Everything You Ever Wanted to Know about Firm and Worker Dynamics
...but were afraid to ask

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Presented at conference in honor of John Haltiwanger
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- “The presence of nonconvexities in a subset of the sectors of the economy can have interesting aggregate implications.” Cooper & Haltiwanger (1992 JME)
- “High-frequency fluctuations are typically modeled in an aggregate fashion that abstracts from sectoral and especially establishment-level heterogeneity… this standard view is incomplete.” Davis & Haltiwanger (1990 NBERMA).
- “Employers rely heavily on other instruments, in addition to vacancies, as they vary the rate of new hires… Advertising expenditures, screening methods, hiring standards, and compensation packages—influence job-filling rates through effects on applications per vacancy, applicant screening times, and acceptance rates of job offers.” Davis, Faberman & Haltiwanger (2013 QJE)

Firm growth, dynamics, and flows

Setting the stage: John's early work on firms and aggregation

- **Aggregating lumpy firm decisions** (Haltiwanger & Maccini 1988, Cooper & Haltiwanger 1990, 1992, 1993, 1996 & Power 1999; Caballero, Engel, Haltiwanger 1995)
  - Firms face nonconvexities in investment and production decisions (machine replacement, retooling)
  - These may not "aggregate away" if there are complementarities across firms (e.g., via factor markets), costly inventories, etc.
    - Example: Annual auto plant retooling
- **Upshot:** Sector or allocative shocks can lead to aggregate fluctuations with comovement and persistence

A big idea: Gross job flows

- **Net job growth dominates headlines**
  - A focus on net flows lends itself to an aggregate or sector-level "representative agent" view of growth and business cycles
- **A higher moment: Gross job flows**
  - ***Gross job creation***: jobs created by entering or expanding business establishments
  - ***Gross job destruction***: jobs destroyed by contracting or exiting business establishments
  - ***Gross job reallocation***: Job creation + destruction; ***excess reallocation*** subtracts absolute net employment change

$$JC_t = \frac{\sum_{\Delta e_{it>0}} \Delta e_{it}}{\sum .5(e_{it} + e_{it-1})}$$

$$JD_t = \frac{\sum_{\Delta e_{it<0}} \Delta e_{it}}{\sum .5(e_{it} + e_{it-1})}$$

$$\mathrm{XR_t} = JC_t + JD_t - |JC_t - JD_t|$$

Gross job flows: Large and varied

- 1980s saw nascent literature on gross *job* flows (vs. worker)
  - Leonard (1987) – Wisconsin, 1977-82
  - Dunne, Roberts, Samuelson 1989 – Econ Censuses 1963-82

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  - Dunne, Roberts, Samuelson 1989 – Econ Censuses 1963-82
- Davis, Haltiwanger, Schuh **LRD data work**: D&H (1990 NBERMA), D&H (1992 QJE), DHS (1990 CES), DHS (1996 book), etc.:
  - Gross flows large versus net
  - Vary widely across "sectors"
  - Heavily driven by estab. birth/death
  - *Persistent* and *concentrated*
  - Account for large share of worker flows
  - And more…

	2010-2019
Gross job creation	13.0
Gross job destruction	11.5
Net job creation	1.5
Excess job reallocation	22.5

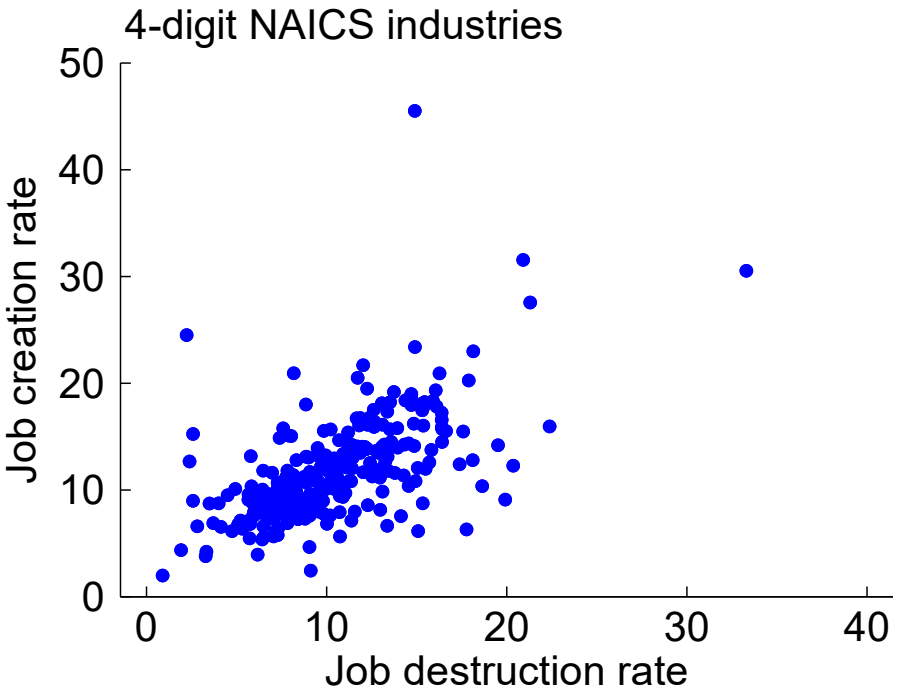
Note: ppts. BDS, average 2010-2019. Economywide.

	Excess Realloc: Interdecile range
NAICS 4	18
County	11
County-by-sector	28

Note: ppts. BDS, average 2010-2019. Economywide. Unweighted distributions.

Not just aggregate or sector shocks

- JC and JD occur simultaneously, within cells…
- …not negatively correlated in cross section
- Most aggregate excess reallocation occurs *within*, not *between* cells
- **What's going on?**
  - Learning (a bit) (Jovanovich 1982)
  - Lifecycle, vintage capital, initial conditions, sunk costs, uncertainty (Lambson 1991, Ericson & Pakes 1989)
  - Idiosyncratic "allocative shocks strike the economy continuously & with considerable intensity" (DHS 1996)
- ***Upshots:***
  - Gross flows likely productivity enhancing ('25 Nobel writeup; Baily, Bartelsman, Haltiwanger 1994 SBE, Foster Haltiwanger Syverson 2008, Davis Haltiwanger Handley Jarmin Lerner Miranda 2014, Blackwood Foster Grim Haltiwanger Wolf 2021)
  - **"Raises significant questions about research based on the assumption of a representative firm"** – Abraham comment on D&H 1990



Source: BDS, 2019. Economywide.

	Cross-sec Corr.	"Within" share
NAICS 4	.55	97
County	.10	98
County x sector	.05	88

Note: BDS, average 2010-2019. Economywide.

Gross flows are cyclical

- D&H (1990 NBERMA), DHS (1996 book), others document cyclicality
  - Reallocation, firm-level volatility are *countercyclical*
  - Job destruction more cyclical than creation
- The idiosyncratic component of gross job flows *enhances* JD cyclicality
  - "Cleansing" recessions? Though not always (Foster, Grim, Haltiwanger 2016)
- Points to importance of "allocative" shocks, not just aggregate or sector-level shocks, for the business cycle

Regress cycle indicators on gross flows: t statistics

	Net job creation rate	Change in unemp. rate
Excess realloc.	-2.1	1.3
Job destruction	-6.0	4.4
Job creation	4.3	-3.9

Note: BDS, 1980-2019. Job flows linearly detrended

From flows to firms: "Netting out reality" about small business

- DH 1990, 1992: *Gross flows put net job creation in perspective*
- DHS 1994 SBE: "Few ideas about the U.S. economy reap greater homage in public discourse than the belief that small businesses are the fountainhead of job creation."

From flows to firms: "Netting out reality" about small business

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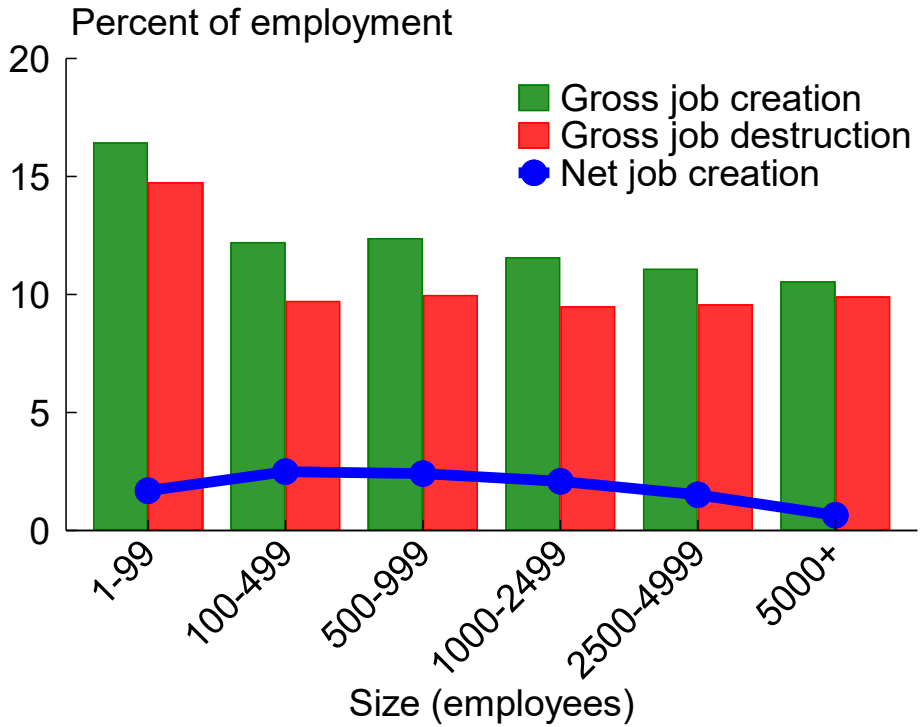
- DHS 1994 SBE: "Few ideas about the U.S. economy reap greater homage in public discourse than the belief that small businesses are the fountainhead of job creation."
- Job creation and job destruction are both around 10% or higher *in any size class*
  - Net job creation is very small by comparison

