National Estimates of Gross Employment and Job Flows from the Quarterly Workforce Indicators with Demographic and Industry Detail

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• The opinions expressed in this presentation are those of the authors and not the National Science Foundation nor the Census Bureau.
Outline

• A brief introduction to the Longitudinal Employer Household Dynamics (LEHD) Program
• Background to National QWI
• Data sources and definitions
• Statistical methodology
• Basic results
• Using the data from the Cornell VirtualRDC
Based on


- Also: Abowd & Vilhuber (2010), *CES WP 10-11*
BACKGROUND
Research Background

• Gross job flows:
  – Dunne, Roberts and Samuelson (1989)
  – Davis and Haltiwanger (1990, 1992)
  – Davis, Haltiwanger and Schuh (1996)
  – BLS Business Employment Dynamics (Spletzer et al. 2004)

• Gross worker flows:
  – Abowd and Zellner (1985)
  – Poterba and Summers (1986)
  – Anderson and Meyer (1994)
  – BLS Job Openings and Labor Turnover Survey (Boon et. al 2008)

• Integrated flows (Worker, Job, Excess/Churning)
  – Abowd, Corbel and Kramarz (1999)
  – Burgess, Lane and Stevens (2000, 2001)
  – BLS JOLTS + BED (Davis, Faberman and Haltiwanger 2006; Boon et al. 2008; Davis, Faberman, Haltiwanger, and Rucker 2010)
Stylized Facts

- Gross worker and job flows are an order of magnitude bigger than net flows
- Gross flows are not very cyclical (viewed as reallocation rates)
  - Cyclical patterns show in component rates
- Gross flows are very heterogeneous even within very detailed industry, geography, establishment size, or demographic group
- Gross work and job flows are difficult to measure on a consistent basis without fully integrated micro-data at the job (employer-employee link) level
Data Sources (Quarterly Only)

• Quarterly Workforce Indicators (Census Bureau)
• Quarterly Census of Employment and Wages (BLS)
• Business Employment Dynamics (BLS)
• Job Openings and Labor Turnover Survey
• Adjustments by to JOLTS by Davis, Faberman, Haltiwanger, and Rucker (2010)
Data Sources (Yearly Only)

- Business Dynamics Statistics (BDS; Census Bureau)
  - Job creation/destruction/expansion/contraction
  - establishment entry and exit
  - Startups and shutdowns
DEFINITIONS
Quarterly Workforce Indicators I

- Flows are based on longitudinally linked (by employer and employee) Unemployment Insurance Wage Records
- Beginning-of-quarter employed if wage record with earnings > $1.00 in quarters \( t-1 \) and \( t \) (\( B \))
- End-of-quarter employed if wage record with earnings > $1.00 in quarters \( t \) and \( t+1 \) (\( E \))
- Accession if wage record in \( t \) but not \( t-1 \) (\( A \))
- Separation if wage record in \( t \) but not \( t+1 \) (\( S \))
Quarterly Workforce Indicators II

- Job creation if establishment has positive employment change from beginning to end of quarter ($JC$)
- Job destruction if establishment has negative employment change from beginning to end of quarter ($JD$), always stated as absolute value of change
Quarterly Workforce Indicators III

- Demographic
  - (age x gender)
  - (race x ethnicity)
  - (age x education)

- Geography (county, CBSA, WIB),

- NAICS (sector, sub-sector, industry group),

- ownership (All, private)
Quarterly Census of Employment and Wages

- Stocks of employment measured as of the 12th day of the month for each month in the quarter for each establishment (no job level data)
- BLS uses month-3 employment to measure changes
- Beginning of quarter employment is month-3 employment from quarter t-1
- End of quarter employment is month-3 employment for quarter t
- Geography (county, MSA), NAICS (sector, sub-sector, industry group), and ownership (all, public, private)
Business Employment Dynamics

• Gross job gains (job creations) is the change in employment at an establishment between month-3 in quarter $t-1$ and month-3 in quarter $t$, if positive

