Changing Patterns of Productivity and Business Dynamism: Is There a Connection?

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By

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This talk, without attribution, draws on joint work with Steven Davis, Ryan Decker, Jason Faberman, Lucia Foster, Cheryl Grim, Ron Jarmin, Javier Miranda, and Zoltan Wolf.
Declining Business Dynamism in U.S. is Evident from Multiple Data Sources


Job Reallocation Rate, U.S. Private Non-Farm (Quarterly)
Source: BED

Job Reallocation Rate, U.S. Private Non-Farm (Annual)
Source: BDS

Dashed lines are Hodrick-Prescott Trends
Young businesses are much more volatile than mature businesses. The changing age distribution of businesses accounts for about 25% of the secular decline in dynamism from the late 1980s to mid 2000s (Decker et al. 2014).

Share of Employment for Young Firms, 1981-2014, Nonfarm Private Sector

Source: BDS
Possible connections between indicators of business dynamism and productivity?

1. Increase in frictions and distortions has reduced pace of dynamism and entrepreneurship.
   - Ubiquitous finding: Large, within industry dispersion in productivity.
   - In healthy economy, reallocation moving resources from less productive to more productive.
   - An increase in frictions (e.g., Hopenhayn and Rogerson (1993)) will yield a decline in productivity
     - How to reconcile 1990s?

2. Decline in pace of innovation/technological change (Gordon (2016)) has led to decline in dynamism/entrepreneurship (Gort and Klepper (1982) and Jovanovic (1982))
   - Innovation/entry → Experimentation/Dispersion → Reallocation/Productivity Growth

3. Structural changes due to demographics, changes in business model
   - Unclear prediction or even benign implications for productivity?
High Tech are STEM intensive industries. Includes ICT and Bio Tech.
Share of activity accounted for by Single Unit Establishment Firms ("Mom and Pop" Firms) has declined from 50 to 35 percent. Almost all of the increase in Multi-Unit Share is from Large, National Chains.

Productivity Gap between Single-Unit Establishment Firms and Large, National Chains is 25 log points.

Employment-weighted annual exit Rate of Single-Units is about 8 percent. About one half of one percent for Large, National Chains.

Job Reallocation Rate for Single-Units is almost 3 times larger than for National Firms.

Shift to National Chains has been productivity enhancing and reduced volatility.

Source: Foster et. al. (2016)
Increases in Frictions and Distortions?

- Hopenhayn and Rogerson (1993):
  - Canonical firm dynamics model where firms face idiosyncratic productivity shocks, endogenous entry and exit and adjustment frictions (extension of Hopenhayn (1992) with adjustment frictions).
  - Increased adjustment frictions imply:
    - Reduced dispersion of firm growth rates
    - Firms with higher realizations in productivity are less likely to grow, lower realizations in productivity are less likely to contract/exit.
    - Reduced aggregate productivity
Illustrative Model of Increases in Adjustment Frictions


\[ V(E_{it-1}; A_{it}) = A_{it}E_{it}^\alpha - w_tE_{it} - C(H_{it}) + \beta V(E_{it}; A_{it+1}) \]

\[ C(H_{it}) = \begin{cases} 0, & \text{otherwise} \\ \gamma \left( \frac{H_{it}}{E_{it-1}} \right)^2 + F_+ \max(H_{it-1}, 0) + F_- \max(-H_{it-1}, 0) & \text{if } H_{it} \neq 0 \end{cases} \]

\[ a_{it} = \rho a_{it} + \eta_{it} \]

\[ E_{it} = E_{it-1} + H_{it} \]

Where \( \alpha < 1 \) due to decreasing returns or product differentiation.

Calibration of this model helps illustrate different mechanisms.
With increases in adjustment frictions:
1. Declining Reallocation and Responsiveness.
2. Rising Dispersion of LP.

With decreases in shock dispersion:
1. Declining Reallocation and Responsiveness.
2. Declining Dispersion of LP.
$P_i = \tilde{p}_i + \text{cov}(\theta_f, p_f)$, Olley-Pakes (OP) Decomposition of industry-level productivity insightful here. OP covariance using either TFP or LP declines with increase in adjustment costs.