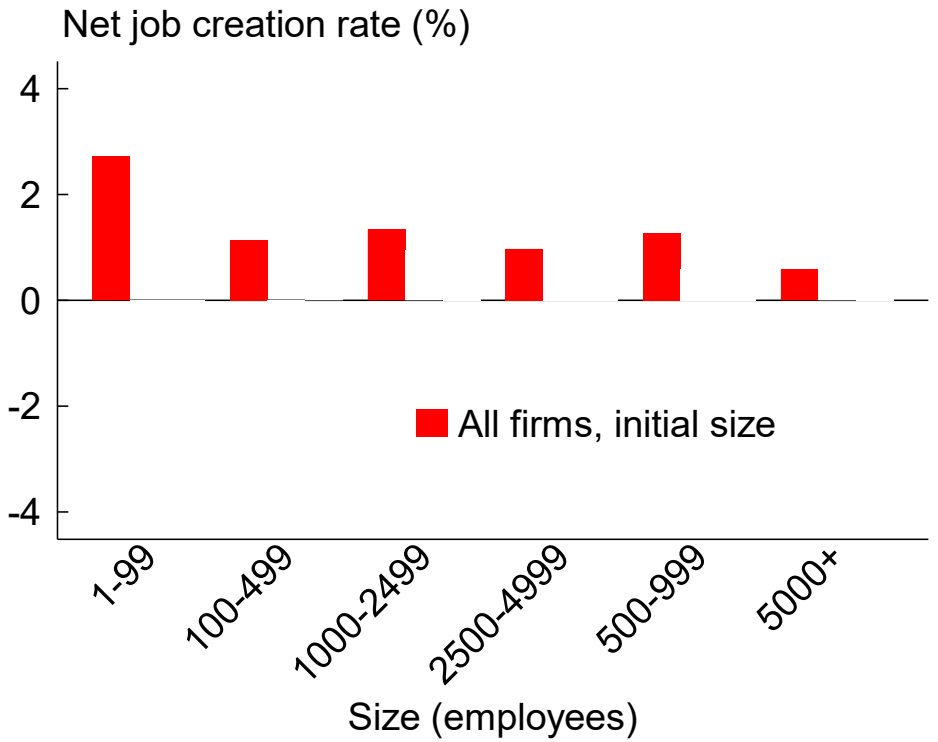


Source: BDS, 2010-2019 average. Economywide.

1973 and 1974. Since net job growth was only 16,000 during this period, we could easily identify a set of large manufacturing plants that accounted for 50 percent, 100 percent, 200 percent, or 1000 percent of net job growth. We could do so by choosing a set of large plants situated in states with robust employment growth or rapidly expanding industries. We could even identify several distinct sets of large plants, each of which accounted for, say, 100 percent of net job growth. Would useful economic policy prescriptions then follow from these characterizations of the data? Certainly not! Yet it is precisely this type of data characterization and argument that underlies claims that small businesses create most jobs and – therefore – ought to receive favorable tax and regulatory treatment.

Small business: “Dissecting the myth”

- “Small business is the engine of job creation”



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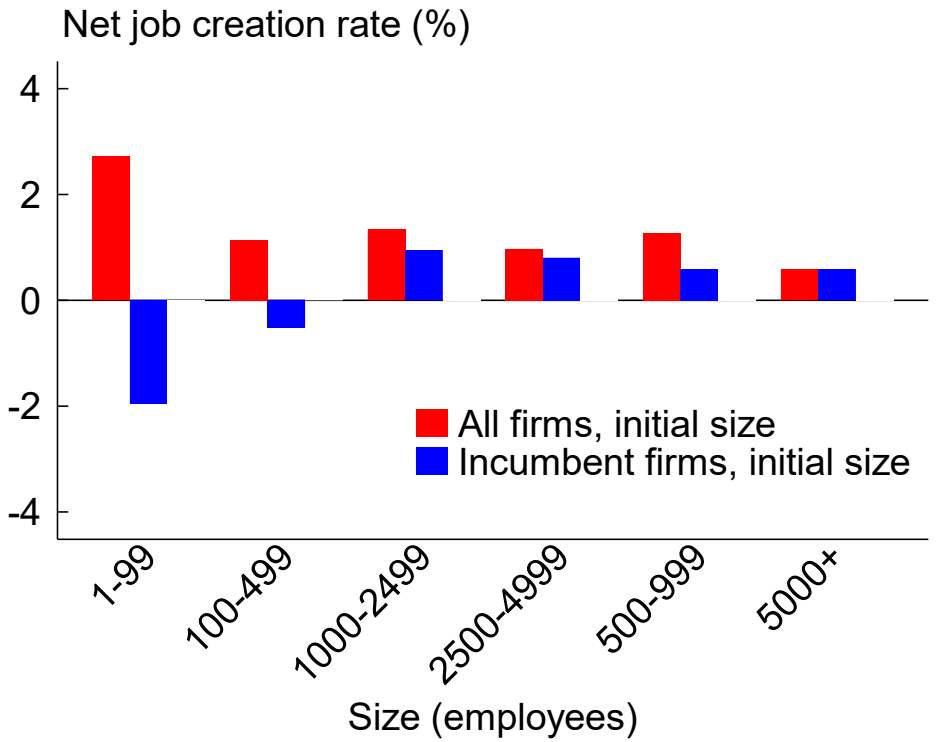
Small business: "Dissecting the myth"

- "Small business is the engine of job creation"
- Haltiwanger, Jarmin, Miranda (2013)
  - Startups, young firms are small
  - Incumbent small firms don't grow on net, destroy many jobs



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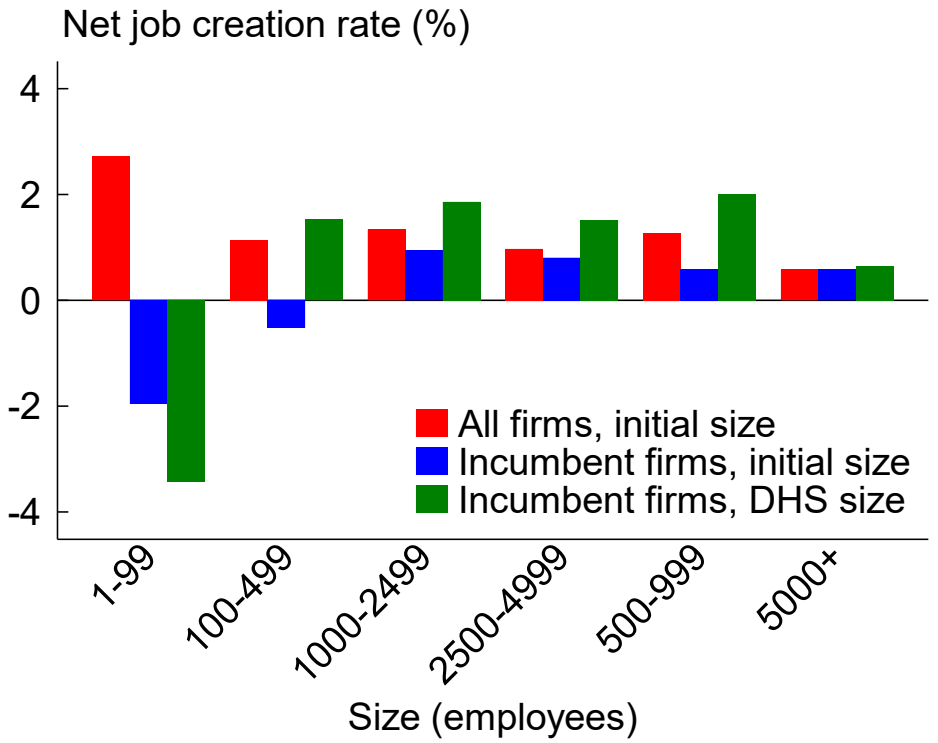
- DHS (1994, 1996): Small firm growth is a "regression fallacy"
  - DHS size = average size last year, this year