• Gross job losses (job destructions) is the absolute value of the change in employment at an establishment between month-3 in quarter $t-1$ and month-3 in quarter $t$, if negative

• Limited geography (state), NAICS (sector) detail
Job Openings and Labor Turnover Survey

• Monthly survey of continuing establishments
• Accessions measured as all new employment over the course of the month (summed over the three months in the quarter here)
• Separations measured as quits, layoffs, discharges, and other over the course of the month (summed over the three months of the quarter here)
• Limited geography (national) and NAICS (sector) detail
MOTIVATION
## Comparing the sources

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Motivation

• QWI a unique source integrating many of the different measures that are of interest in labor market analysis, from the same source data

• Example: *Excess reallocation rate*
Worker Reallocation Rate

\[ WRR_{agskt} = \frac{A_{agskt} + S_{agskt}}{\left( B_{agskt} + E_{agskt} \right)/2} \]

- This rate is available in the QWI for 8 age groups, both genders, NAICS sector, state (more detail is available than we used)
Job Reallocation Rate

\[ JRR_{agskt} = \frac{JC_{agskt} + JD_{agskt}}{(B_{agskt} + E_{agskt})/2} \]

- This rate is available in the QWI for 8 age groups, both genders, NAICS sector, state (more detail is available than we used)
Excess Reallocation Rate

- \( ERR = WRR - JRR \)
- The excess reallocation rate measures the extent to which gross worker flows exceed the minimum required to service the gross job flows.
- This has been very difficult to estimate nationally because there were no data collected on a consistent basis for all the component flows.
- QWI solved that problem.
Motivation

• QWI a unique source integrating many of the different measures that are of interest in labor market analysis, from the same source data

• Example: *Excess reallocation rate*

• Just one problem...
QWI Coverage of the Private Workforce

- **Period A**
- **Period B**
- Proportion of QCEW universe in QWI
State availability in QWI + MA

The graph shows the number of states available over time, with two periods distinguished:
- **Period A** is represented by the black line.
- **Period B** is represented by the red line.

The graph indicates an increase in the number of states available over the years, with a notable increase during the transition periods between each quarter.
The solution

- Use data patterns from similar states to fill in the blanks
- Use QCEW employment by industry as a benchmark
- Then aggregate up to national level
- This is an impute: we do it “right” = 200 times (or more)
- Measures of uncertainty available
QWI Coverage of the Private Workforce

Sub-period 1

Sub-period 2

Period A

Proportion of QCEW universe in QWI

Period B
• Divide the analysis into two periods
  – 1993:Q1-2001:Q4 (early period, many states are completely missing, 10 states complete)
  – 1999:Q1-(latest available) (later period, 37 states are complete)
• For each sub-period use a multiple imputation model to complete the missing data
• For the overlap period, use a ramped weight to compute the average implicate combining the two periods
• Use the standard multiple imputation formulae to combine implicates
National Estimates

\[ WRR_{agt} = \frac{A_{agt} + S_{agt}}{(B_{agt} + E_{agt})/2} \]

\[ = \frac{2}{B_{agt} + E_{agt}} \left[ \sum_{k,s} \left( \frac{B_{agkst} + E_{agkst}}{2} \right) WRR_{agkst} \right] \]

- The combining formula for producing the national WRR is shown above (similar formulae apply to other rates)
Implicate Combining Formulae I

\[
\overline{WRR}_{agkt} = \frac{1}{M} \sum_{\ell=1}^{M} \sum_{\forall s} \left( \frac{B(\ell)_{agskt} + E(\ell)_{agskt}}{2} \right) WRR^{(\ell)}_{agskt} \\
\]

\[
\hat{WRR}^{(\ell)}_{agkt} = \sum_{\forall s} \left( \frac{B(\ell)_{agskt} + E(\ell)_{agskt}}{2} \right) WRR^{(\ell)}_{agskt} \\
\sum_{\forall \nu} \frac{B(\ell)_{ag\nukt} + E(\ell)_{ag\nukt}}{2}
\]
Implicate Combining Formulae II

