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Presentation: Education, flows and the Great Recession in the United States

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Presentation: Education, flows and the Great Recession in the United States

Abstract
Using gross flows of workers into and out of employment, we investigate the composition of flows in non-recessionary periods as well as in the Great Recession of 2008-2009. In particular, we use gross flows at highly detailed geographic and demographic levels to assess whether particular demographic groups are less affected by the sharp changes in gross flows during recessions, and whether such effects are robust across detailed geographic areas.

Following Abowd and Vilhuber (2011), we develop a internally consistent measure of national gross worker and job flows with demographic detail. In particular, we expand on the earlier attempt by providing the first estimate of consistent worker and job flows by age and educational attainment. We provide a comparison to existing job and worker flows derived from several independent sources (CPS, BED, JOLTS). We then identify particular patterns in the national data we develop that highlight certain differential effects. Finally, we assess whether such patterns, observed at the national level, are present in all or only a subset of local labor markets.

We find worker reallocation rates nearly three times as large as job reallocation rates. Workers with less than a high-school diploma have a worker reallocation rate that is nearly twice that of workers with a bachelor’s degree or higher, whereas there is less discrepancy in job reallocation rates. Finally, while these differences are high, excess reallocation rates for different education groups have converged in the last decade. No such convergence is apparent when disaggregating by age.

The national estimates from the QWI are an important enhancement to existing series because they include demographic and industry detail for both worker and job flow data compiled from the same underlying micro-data that have been integrated at the job and establishment levels by the Longitudinal Employer-Household Dynamics Program at the Census Bureau. The estimates presented herein were compiled exclusively from public-use data series and are available for download.

Comments
Suggested Citation

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Education, flows and the Great Recession in the United States

John M. Abowd\(^1,2,3\) Lars Vilhuber\(^1,2\)

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\(^3\) NBER, IZA, CREST

May 2012, SOLE
Research results and conclusions expressed are those of the authors and do not necessarily reflect the views of the Census Bureau.

This is work in progress, some results are very preliminary!
Unemployment by education

Time series of the Unemployment Rate by Education (NSA)

- Recession
- <HS avg
- HS, No College avg
- Some College avg
- BA+ avg

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Some elements

- Younger and less educated workers more affected
- By some measures, men more affected
- (lots of other presentations) Reduction in the employment/population ratio
Differences in job market measures across MSAs

- Accession (hiring) rates
- Albany-Schenectady-Troy, NY Metropolitan Statistical Area (10580)
- Columbus, OH Metropolitan Statistical Area (18140)
- Dallas-Fort Worth-Arlington, TX Metropolitan Statistical Area (19100)
- Phoenix-Mesa-Glendale, AZ Metropolitan Statistical Area (38060)

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Education and flows
Differences in job market measures across MSAs

Worker reallocation rates
- Albany-Schenectady-Troy, NY Metropolitan Statistical Area (10580)
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Goals in this paper

Explore the local differential effects of education

- We go very local - individual job markets (MSAs)
- Unemployment rates by education only available at the national level
- Use flows (worker and job flows) from integrated data, controlling for national effects, local unemployment, and national unemployment rates for educational groups
Some concepts

Worker reallocation rate

\[ WRR_{egkst} = AR_{egkst} + SR_{egkst} \]

where

\[ AR_{egkst} \equiv \text{accession rate (new hires plus recalls)} \]
\[ SR_{egkst} \equiv \text{separation rate (quits, layoffs, other)} \]

measured for education groups \( e \), gender \( g \), industry \( k \), geography \( s \) and time (quarter) \( t \).
Some concepts

Job Reallocation Rate
Gross job flows are measured in similar fashion using the symmetric Job Reallocation Rate ($JRR_{egkst}$)

$$JRR_{egkst} = JCR_{egkst} + JDR_{egkst}$$

where

$$JCR_{egkst} \equiv \text{job creation rate}$$
$$JDR_{egkst} \equiv \text{job destruction rate}$$
Data
Quarterly Workforce Indicators

Input data, scope

- Based on quarterly wage record reports from 49 (50,...) states
- Flows, based on longitudinally linked (by employer and employee) Unemployment Insurance Wage Records
- Augmented with person and firm demographics from other data sources
Quarterly Workforce Indicators

Detail

- 30+ indicators on employment dynamics
Quarterly Workforce Indicators

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- Aggregated to detailed time-series by industry x geography x demographics:

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  - NAICS sectors, sub-sectors (3-digit), industry groups (4-digit)
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  - NAICS sectors, sub-sectors (3-digit), industry groups (4-digit)
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  - Demographics:
    - Sex x age (8 categories)
    - Sex x education (4 categories)
    - Race (6 categories) x ethnicity (hispanicity)
    - All levels fully crossed
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Education and flows
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Abowd and Vilhuber (CES WP 2010-11; Journal of Econometrics, 2011)

- Addresses the issue of missing historical (and sometimes contemporary) data by using multiple imputation
- First time that person and job flows are computed at a national level from a consistent data source

Lazear and Spletzer (AEA PP, 2012), "Hiring, Churn and the Business Cycle" do a similar exercise with JOLTS data.
Unemployment data

- Source: BLS
- National level: by different demographic categories, from CPS
- Sub-national level: no demographics, but down to large cities/counties/etc, from models (using CES, CPS, etc.)
Unemployment data

Unemployment rate by county

Use this graphic to explore how the unemployment rate around the country has changed over the last year. Click the tabs to see figures since 2007.