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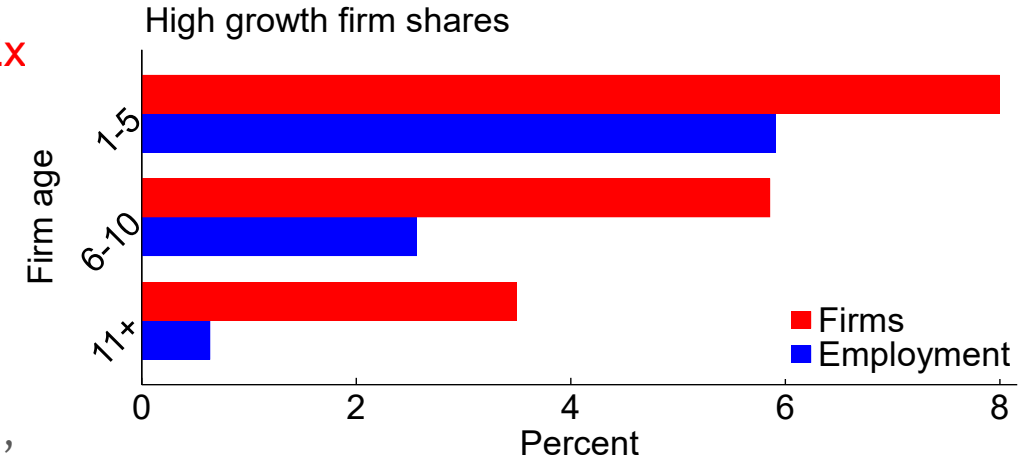
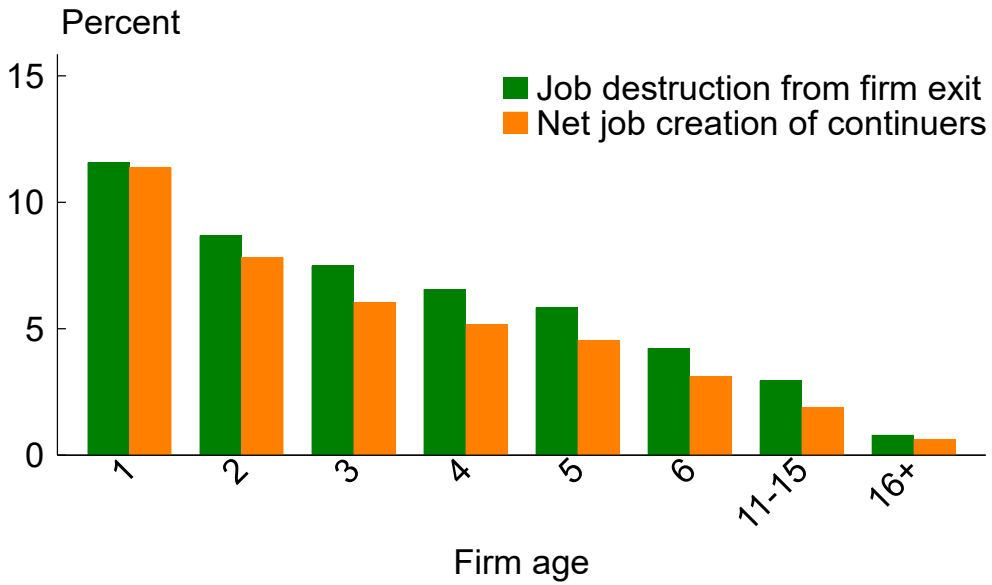
High growth is a young firm's game… but it's up or out!

- "High growth" as DHS growth of 0.8 is 2x as common for young firms (6x employment share)
  - Note: Brand new firms also high growth, by construction
- But high growth among surviving young firms… while failed firms destroy many jobs
  - Related: enormous dispersion of young firm growth rates (Haltiwanger, Kim, Choi, Goldschlag 2024, Decker, Haltiwanger, Jarmin, Miranda 2014, 2016)
  - Still… Typical cohort makes long-lasting contribution to net jobs (inclusive of entry)



Source: BDS, 2010-2019 average, incumbents. High growth is DHS growth>= 0.8



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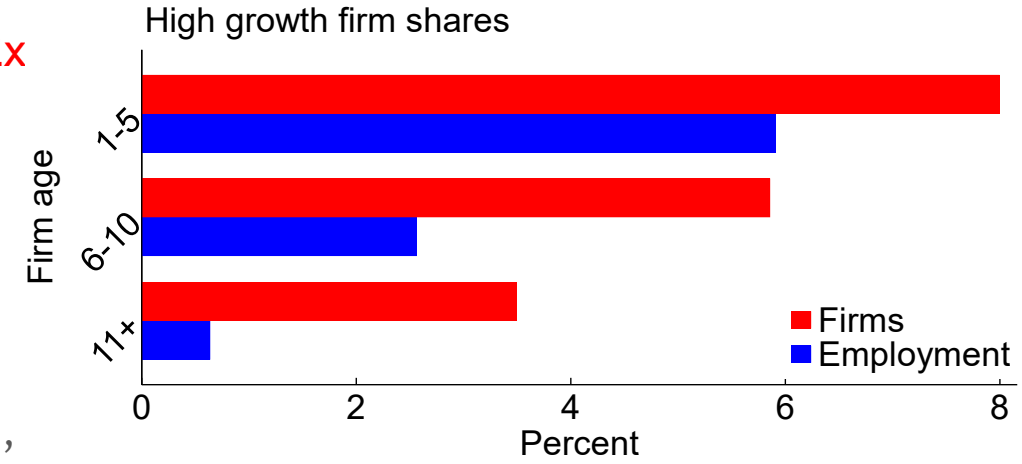
  - Still… Typical cohort makes long-lasting contribution to net jobs (inclusive of entry)
- What's going on? Young firms
  - Face intense **selection** (Decker, Haltiwanger, Jarmin, Miranda 2020)
  - Are **cyclically sensitive** (Fort, Haltiwanger, Jarmin, Miranda 2013; Pugsley & Sahin 2019)
  - **Learn** (Jovanovich 1982)
  - Face **financial constraints** (Clementi & Hopenhayn 2006)
  - **Innovate** (Acemoglu et al. 2018)
  - **Depend on founder skill** (Choi, Goldschlag, Haltiwanger, Kim forthcoming)



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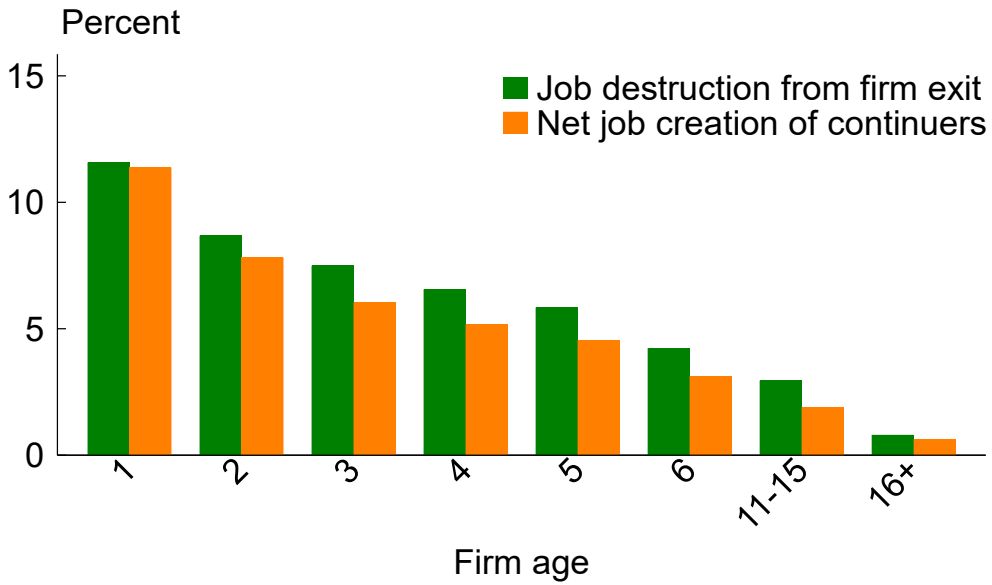
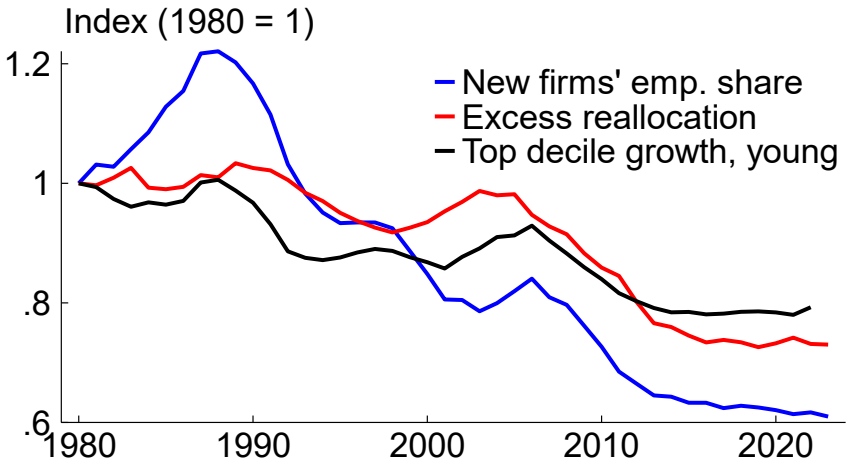


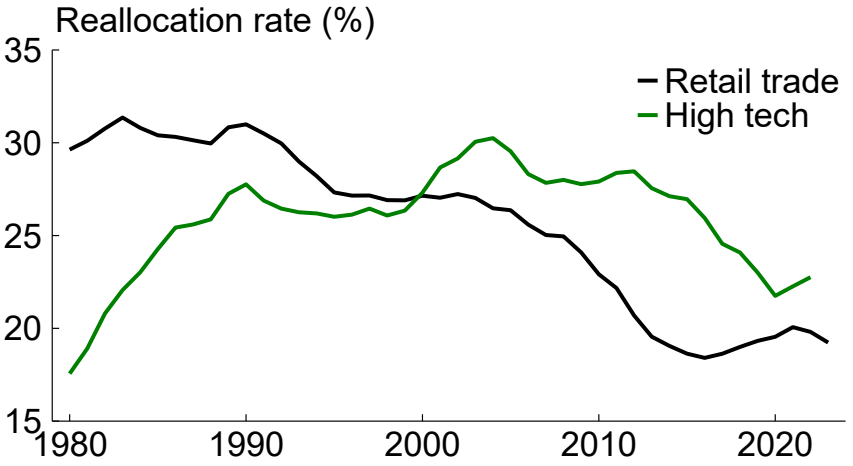
Source: BDS, 2010-2019 average.

Business dynamism after 1980

- First noted (?) in Davis, Haltiwanger, Jarmin, Miranda (2007 NBERMA); early work by Davis Faberman Haltiwanger Jarmin Miranda (2010); Hyatt & Spletzer (2013); Decker Haltiwanger Jarmin Miranda (2014, 2016)



Source: BDS. Young firms have age less than 6. 5-year MA.



