Value Without Employment

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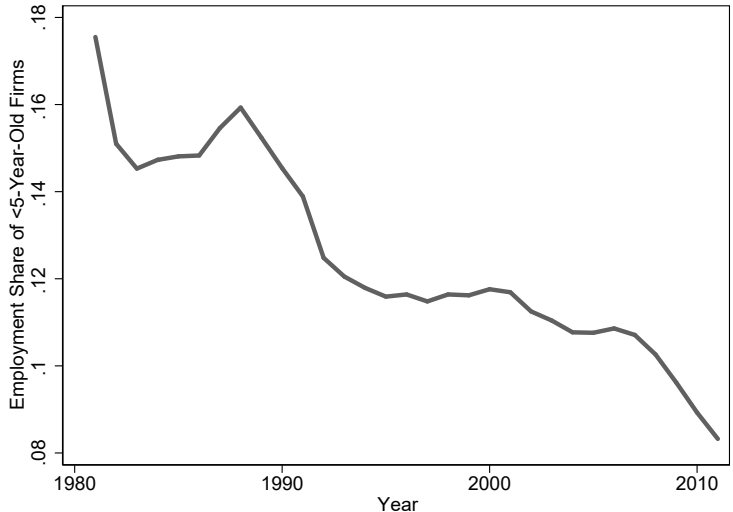
Employment Contribution of Young Firms



Source: Decker et al. (2016)

Declining Dynamism

- Since the early 1980s
  - Declining employment contribution of young firms (Decker et al. (2016a))
  - Declining gross labor flows (Decker et al. (2014))
  - Declining firm entry and exit rates (Decker et al. (2016a))
- Since the early 2000s
  - Decline in high growth firms (Decker et al. (2016b))
- Magnitude for contribution: at least 15pp to 10pp, **a 33% decline**

How Concerned Should We Be?

Will output and consumption decline and if so by how much?

This Paper

1. New stylized fact:
   - Market valuations and sales don't show that same weakness as employment
2. Interpretation:
   - New cohorts of firms have high average- and low marginal- product of labor
3. Model to study implications:
   - Stylized model of dynamic firm heterogeneity
   - High-APL low-MPL for new cohorts generates declining dynamism
   - Use model to determine implications for long run consumption

Preview of Empirical Results

1. Compustat: Increase in market value/employment and sales/employment
2. Pitchbook: Increase in market valuations across cohorts
3. NETS: establishments purchased by young firms have less employment growth

Preview of Model Results

1. This one feature (high APL, low MPL) can generate:
   - Declining labor share, contribution of young firms (targeted)
   - Declining exit rates
   - Declining gross labor flows
   - Increase in TFP dispersion
2. Log-linear formula relates long-run consumption to contribution of young firms
   - Slope is likely very small (multiplies 50% decline)
   - Intercept may be large (effect of structural change)
   - Intercept depends on the cause of declining dynamism

Market Value vs Employment

Compustat: Data

- US public firms traded on NYSE, AMEX, NASDAQ
  - Exclude finance, utilities...
- Supplement with data on firm founding year
  - Avoid counting the contribution of old firms going public (age>10 at IPO)
  - Taken from large number of sources to reach maximum coverage:

    Loughran and Ritter (2004), Jovanovic and Rousseau (2001), SDC Platinum,

    Crunchbase, Wikipedia, Bloomberg, Funding Universe, and Google
- Outcomes: market value (debt + equity), employment, and sales
  - Operating income in Appendix D

Compustat: Contribution of IPO Cohort

- Contribution of IPO Cohort t as:

$$\text{Employment Contribution}_t = \frac{\text{Employment of IPO Firms (Excluding Mature Firms)}_t}{\text{Total Employment}_{t-1}}$$

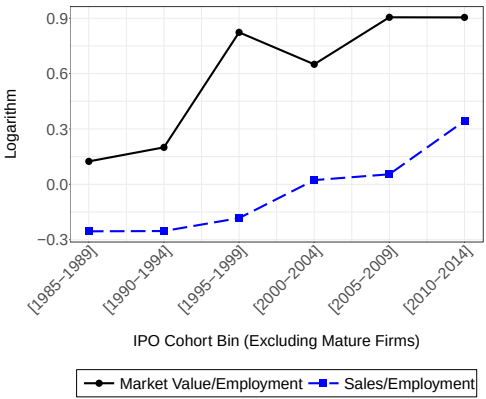
- We bin IPO cohorts into 5-year bins

$$\text{Employment Contribution}_{bin} = \sum_{i \in Bin} \text{Employment Contribution}_i$$

