	x		x				x	x			
47 Information and Data Processing Services	518,519	x		x				x	x			
48 Finance, insurance, and real estate	52-53											
49 Credit intermediation and related activities	521,522											
50 Securities, commodities, and other fin. invest. activities	523											
51 Insurance carriers and related activities	524											
52 Funds, trusts, and other financial vehicles	525											
53 Real estate	531											
54 Rental and leasing services and lessors of intangible assets	532,533											
55 Services	54-61											
56 Legal services	5411	x		x			x	x			x	
57 Computer systems design	5415	x		x								
58 Miscellaneous professional, scientific, and technical services	5412-5414,5416-5418			x			x	x			x	
59 Management of companies and enterprises	55			x								
60 Administrative and support services	561			x				x	x		x	
61 Waste management and remediation services	562						x	x				
62 Education services	61			x				x	x			
63 Ambulatory health care services	621			x			x	x				
64 Hospitals and nursing and residential care facilities	622,623						x	x			x	
65 Social assistance	624			x			x	x			x	
66 Performing arts, spectator sports, museums, and related ind.	711-712			x			x	x			x	
67 Amusement, gambling, and recreation industries	713			x			x	x			x	
68 Accommodation	721			x			x	x	x		x	
69 Food services and drinking places	722			x			x	x	x		x	
70 Arts, entertainment, and recreation	71											

References

- Bloom, Jones, Van Reenen Webb 2017: “Are Ideas Getting Harder to Find”
- Decker, Haltiwanger, Jarmin, Miranda 2016: “Changing Business Dynamism and Productivity: “Shocks vs Responsiveness”
- Duernecker, Herrendorf, Valentinyi 2016: “Unbalanced Growth Slowdown”
- Fernald 2014: “Productivity and Potential Output Before, During, and After the Great Recession”