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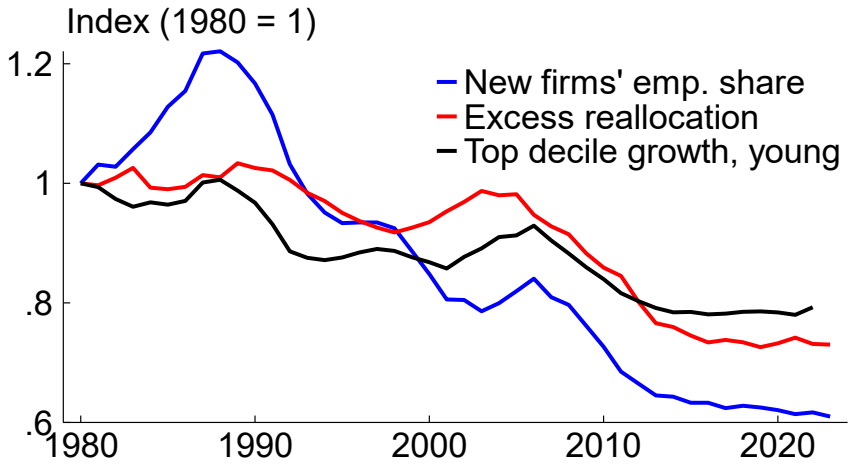
- Stories
  - Weaker selection/productivity responsiveness, rising adjustment frictions, regulation (Decker Haltiwanger Jarmin Miranda 2020; Davis & Haltiwanger 2014; Goldschlag & Tabarrok 2018; Cooper Haltiwanger Willis 2024)
  - "Big box" retail; hump-shaped high tech pattern (Decker Haltiwanger Jarmin Miranda 2016; Guzman et al. various)
  - Slowing labor force growth (Karahan, Pugsley, Sahin 2024)
  - Intangibles, market power (De Loecker, Eeckhout, Mongey 2022; Akcigit & Ates 2023; De Ridder 2024; Albrecht & Decker 2025)
- On balance, post-2000 patterns likely a drag on aggregate productivity



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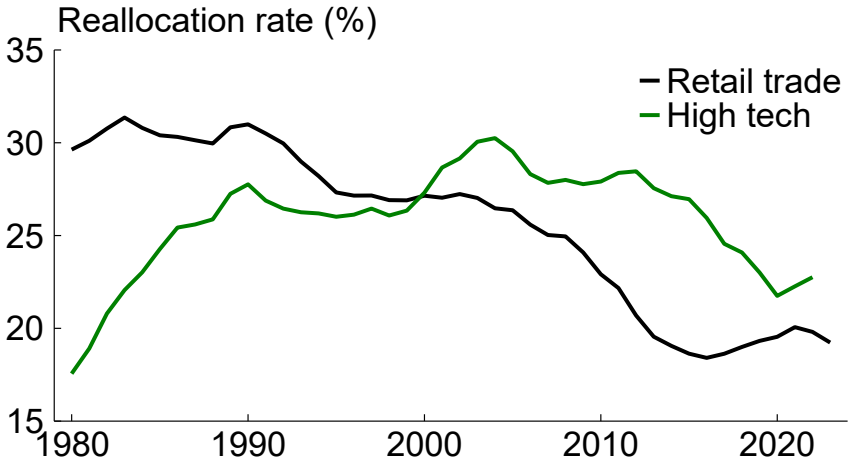

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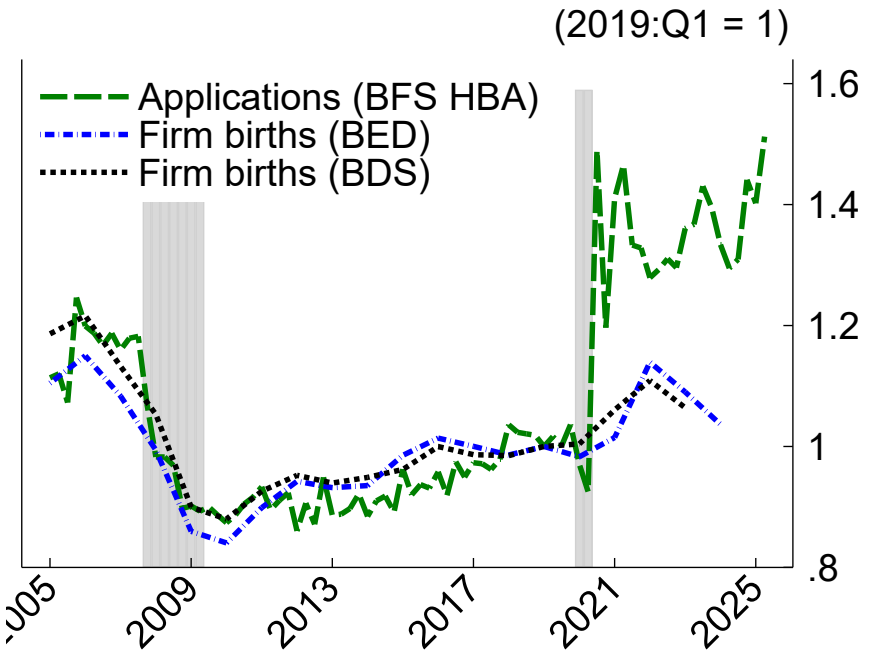
Pandemic surge

- Just in time: Business Formation Statistics (BFS) based on EIN applications (Bayard Dinlersoz Dunne Haltiwanger Miranda Stevens 2018)
- Striking surge in business applications starting mid-2020 - opposite of GFC (Dinlersoz Dunne Haltiwanger Penciakova 2021 AEA P&P; Haltiwanger 2022)



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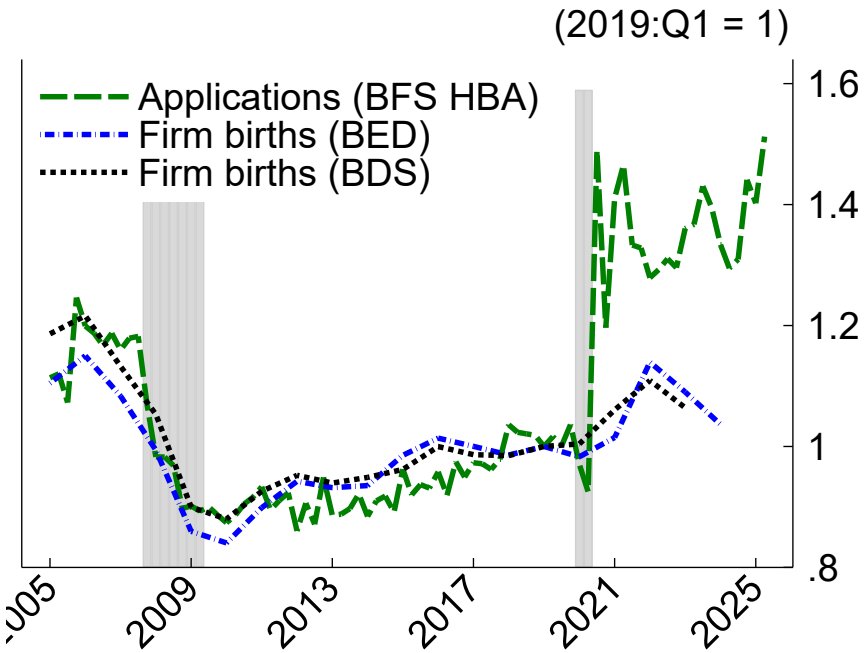
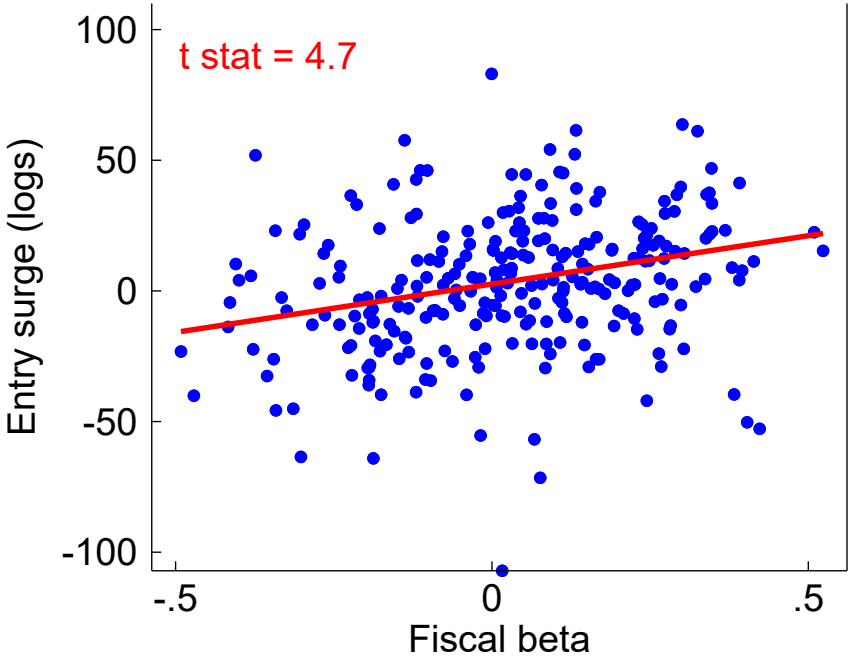
- Resulted in actual employer business formations (Decker & Haltiwanger 2024 BPEA, FEDS)
  - Likely related to "Great Resignation"
  - Industry and geography patterns consistent with pandemic adaptation, AI
  - Bigger surge in industries more sensitive to fiscal policy, house prices, interest rates (work in progress)
- Nearly 40 years after John started working on business dynamics, he is still creating data and producing research of relevance to the current moment.