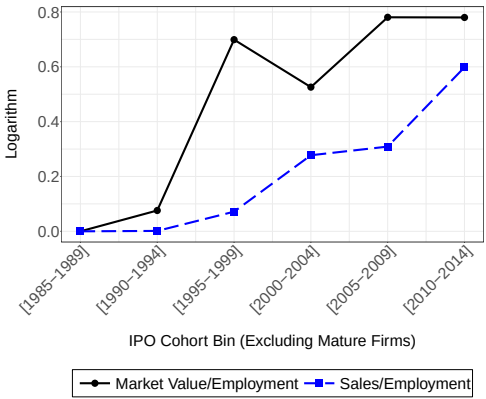
- Analogous measures for market value and sales

Compustat: Results (Ratio)

(c) Ratio of Contributions



(d) Ratio of Contributions Normalized



Compustat: Magnitude

Comparing 1985–1989 cohort with 2010–2014 cohort

- Employment contribution declines 50%
- Sales contribution declines 10%
- Market value contribution shows small increase

Compustat: Additional Comments and Results

- Composition
  - Numerator: Entering firms could come from sectors with high MV/emp
  - Denominator: Mature firms could come from sectors with low MV/emp
  - Both are treated in Appendix D
- Operating Income
  - Would like to use value added as outcome (not available in Compustat)
  - Results with Operating Income in Appendix D

Pitchbook

- Financial data provider that covers venture capital, private equity, and M&A
- Firm level information on public and private firms
  - Line of business, key personnel, founding year, recent news, and financial history
- When firm exits (IPO or M&A) the data provide post-money valuation (equity)

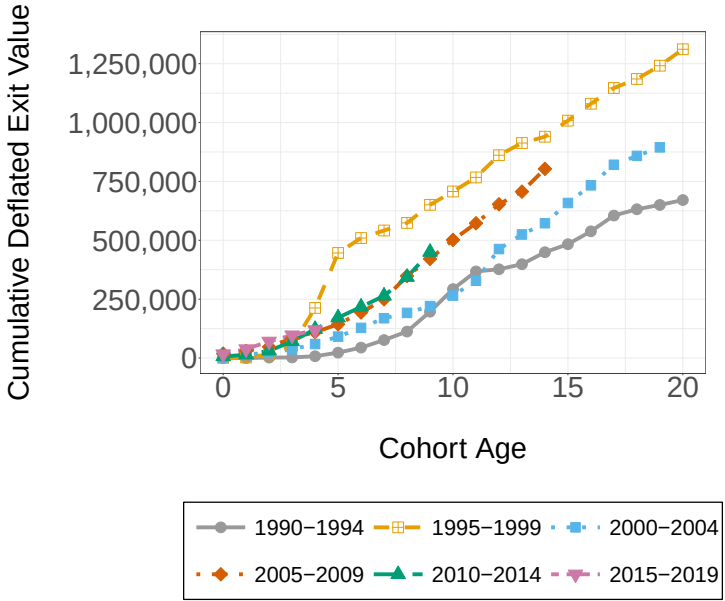
Pitchbook: Data

- Construct cohorts using founding year (Compustat was based on IPO year)
- Extract aggregate exit values for each cohort in each year
  - Separately for IPO and M&A
- Example: 2002 cohort in year 2006
  - IPO exit value $3.6bil
  - M&A exit value $4.1bil
- Our sample covers 1990–2019

Pitchbook: Construction

- Bin cohorts into 5-year bins (1990–1994, 1995–1999, ...)
- Measure the cumulative exit values at each "age"
  - Age of the cohort bin 2000-2004 in 2005 is 5
- Deflate exit values in year t by US market cap at end of year t-1

$$\text{deflated exit value}_t = \text{nominal exit value}_t \times \frac{\text{market capitalization}_{2000}}{\text{market capitalization}_{\textit{end of t-1}}}.$$