\[ V^{(\ell)}[\widetilde{WRR}_{agkt}] = \frac{1}{49} \sum_{s} \left( \frac{B_{agskt}^{(\ell)} + E_{agskt}^{(\ell)}}{2} \right) \left( WRR_{agskt}^{(\ell)} - \widetilde{WRR}_{agskt}^{(\ell)} \right)^2 \]

\[ B\left[\overline{WRR}_{agkt}\right] = \frac{1}{M - 1} \sum_{\ell=1}^{M} \left( \widetilde{WRR}_{agkt}^{(\ell)} - \overline{WRR}_{agkt} \right)^2 \]

\[ T\left[\overline{WRR}_{agkt}\right] = \frac{1}{M} \sum_{\ell=1}^{M} V^{(\ell)}[\widetilde{WRR}_{agkt}] + \frac{M + 1}{M} B\left[\overline{WRR}_{agkt}\right] \]
Implicate Combining Formulae III

\[ MR\left[ \overline{WRR}_{agkt} \right] = \frac{B\left[ \overline{WRR}_{agkt} \right]}{T\left[ \overline{WRR}_{agkt} \right]} \]
Results

• Comparison of $WRR$ between QWI and JOLTS
• Comparison of $JRR$ between QWI and BED
• Demographic detail
• Industry detail
WRR: QWI v. JOLTS

Fraction of employment

- QWI: Worker Reallocation Rate
- JOLTS: Worker Reallocation Rate
- JOLTS: WRR adjusted

X-axis: 1993q1 to 2011q1
JRR WRR ERR by Gender
ERR (Churning) by Age Group

- All
- 14-18
- 19-21
- 22-24
- 25-34
- 35-44
- 45-54
- 55-64
- 65-99
ERR (Churning) by NAICS and Age Group

Graphs by NAICS Sector
Basic Findings

• National average WRR 49%
• National average JRR 13%
• National average ERR 36%
• Strong seasonal patterns in all
• Little gender variability
• Strong age variability
• Strong sector and sector x age variability
BUT THERE’S MORE!
Prototype National QWI

The Quarterly Workforce Indicators are local labor market data produced and released every quarter by the United States Census Bureau. Unlike any other local labor market series produced in the U.S. or the rest of the world, the QWI measure employment flows for workers (accession and separations), jobs (creations and destructions) and earnings for demographic subgroups (age and sex), economic industry (NAICS industry groups), and detailed geography (county, Core-Based Statistical Area, and Workforce Investment Area, as well as experimental, unrealized block-level estimates). The current QWI data cover 47 states and about 98% of the private workforce in each of those states.

John Abowd and Lars Vilhuber have used the existing public-use data (and only those public-use data) to construct the first national estimates. The national estimates are an important enhancement to existing series because they include demographic and industry detail for both worker and job flows compiled from data that have been integrated at the micro-level by the Longitudinal Employer-Household Dynamics Program at the Census Bureau. The research paper (see below) compares the new estimates to national data published by the BLS from the Quarterly Census of Employment and Wages and the Business Employment Dynamics series. The paper and its underlying data can be downloaded from below.

Paper


- Paper in PDF format (color graphs)
- View paper with Google Docs


Data

The most current data can be downloaded from http://www.ude.cornell.edu/qwi/national.
CURRENT WORK
We are currently working on...

- Much improved methodology to get all measures (including CS, CA and FQ) right, using all possible constraints (small-cell edit)
- Assessing robustness for RH, SE tabulations
- Faster release of updated data on VirtualRDC
  - Including all (200) implicates
Medium-term steps

• Expanding from NAICS sectors to NAICS3
  – Depends on the “small-cell” edits working – far more suppressed cells
  – Making available the lower-level imputes (NAICS sector, NAICS3) to researchers (longer time-series for research for all states!)

• Extending to \{WIA,RH,SE\} x \{FA,FS\} tabulations

• Integration of some or all of the tabulations into official LEHD release
Thank you

http://www.vrdc.cornell.edu/nqwi/
http://goo.gl/96UCw