From Firm Dynamics to Worker Dynamics

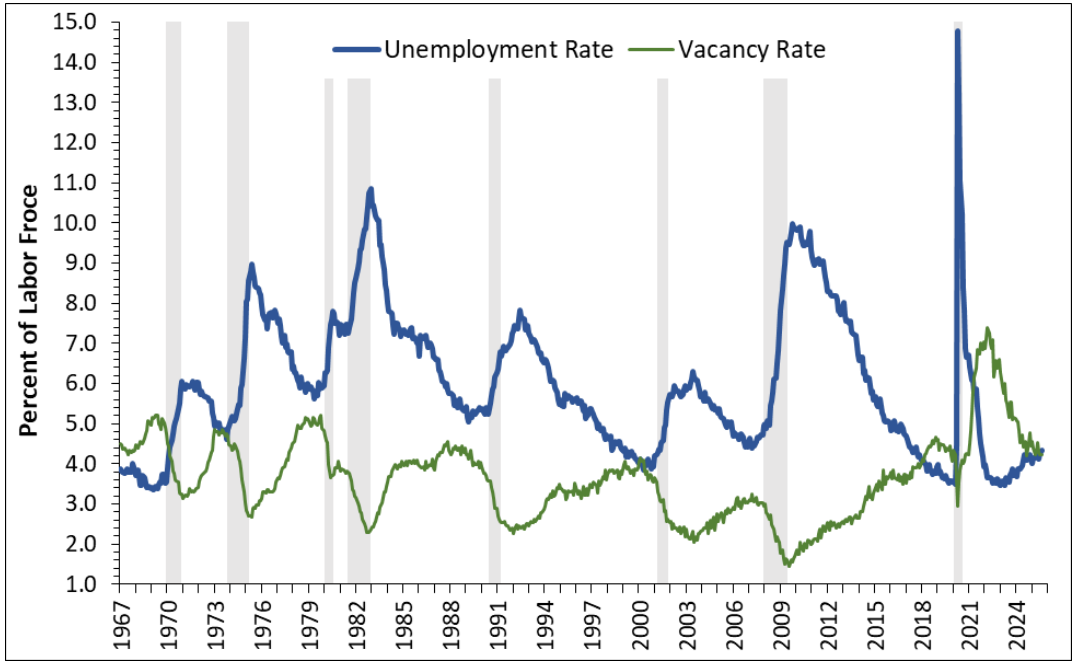
From Firm Dynamics to Worker Dynamics

- **John's contributions on firm behavior have had considerable spillovers and for understanding worker behavior**

- **From adjustment costs to search frictions**
  - Nonconvexities matter for labor adjustments (similar to capital, investment)
- **Worker flows and job flows: the "hockey stick" relationships**
  - "Iron link" between worker flows, job flows in cross section, with aggregate implications
- **Worker flows and the business cycle: hiring and separations**
  - Multiple margins matter: important to distinguish between quits, layoffs
  - Chapter in long-running debate on main driver of employment fluctuations
- **Hiring, vacancies, and recruiting intensity**
  - Multiple margins matter (again): Aspects of recruiting besides vacancy posting have important labor-macro implications
- **Broader macro implications of worker flows**
  - Job ladder movements, firm size/age, and the business cycle
  - From the job ladder to wage growth to inflation

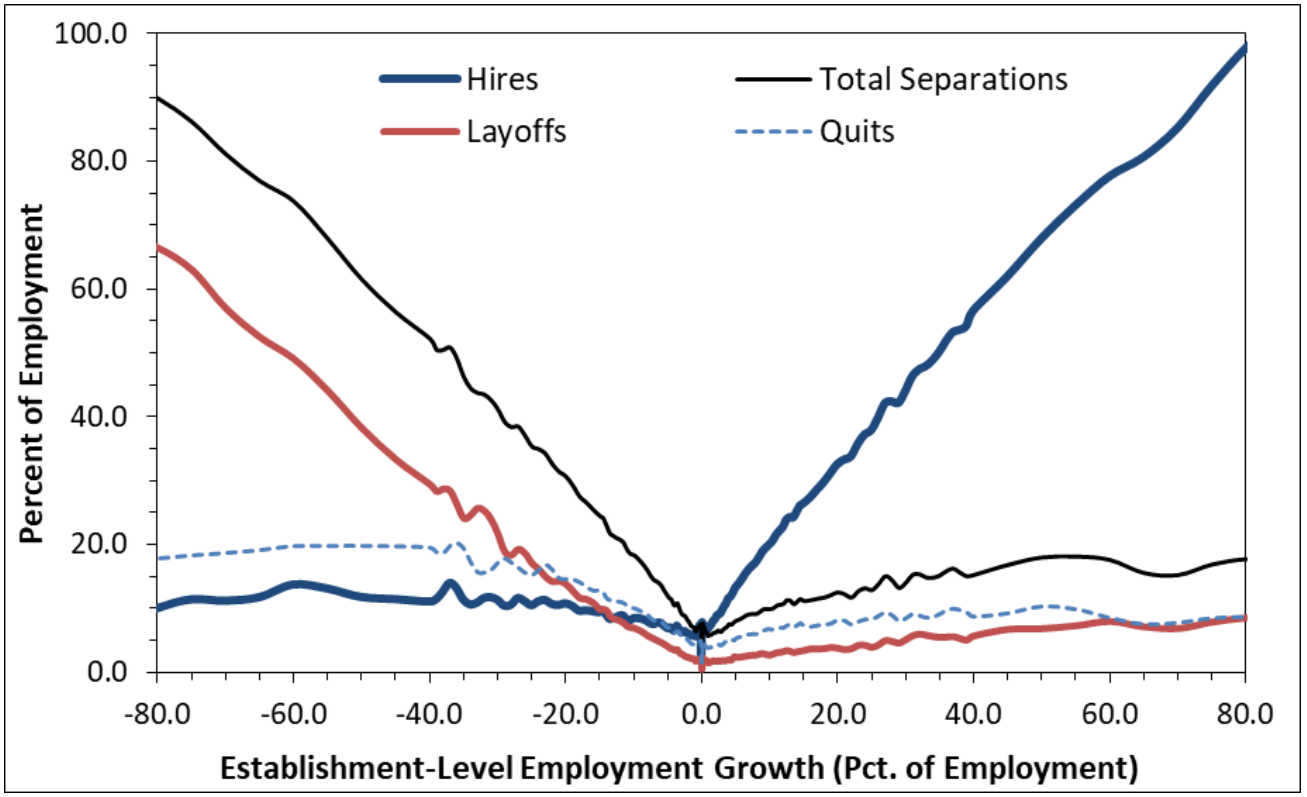
Labor Adjustment: Nonconvexities Matter Here, Too!

- **Cooper, Haltiwanger, Willis (2007 JME):**
  - ***Nonconvexities*** in firm hiring just as important as nonconvexities in investment, capital adjustment
    - Fixed vacancy costs, job creation costs, etc.
    - Help match fluctuations in unemployment, vacancies over the business cycle
  - Complement search frictions within Diamond-Mortensen-Pissarides framework in explaining labor market fluctuations over time
  - Builds on even earlier work by John highlighting the macro importance of nonlinear employment adjustments at the micro level (Caballero, Engel, Haltiwanger, 1997 AER)



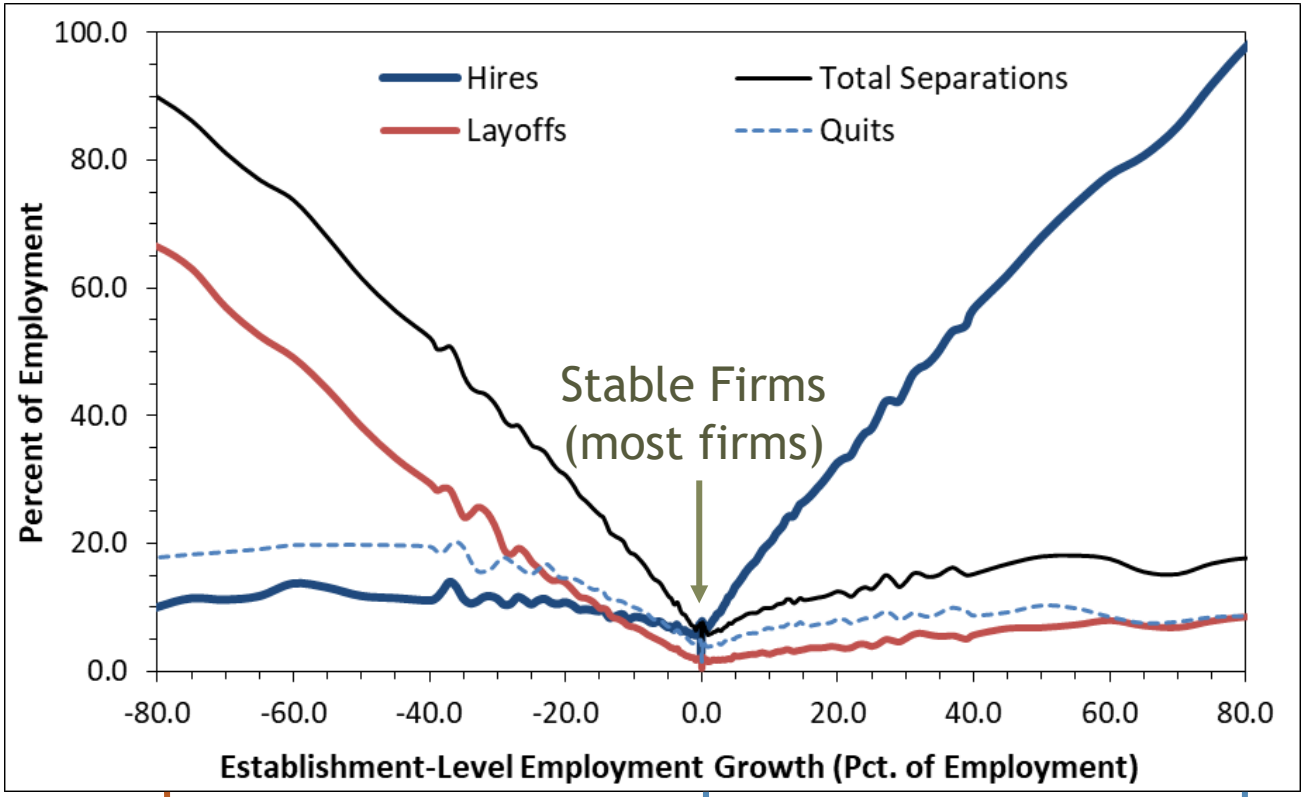
Worker Flows and Job Flows: A "Hockey Stick" Relationship