Cumulative Deflated Exit Value
1,250,000
1,000,000
750,000
500,000
250,000
0
0
5
10
15
20
Cohort Age
1990−1994
1995−1999
2000−2004
2005−2009
2010−2014
2015−2019

Pitchbook: Additional Comments and Results

- Previous slide combines IPO and M&A
  - M&A exits are twice as large in value as IPO exits
  - Important to use data that covers both
- The results hold separately for IPO and M&A exits
  - Despite decline in number of firms going public, no decline in their combined value

Implications of Finding for Average/Marginal Product of Labor

- Goal: implications of finding for average/marginal labor productivity
  - $\delta_{t,s} \equiv \frac{\frac{y_{t,s}}{l_{t,s}}}{w_t} - 1$ (average/marginal)
- Setup (year t, cohort s, age = t-s)
  - $\pi_{t,s} \equiv y_{t,s}(l_{t,s}) - w_t l_{t,s}$ Notation: gross profits
  - $\frac{P_{t,s}}{\pi_{t,s}} = A(t) \times B(t-s)$ Assumption: valuation ratio
- Result

$$\Delta \log \underbrace{\left(\frac{P_{t,t}}{\sum_{s \leq t} P_{t,s}} \right)}_{\text{MV Contribution}} - \Delta \log \underbrace{\left(\frac{l_{t,t}}{\sum_{s \leq t} l_{t,s}} \right)}_{\text{Emp Contribution}} = \Delta \log \left(\frac{\delta_{t,t}}{\sum_{s \leq t} \omega_{t,s} \delta_{t,s}} \right)$$

Why NETS?

- Compustat: public firms, lots of outcomes
- Pitchbook: VC + PE backed firms, market value outcome
- NETS: universe of US firms, employment outcome

NETS: Thought Experiment

- Two identical establishments for sale
  - Will command same price and have same discount rate
  - Implies same profits
- One is purchased by young firm, the other by an old firm
- If establishment purchased by young firm operates with fewer employees then
  1. Must have lower MPL (fewer employees)
  2. Must have higher APL (higher profits per employee)
- Complete details in Section 2.4 of the paper

NETS: Data

- Establishment data from National Establishment Time-Series (NETS) Database
- Constructed from annual snapshots of Dun and Bradstreet (D&B)
- Contain unique id, headquarters (HQ), industry, employment, and location
  - Firm is the collection of establishments that share an HQ
- Time period: 1991–2015
- We carefully construct firm age (details in Appendix E)

NETS: Switchers

Switchers are establishments that have change in HQ (change in ownership)

Sample	N
Changes in ownership, all private payroll establishments	1,728,088
After removing exiting establishments	1,618,286
After further removing reorganizations and spin-offs	1,546,055
After further removing imputed employment	982,131
After further removing sticky employment	213,255

NETS: Specification

- Unit of observation is an acquired establishment
- Dependent variable: $\log L_{t+1} - \log L_{t-1}$
- Baseline specification: indicator for young acquirer (age$<$8) + fixed effects
- Main specification: split sample into early and late (2005 is mid point)

NETS: Table 1

	Dependent variable:		
	$\log L_{t+1} - \log L_{t-1}$		
	(1)	(2)	(3)
Young Acquirer	-0.039^{***}	-0.035^{***}	-0.027^{**}
	(0.010)	(0.010)	(0.012)
Fixed Effects	Year	Year×SIC4	Year×SIC4×State
S.E. Cluster	Year×SIC4×State	Year×SIC4×State	Year×SIC4×State
Sample Period	1998–2014	1998–2014	1998–2014
Observations	213,255	213,255	213,255
R^2	0.015	0.119	0.504
Note:			*p<0.1; **p<0.05; ***p<0.01

NETS: Table 2

	Dependent variable:		
	$\log L_{t+1} - \log L_{t-1}$		
	(1)	(2)	(3)
Young Acquirer	-0.018^{*}	-0.018^{*}	-0.017
	(0.009)	(0.010)	(0.013)
Young Acquirer × Post-2005	-0.134^{***}	-0.127^{***}	-0.120^{**}
	(0.035)	(0.039)	(0.055)
Fixed Effects	Year	Year×SIC4	Year×SIC4×State
S.E. Cluster	Year×SIC4×State	Year×SIC4×State	Year×SIC4×State
Sample Period	1998–2014	1998–2014	1998–2014
Observations	213,255	213,255	213,255
R^2	0.015	0.119	0.504
Note:			*p<0.1; **p<0.05; ***p<0.01

