Comments on “Innovation Growth Accounting” by Peter Klenow and Huiyu Li

Comments by John Haltiwanger
Overview

• Innovative growth accounting framework motivated by quality ladder model of innovation

• Distinguishing features:
  • Indirect method of quantifying creative destruction, own innovation, and new varieties from growth rate distribution of all private sector establishments in the U.S.
    • Distinct from more direct approaches using patents, R&D, or new product introduction
    • Establishments are products
  • Permits heterogeneity in own innovation, arrival rate of creative destruction, step size by groups of establishments classified by firm age and firm size classes.
  • Creative destruction (CD) is random. Rate of loss from CD is the same across all firm groups.
  • Obsolescence threshold the same across all firm groups.
Many Interesting Results – Highlighting two:

• New and young firms punch more than their weight. Almost 50% of aggregate productivity growth accounted for by firms age<5 even though they account for only about 16% of employment.

• Surge in productivity in mid 1990s and then slowdown thereafter accounted for by older firms. Key component: own innovation.
Shift from goods to services interacts with changing age (and size) distribution.

Broad sector is crude -- substantial changes in composition of industries within these broad categories.

Note:  Source:  BDS, First Subperiod differs from paper (avoid imputation of 6-10/11+ in 1982-86)
Entry Employment Share = Employment from new establishments/Total employment for all ages in industry.

Holding industry composition constant even at 1 digit level yields non-trivial differences in decline in entry employment share over time that differs across age groups.

Davis et. al. (2006) and Decker et. al. (2016) find economy-wide employment dispersion/reallocation measures decline by 20 percent more than actual holding detailed industry composition constant.

Source: BDS
Comment 2: Creative Destruction is not random.

A new retail establishment is not directly competing with existing manufacturing establishments in terms of product innovation.

Especially for retail, effects are detailed industry specific and local:

When a Big-Box retailer in General Merchandise (e.g., Wal-Mart) enters a specific location:
-- Exit rates of single unit and small chain general merchandise stores increase especially in 1-5 mile radius.
-- Entry increases and exit declines for restaurants in the immediate area.
(Haltiwanger, Krizan and Jarmin, 2010)

Source: BDS
This paper: Wal-Mart/Amazon have exhibited substantial increases in scale but apparently little gains in Revenue Per worker.

Is this the right comparison?

During this period of dramatic change in the business model in Retail trade:

Revenue Per Worker of Establishments of Large, National Chains persistently 25 log points Higher on average than establishments of Single-Unit Establishment Firms in the same detailed industry.

Source: Foster et. al. (2016)
Comment 4: Surge and Slowdown in Productivity dominated by High Tech (ICT). Young Firm dynamics Distinct for ICT compared to overall economy.

Source: Left Panel from Fernald, SF Fed. Right Panel from Aggregated 4-digit industries from BLS
Putting the pieces together: ICT producing (and in turn intensive ICT using) dominates productivity Surge and Decline. Surge initially in producing and then in intensive ICT using.

Source: Byrne et. al. (2016)
High Tech Had surge Of entry and Young firms During Productivity Surge.

Was Productivity Surge and Decline in High Tech driven By mature firms?

Declining Economy-wide Young Firm Share dominated by Retail Trade

Source: Tabulations from LBD (Census) by Decker et. al. (2017) spliced with Business Employment Dynamics (BLS)
1990s cohort of IPOs large and rapidly growing contribution – dominated by ICT

Share of employment by IPO cohorts among publicly traded firms

Source: Decker et. al. (EER, 2016) and Ritter (2016)
Comment 5: What moments are driving the finding of surge and decline in own innovation for older firms?

Survivor Growth=Continuing establishments employment share in t divided by share in t-1

Survivor growth highest (and above one) for young firms.

Survivor growth lower (and below one) for older (age 11+) firms.

Only modest increase in survivor growth over time for age 11+.

Source: BDS
Taking stock and possible next steps

• Applying innovation accounting model to pooled private sector growth rate distribution of establishments has significant limitations:
  • Changing age and size structure partly driven by structural change outside scope of accounting framework.
  • Creative destruction is directed (at least within sector)
  • Pooled moments on employment growth distribution and aggregate productivity miss the outsized role of ICT and its distinct firm dynamics (with a surge of entry and fast growing young firms in the 1990s)

• Possible next steps:
  • Use accounting model at a detailed sectoral level.
  • Aggregate likely not using CES (or at least nested CES). Hottman, Redding and Weinstein (2016) use CES within each detailed product group and then Cobb-Douglas to aggregate across product groups.
  • Still not clear how this would capture spillover effects of innovations in general purpose technology from ICT.
Extra Slides
Comment 6: Useful to distinguish between employment shares by age (size) and entry/exit patterns by age/size

Exit Employment Share = Employment from Exiting Establishments/Total Employment for all ages in industry

Employment-weighted moments suggest older firms dominate establishment-entry and exit. After age=0.

What is driving this is most employment is with older firms and this is growing.
Exit Rate Within Group=Employment from Exiting Establishments/Employment for age group

Exit Rates much higher for establishments of young firms compared to old firms.

Useful to distinguish between Changes within groups And changes in size of groups
Comment 7: Missing Dynamics: Experimentation, Learning and Shake Out Process

• Gort and Klepper (1982) and Jovanovic (1982) emphasize that periods of innovation lead to:
  • Phase one: Surge of entry and experimentation
  • Phase two: Shake out process
  • Phase three: Successful (high quality/high productivity) entrants grow

• Gort and Klepper track many different innovations (e.g. autos, tv’s, computers, lasers) and find these dynamics take many years and vary by innovation.
Evidence from RE-LBD provides support for Gort and Klepper type dynamics in High Tech productivity Surge in the 1990s

Changes in Productivity Dispersion and Growth from a 1% (one time) Increase in Entry Rate (Years 1-3), High Tech

Surge in entry in a given 3-year period leads to:

- Rise in within industry productivity dispersion and decline in industry productivity growth in next 3-year period
- Decline in within industry productivity dispersion and rise in industry in subsequent 3-year period
- Surge in reallocation following surge in entry as well (not depicted).
- Similar, dampened patterns for Non-Tech

Using 4-digit NAICS data for High Tech sectors (ICT in mfg and non-mfg plus sectors such as Bio Tech)

Source: Foster et. al. (2018)