- **Series of papers with Steve and John highlight tight link between firm hiring, separations and firm growth (JC, JD) (DFH, 2006 JEL; 2012 JME)**
  - Introduce an additional margin for thinking about worker dynamics
  - Fueled further research highlighting importance of the firm in (DMP) labor models (Elsby, Michaels, 2013 AEJM; Acemoglu, Hawkins, 2014 TE; Bilal et al., 2022 Ecma, among others)



Worker Flows and Job Flows: A "Hockey Stick" Relationship

- **Key facts:**
  - Hiring rates rise strongly with job creation rate (expansion),
  - Separation rates (esp. layoffs) rise strongly with job destruction rate



Identities:

Firm (Net) Growth
$= JC - JD$
$= H - S$

Churn
$= H + S - |Net|$
at micro level
$= H \mid Net \leq 0$
$= S \mid Net \geq 0$

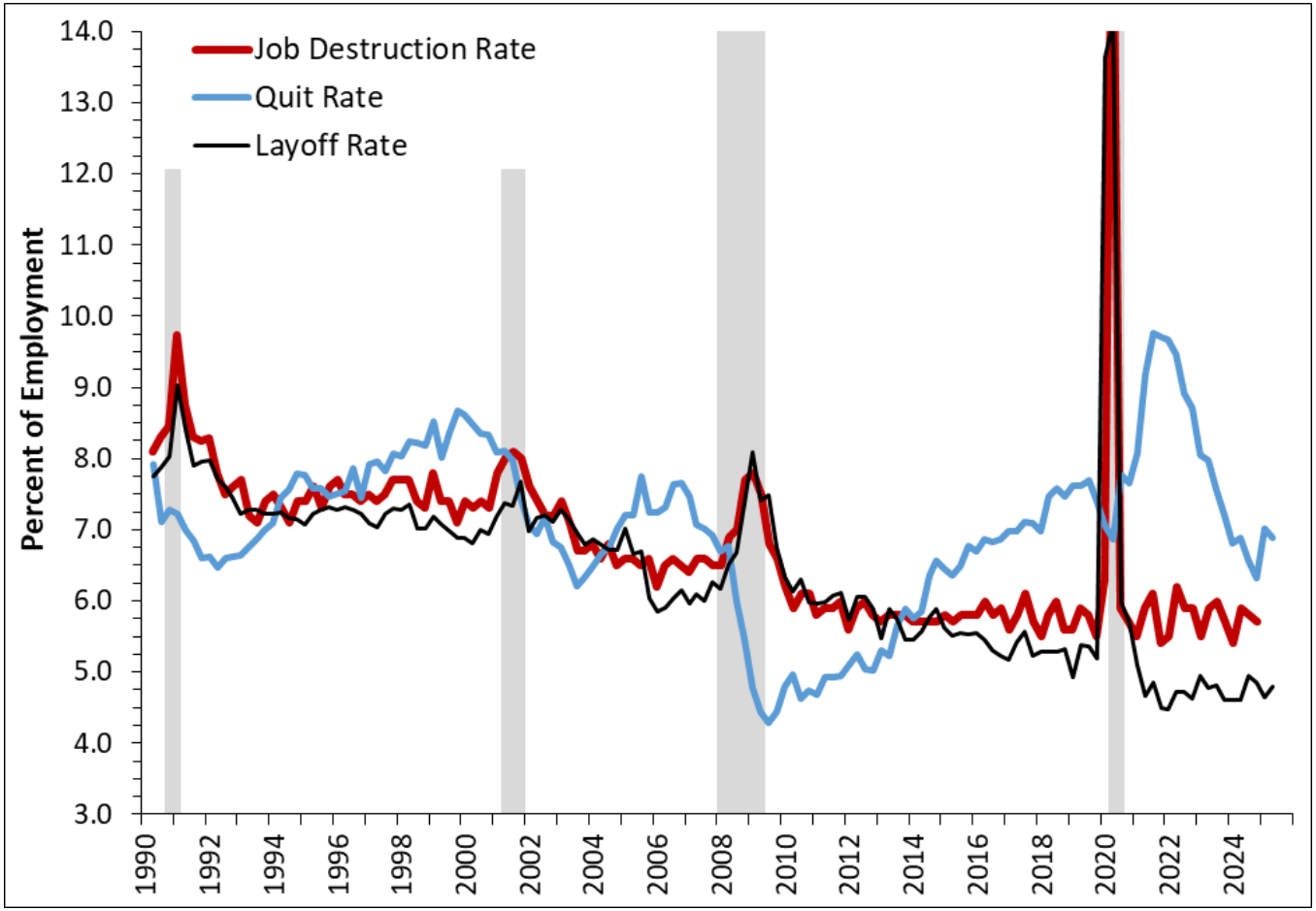
Worker Flows in the Aggregate: An Important Distinction

- **Long-running debate on main driver(s) of employment fluctuations over the business cycle**
- **Are recessions driven more by high job loss or difficult job finding (low hiring)?**

- Darby, Haltiwanger, Plant (1985 AER, "*The Ins and Outs of U*"):
  - **Job loss** margin more important ("*The Ins Win*")
- Hall (2005 NBERMA), Shimer (2012 RED):
  - Fluctuations driven mostly by **hires**, **job-finding**; separations essentially acyclical
- Davis, Faberman, Haltiwanger (2012 JME) (also Hall, 1995 NBERMA; Fujita-Ramey 2009 IER; Elsby, Michaels, Solon 2009 AEJM, …literally *every* other macro-labor economist):
  - Important to distinguish between ***quits vs. layoffs***
  - Once you do, ***job loss*** major driver of employment fluctuations (again…)

Worker Flows in the Aggregate: An Important Distinction

- **Key point:**
  - **Quits:** procyclical
  - **Layoffs:** countercyclical (and has sharp cyclical spikes)