NETS: Robustness

- Two concerns
  1. Young firms might purchase young establishments
  2. Young firms might purchase smaller establishments
     - Note: would need change over time
- Paper presents results controlling for target age and size

Recap of Empirical Results

- Compustat: weak employment contribution, but stable market value contribution
- Pitchbook: (deflated) exit values have been increasing with each cohort
- NETS: establishments purchased by young firms display less employment growth
- Interpretation: recent cohorts display increasing APL and declining MPL
  - Low MPL needed to rationalize low employment contribution
  - High APL needed to rationalize high valuations / employment

Model

Model Overview

- Declining labor share + dynamism as consequence of high-APL, low-MPL
  - Simplest version of model: labor only input into production
  - Agnostic on reason for high-APL, low-MPL
- log-linear formula relates long-run consumption to contribution of young firms
  - Richer model: labor and capital inputs
  - Can offer guidance under different theories of high-APL, low-MPL
- Model points to increase in rents as reason for high-APL, low-MPL
  - Necessary to *jointly* explain declining labor share and declining dynamism

Model: Setup

- Continuous time, continuum of firms
  - Birth, exogenous exit (death shock), and endogenous exit (bankruptcy, low Z)
- Production + permanent idiosyncratic productivity shocks (no aggregate risk)

$$f(l_{it}, Z_{it}) = Z_{it} l_{it}^{\alpha}$$

$$dZ_{it} = \mu Z_{it} dt + \sigma Z_{it} dW_{it}$$

- Households supply labor and consume output

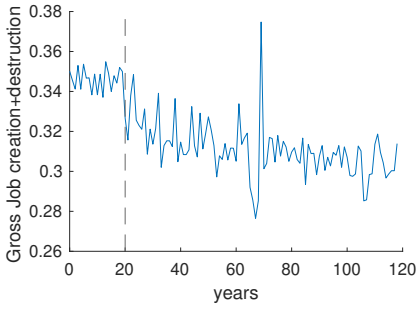
$$r_t = \rho + IES^{-1} \left(\frac{\dot{C}_t}{C_t} \right)$$

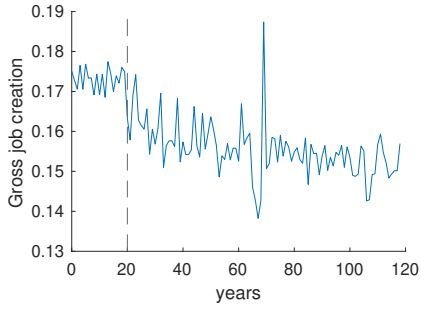
Transition Path

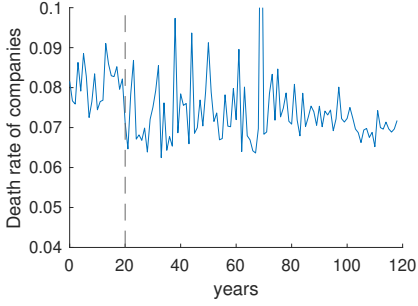
- Change production of new cohorts
  - Lower α to match decline in labor share (low MPL)
  - Higher Z to match output decline $<$ employment decline (high APL)
- Numerical solution of economy along transition path
  - Guess path of bankruptcy cutoffs
  - Clear all markets (path of prices w_t and r_t)
  - Iterate until solution converges
  - Described in Appendix C

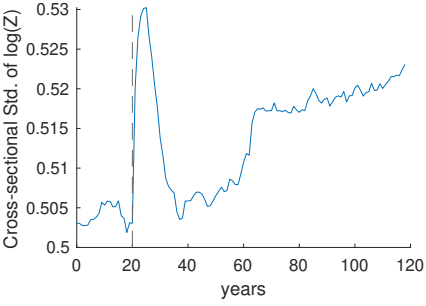
Along Transition Path

- Work in Progress (calibration and simulation noise)
- Targeted
  - Declining labor share (features small within-firm increase)
  - Declining output contribution $<$ declining employment contribution
- Consequence: declining dynamism
  - Declining gross job flows
  - Declining exit rates
  - Increase in TFP dispersion