By Agg TFP we mean employment-weighted micro TFP. Since unweighted mean does not vary, variation in Agg TFP is isomorphic to the OP Covariance.
Dispersion and Persistence

Shock Processes in Manufacturing

Little evidence that changes in persistence drive patterns of reallocation

Patterns for innovations mimic overall shocks
Marginal Response of Plant-Level Employment Growth and Investment to TFP for High Tech – Results from estimating plant-level regressions of outcomes on lagged TFP realizations

- Increased responsiveness during 1990s for young firm plants in High Tech
- Decreased responsiveness during 2000s for both young and mature firm plants in High Tech
Implications for Aggregate (Industry-Level) Productivity

Start with (industry) aggregate productivity:

\[ P_t = \sum \theta_{it} P_{it} \]

\( \theta_{it} = \) employment weight, \( P_{it} = \) plant TFP, Correlation with traditional measures about 0.8

Reallocation contribution to prod. growth:

\[ P_{t+1}^C = \sum \theta_{it+1} P_{it} \]

\[ P_{t+1}^C - P_t \]

Agg. prod. growth accounted for by reallocation (essentially Change in OP covariance for fixed \( P_{it} \))

Model-based \( \theta_{it+1} \) \( \Rightarrow \) counterfactual \( P_{t+1}^C - P_t \) (with and without change in responsiveness) \( \Rightarrow \) Diff-in-diff
Difference in contribution of reallocation to Within industry Productivity Growth between Model estimates with trend and model Estimates with Responses in 1980
Economy Wide

- Much more difficult to construct measures of shock processes
- Instead measure Revenue Labor Productivity (RLP)
  - New Comprehensive Firm-Level Database
    - Exclude the financial sector (private, non-farm, non-financial)
  - Distributions of RLP will reflect shocks and frictions (dispersion endogenous)
  - High (low) TFPR/RLP should grow (shrink) as they will have high (low) Marginal Revenue Products. Covariance between growth and these measures still informative.
  - Focus on relative productivity within detailed industries.

- Implication:
  - Both changes in dispersion of measured productivity and covariance between measured productivity and growth informative moments.
Young dispersion > Mature dispersion
Consistent with Young facing more frictions, engaged in learning and experimentation.

Dispersion rises within age groups post 2000.
Difficult to reconcile with Gort-Klepper dynamics.
Reduced Responsiveness of Employment Growth to Productivity in 1997-2013 (Cov(growth,productivity) is declining)

Declining responsiveness is consistent with rising dispersion in revenue labor productivity.

Overall Net Employment Growth (inclusive) of Exit has become less responsive to productivity.
Reduction in Contribution of Reallocation to Productivity from Reduced Responsiveness, Tech vs. Nontech (Diff-in-Diff counterfactual)

Each point reflects immediate gains in specified year if responsiveness returned to 1997 rates with current year dispersion (latter partly reflects accumulated effects of declining responsiveness).
Some evidence of Gort and Klepper Dynamics in High Tech:

1. Surge of Entry (proxy for innovative period) leads to immediate rise in dispersion and lagged rise in productivity.
2. But these dynamics can’t account for increase in within industry dispersion post 2000 (IQR increases by more than 10 log points for both young and mature firms in post 2000 period). Entry is declining over this same period. Based on Gort-Klepper dynamics we would have expected a decline in dispersion.

Source: Foster et. al. (2017)
In OECD, declining dynamism with Declining entrepreneurship

And

Rising Within Industry Dispersion of Revenue Labor Productivity

Source: Andrews et. al. (2016)
Taking Stock

- Different dynamics across sectors:
  - Retail Trade:
    - Structural change yielded decline in dynamism, entrepreneurship and rise in productivity.
  - High Tech:
    - Rise and decline in entrepreneurship, dynamism and productivity.
    - Which way does causality run?
      - Declining responsiveness and rising labor productivity dispersion in post 2000 period consistent with rising frictions/distortions.
Rising Frictions/Distortions?

- Labor market (e.g., Occupational Licensing, Employment at Will)
- Decline in competition (e.g., winner takes all sectors make it more difficult to identify and enforce exclusionary practices)
- Financial market regulation (e.g., Sarbanes-Oxley, Dodd-Frank)
- Zoning restrictions in information-centric locations? (Hsieh and Moretti, 2015)
Decline in indicators of dynamism (job reallocation/entry) part of broader decline in labor market fluidity.

The latter has implications beyond those discussed here for productivity:
1. Labor force participation
2. Earnings growth
3. If match quality has declined this also has implications for productivity.

See Davis and Haltiwanger (2014).