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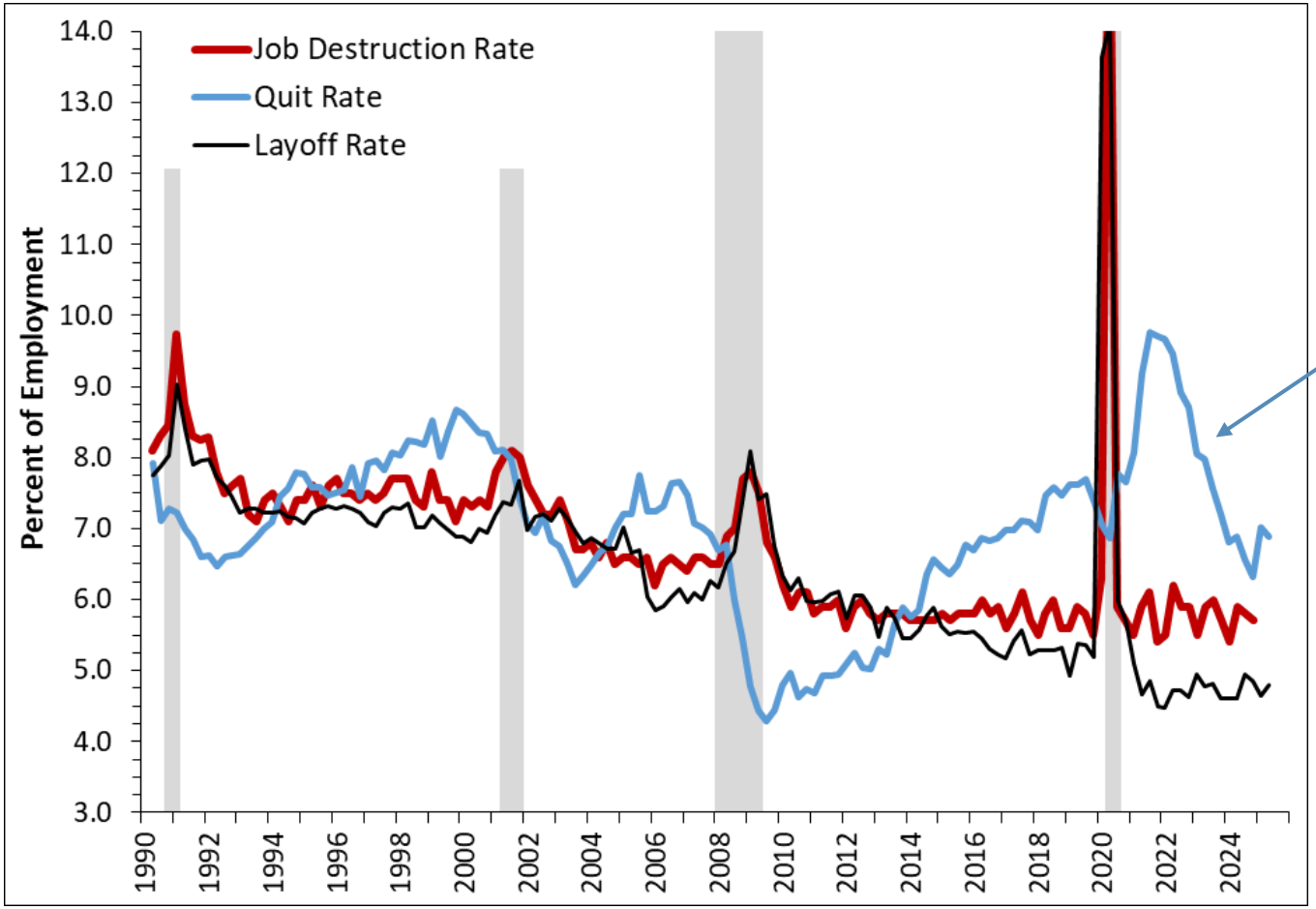
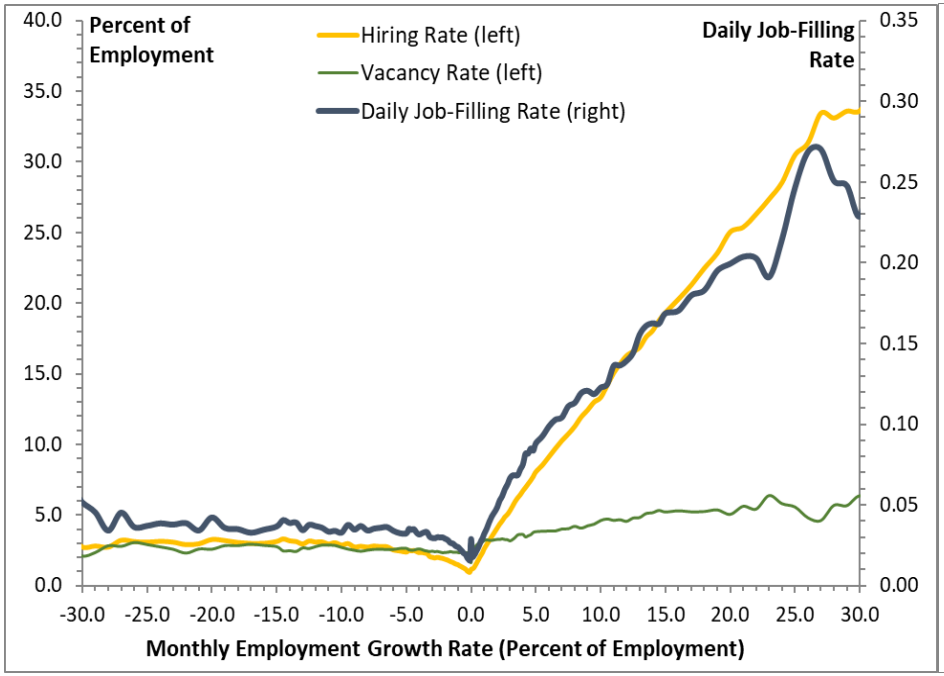


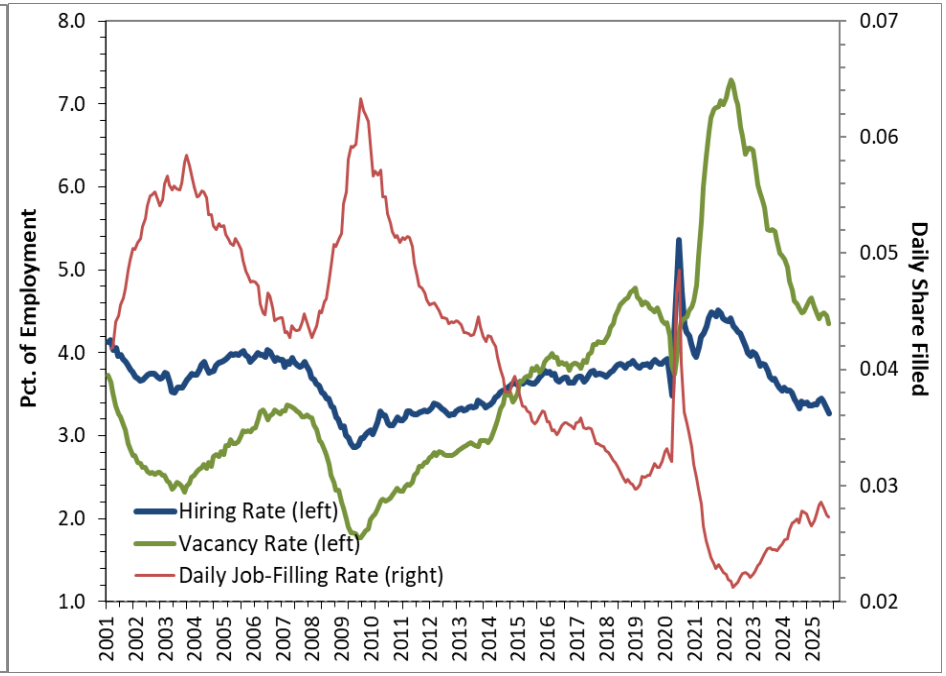
Quits: Important in several ways.

More on quits in a minute…

Another Important Distinction: Vacancies vs. Recruiting Intensity

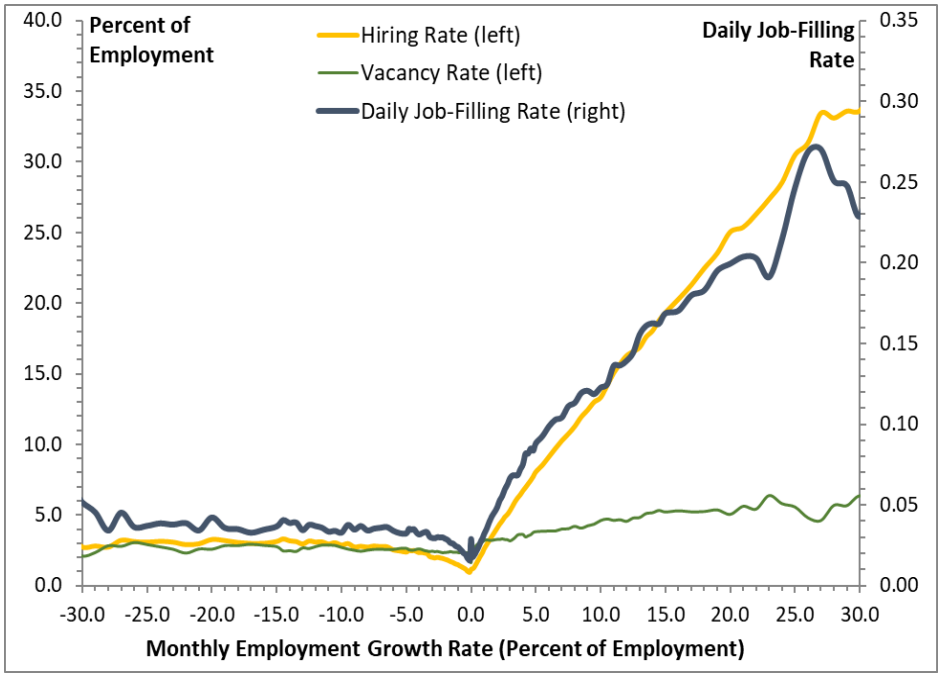
- Davis Faberman, Haltiwanger (2012 AER P&P, 2013 QJE)
- Hiring, vacancies rise strongly with firm growth in the cross-section
  - Implies positive relationship between job-filling rate and growth (*JC*)
- Job-filling rate (vacancy yield) strongly *countercyclical*
  - Recessions are periods where it easier for employers to find workers
- Important role for *recruiting intensity:* networking, hiring standards





Another Important Distinction: Vacancies vs. Recruiting Intensity

- **Recruiting Intensity**
  - **Key point:** firms can adjust their *recruiting intensity*, in addition to posting a vacancy, to attract workers
- **Has led to wide range of research incorporating this point**
  - Kaas-Kircher (2015): firms can post higher wages to attract more workers when they want to grow fast
  - Inspired research on both theory front (e.g., Galenianos, 2014 JET; Wolthoff, 2018 REStud), and empirical front (e.g., Bagger et al., 2022 Labour; Carillo-Tudela et al., 2023 JEEA)



- **Related:** worker ***search intensity***
- Suggests broader view of worker-firm matching via *generalized matching function*