Gross Job creation+destruction
0.38
0.36
0.34
0.32
0.3
0.28
0.26
0
20
40
60
80
100
120
years


Gross job creation
0.19
0.18
0.17
0.16
0.15
0.14
0.13
0
20
40
60
80
100
120
years


Death rate of companies
0.1
0.09
0.08
0.07
0.06
0.05
0.04
0
20
40
60
80
100
120
years


Cross-sectional Std. of log(Z)
0.53
0.525
0.52
0.515
0.51
0.505
0.5
0
20
40
60
80
100
120
years

Implications for Long Run Consumption

- Production: $y_{it} = exp\{z_{it} + z^c\} l_{it}^{\alpha} k_{it}^{\beta}$
  - $1 - \alpha - \beta > 0$ is share of rents
  - Alternative: monopolistic competition with CRS production (Appendix B)
- Study general change $dz^c, d\alpha, d\beta$
- Log-linear formula relating long-run consumption to contribution of young firms

$$d \log C^{SS} = (1 - \alpha - \beta)\, d \log Y^{\text{new}} + \left(\log l^{SS} - \log l^{new} - 1 \right) (d\alpha + d\beta)$$

  - $\log l^{SS} - \log l^{new}$ difference in size between average and entering firm

Theory #1: Capital-Labor Substitution

- Zeira (1998), Acemoglu (2003), Jones (2003), Summers (2013), Brynjolfsson and McAfee (2014), Karabarbounis and Neiman (2014), Piketty (2014), Acemoglu and Restrepo (2016)...
- Ballpark Numbers
  - $d\alpha + d\beta = 0$
  - $1 - \alpha - \beta$ close to 0
  - $d \log C^{SS} = \underbrace{(1 - \alpha - \beta)}_{\text{close to zero}} \times \underbrace{d \log Y^{\text{new}}}_{> -0.4}$ is close to zero

Theory #2: Declining Competition

- Barkai (2020), Gutierrez and Philippon (2017), De Loecker and Eeckhout (2020)
- Ballpark Numbers
  - $d\alpha + d\beta = -0.135$ Barkai (2020)
  - $1 - \alpha - \beta$ close to 0 in old steady state
  - $\log I^{SS} - \log I^{new}$ around 2.7 (calculated in NETS; similar in public LBD)
  - $$d \log C^{SS} = \underbrace{(1 - \alpha - \beta)\, d \log Y^{\text{new}}}_{\text{close to zero}} + \underbrace{\left(\log I^{SS} - \log I^{new} - 1\right)}_{1.7} \times \underbrace{(d\alpha + d\beta)}_{-0.135}$$
- Potentially very large decline

Theory #3: Sectoral Composition

- Model multiple sectors, each with their own α_j, β_j, z_j^c
- Shocks
  - Different productivity shocks $\left\{dz_j^c\right\}$ to entering firms in each sector
  - $(d\alpha_j + d\beta_j) = 0$ in each sector
- $d \log C^{SS}$ likely very small, full details in the paper
- Data: declining labor share and dynamism appear within sector

Model Points to Increase in Rents

- Necessary to *jointly* explain declining labor share and declining dynamism
- $d(\alpha + \beta) = 0$ can't generate decline in firm responsiveness
  - Decline in firm responsiveness $\rightarrow$ decline in gross labor flows
- Consistent with empirical evidence in Decker et al. (2018)
  - Declining responsiveness of firms to productivity shocks

Summary

1. New stylized fact:
   - Market valuations and sales don't show that same weakness as employment
2. Interpretation:
   - New cohorts of firms have high average- and low marginal- labor productivity
3. Model to study implications:
   - Stylized model of dynamic firm heterogeneity
   - High-APL low-MPL for new cohorts generates declining dynamism
   - Log-linear formula relates long-run consumption to contribution of young firms
     - Slope is small, intercept potentially large (rents vs substitution)