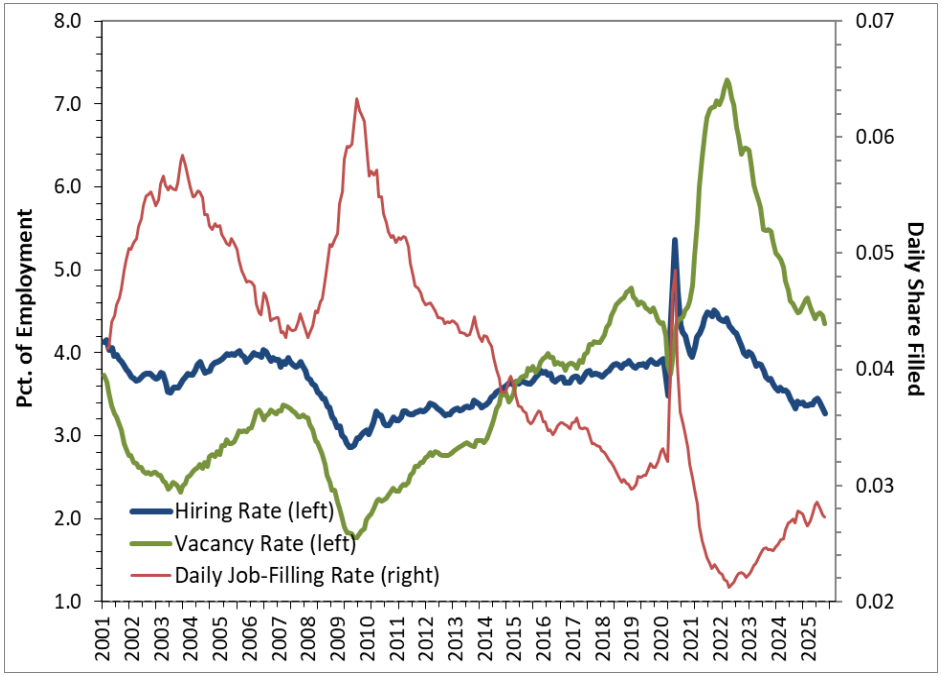
$$\boldsymbol{h = m(sU, qV)}$$

- Both workers, firms endogenously adjust their behavior to create a match

Another Important Distinction: Vacancies vs. Recruiting Intensity

- **Recruiting intensity: has important *cyclical implications* as well**
  - ***Aggregate*** recruiting intensity has large impact on labor market fluctuations, matching efficiency (Gavazza, Mongey, Violante, 2022 AER):
  - Firms vary their ***hiring standards*** over the business cycle (Hershbein, Kahn, 2018 AER; Modestino, Shoag, Balance, 2016 Labour, 2020 REStat)
  - **Related**: concept of ***matching efficiency*** has cyclical component **(**Hall, Schulhofer-Wohl, 2018 AEJM; Abraham, Haltiwanger, Rendell, 2020 BPEA**)**

Key point:
Recessions are periods where it is easier for employers to find workers

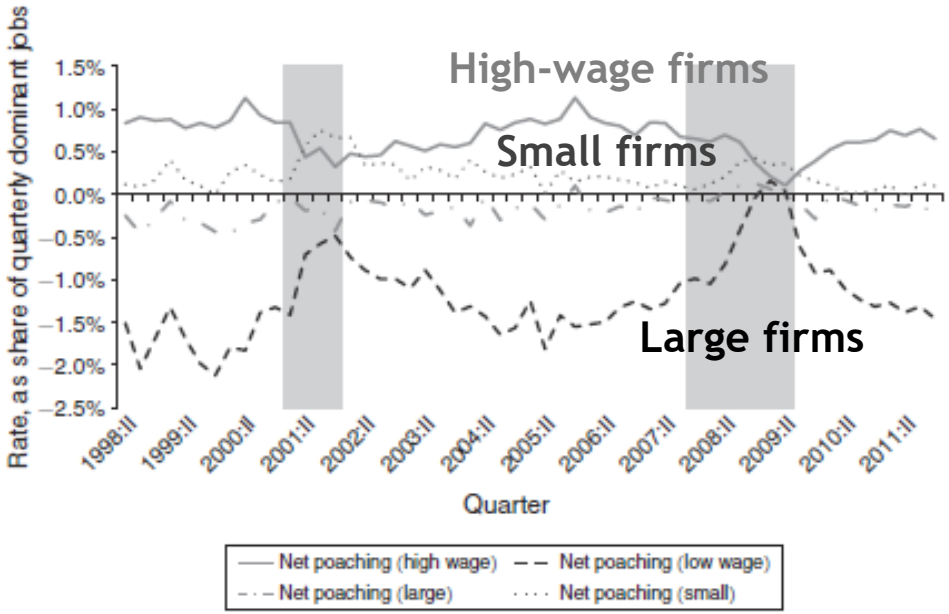


Broader Macro Implications: The Job Ladder

- **"Job ladder" and related job switching has long history in labor macro**
  - Theory dating back to Mortensen (1986 HBLE); with many current forms (e.g., Menzio-Shi 2011 JPE, Christensen et al. 2005 JoLE, Bagger-Lentz, 2019 REStud)
  - Prior to JOLTS, LEHD, sporadic empirical work (Schlicter, 1921; Woytinsky, 1942; Fallick-Fleischmann, 2004)
- **Quits (EE transitions) tightly linked to moves up the "job ladder"**
- **Ability to move up job ladder strongly cyclical, tied to firm size, wages**
  - Haltiwanger, Hyatt, Kahn, McEntarfer (2018): workers tend to move towards smaller younger firms on average (earnings potential), but more likely to move to larger, high-wage firms
  - Haltiwanger, Hyatt, McEntarfer (2018): gains from moving up job ladder greatest for young, less-educated, but they are also most cyclically sensitive

Main Points:

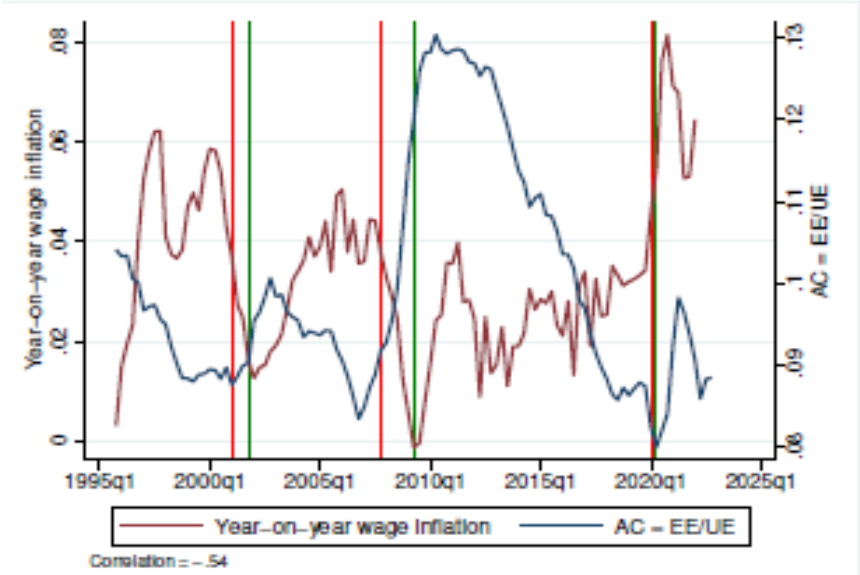
- Small/young and high-wage firms source of wage growth for workers through movements up job ladder
- Ability to move up (or fall off) job ladder highly cyclically sensitive



Broader Macro Implications: Job Switching and Inflation

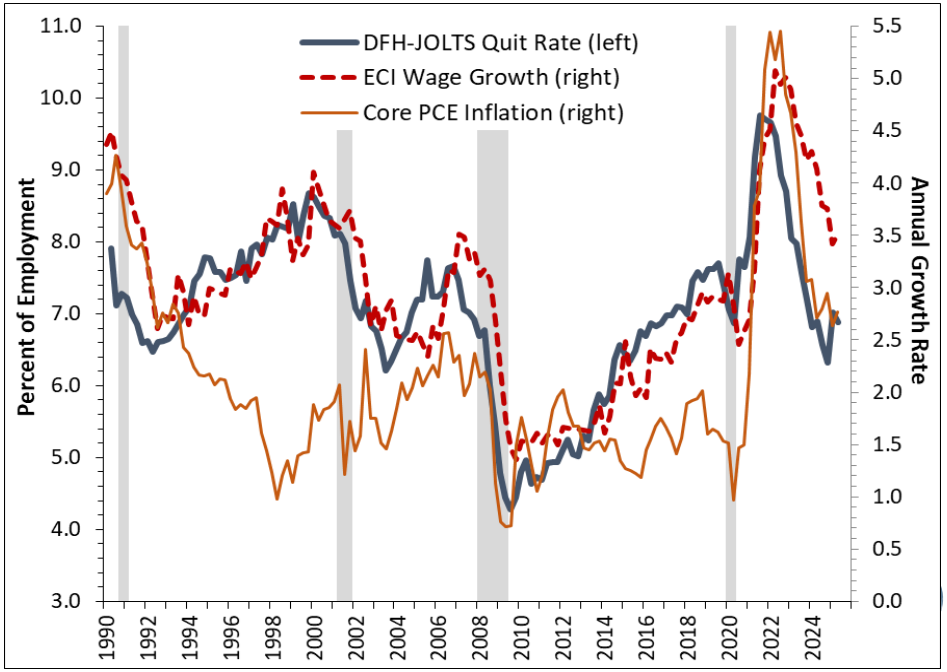
- **Recent research: quits (EE transitions) tightly linked to *inflation***
- Moscarini, Postel-Vinay (2023), Faccini, Melosi (2025 REStat): moves up the job ladder can be ***inflationary***
- **Mechanism:** Poaching firms big up workers' wages
  - Some wage gains reflect more-productive matches (***reallocative***)
  - Other wage gains reflect increased rents (***inflationary***)

Moscarini, Postel-Vinay (2023)



(b) Acceptance rate EE/UE and wage growth

Faberman, Justiniano (2015 CFL)



Summary

- John's contributions to understanding firm and worker dynamics are vast & span a wide range of labor market phenomena

- Firm growth, dynamics, and job flows
  - Firm-level dynamics highlight importance of **heterogeneity** (firm size, age, wages, industry), **gross flows,** and **dynamism** for aggregate growth and cyclical fluctuations
- Hiring, job loss, and worker transitions
  - There are tight links between ***job flows*** (firm dynamics) and ***worker flows*** (hiring, recruiting, job-finding, job-switching) with important ***aggregate implications***

- Common themes throughout John's research:
  - Important to ***move away from representative firm*** to understand employment fluctuations
    - Has been highly influential in moving macro profession in this direction
  - Must account for ***multiple margins*** firms, workers use growth, recruit, find jobs, etc.