National Unemployment Rate:
Jan. 2010: 10.6%

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Unemployment rate, 2009Q2, by MSAs

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Education and flows
It did not always look so diverse
Categorizing job markets

Ranking job markets by unemployment rates

- Classify all metropolitan areas by their unemployment rate in 2009Q2 (trough of recession, but not peak of unemployment rate)
- Consider how labor markets work in MSAs in the bottom 10% (Group 1), middle 80% (Group 2), top 10% (Group 3).
The analysis model
The analysis model

The basic national equation
relating unemployment rates to labor market flows can be expressed as

\[ y_{ot} = x_{ot} \tilde{\beta} + \epsilon_{ot} \]  \hspace{1cm} (1)

for any variable \( y_{ot} \) under study and any vector \( x_{ot} \) of unemployment rates (possibly by demographic groups) and other aggregate labor market conditions (including an intercept and lags, in our case for 5 quarters without restriction).

The local labor market variable
can be modeled as a composite of national and local effects

\[ y_{jt} = x_{ot} \tilde{\beta} + (x_{jt} - x_{ot}) \beta_j + \epsilon_{ot} + \epsilon_{jt}. \]
The analysis model

The purely local equation

\[ y_{jt} - y_{\circ t} = (x_{jt} - x_{\circ t}) \beta_j + \epsilon_{jt} \]  \hspace{1cm} (2)

where the MSA-specific effect \( \beta_j \) is modeled as a mixed effect.
Relaxing the specification gives
\[ y_{jt} = \beta_1 y_{ot} + \beta_2 x_{ot} + \beta_3 x_{jt} + \epsilon_{jt}, \quad (3) \]
where \( \beta_1 = 1 \) with no MSA-level variation, and \( -\beta_2 = \beta_3 \) if the correct model is equation 2. We then restate equation 3 as a mixed-effects linear model:
\[
y_{jt} = \bar{\beta}_1 y_{ot} + \bar{\beta}_2 x_{ot} + \bar{\beta}_3 x_{jt} + \tilde{\nu}_1 y_{ot} + \tilde{\nu}_2 x_{ot} + \tilde{\nu}_3 x_{jt} + \epsilon_{jt}, \quad (4)
\]
where \( \bar{\beta}_1, \bar{\beta}_2 \) and \( \bar{\beta}_3 \) are the fixed national average coefficients, and \( \tilde{\nu}_1, \tilde{\nu}_2 \) and \( \tilde{\nu}_3 \) are the random deviations of MSA-specific coefficients from the national average.
Expanding the specification to account for education

gives

$$y_{jet} = \bar{\beta}_1 y_{ot} + \bar{\beta}_2 x_{ot} + \bar{\beta}_3 x_{jt} + \bar{\beta}_4 x_{oet}$$
$$+ \tilde{\nu}_1 y_{ot} + \tilde{\nu}_2 x_{ot} + \tilde{\nu}_3 x_{jt} + \tilde{\nu}_4 x_{oet}$$
$$+ \epsilon_{jet},$$

where $y_{jet}$ is observed flow rate for MSA $j$ and educational group $e$ and $x_{oet}$ are national unemployment rates for educational group $e$ (and their lags)
Fitted marginal predictor captures the effects of the overall market conditions and MSA variation in local labor market conditions:

\[
\hat{y}_{jet} = \hat{\beta}_1 y_{ot} + \hat{\beta}_2 x_{ot} + \hat{\beta}_3 x_{jt} + \hat{\beta}_4 x_{ot}.
\]
Fitted marginal predictor

captures the effects of the overall market conditions and MSA variation in local labor market conditions:

$$\hat{Y}_{jet} = \hat{\beta}_1 y_{ot} + \hat{\beta}_2 x_{ot} + \hat{\beta}_3 x_{jt} + \hat{\beta}_4 x_{et}. $$

Linear predictor

inclusive of the estimated random effects captures the incremental contribution of the MSA-specific variation in the coefficients:

$$\hat{\hat{Y}}_{jet} = \hat{\hat{Y}}_{jt} + \hat{\upsilon}_1 y_{ot} + \hat{\upsilon}_2 x_{ot} + \hat{\upsilon}_3 x_{jt} + \hat{\upsilon}_4 x_{et}. $$
Estimated random effects
\[ \hat{u}_{jet} = \hat{y}_{jet} - \hat{\bar{y}}_{jet} \]
The model is fit for worker flows, job flows by restricted maximum likelihood assuming that the residuals and the random effects have independent normal distributions with zero means and constant variances, with

- $x_{ot} = U_{o,t=0...-5}, U_{edu,t=0...-5}$
- $x_{jt} = U_{j,t=0...-5}$
- 4 education levels
Introduction
Framework
Data
Model structure
Results
Conclusion

WRR actual, by group

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WRR $\hat{y}_{jet}$, by group

Flow rate

- 2000q1
- 2002q1
- 2004q1
- 2006q1
- 2008q1
- 2010q1

- Recessions
- Group 1
- Group 2
- Group 3

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Education and flows
JRR actual, by group

Abowd, Vilhuber

Education and flows
JRR $\hat{y}_{jet}$, by group

Diagram showing flow rates over time from 2000q1 to 2010q1 with shaded areas indicating recessions. Lines represent different groups: Group 1 (green), Group 2 (blue), and Group 3 (red).
WRR, worst decile by unemployment rate 2009Q2
WRR top 10, relative to middle

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Education and flows
### The top (and bottom) 10

<table>
<thead>
<tr>
<th>Rank</th>
<th>City and Region</th>
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<tr>
<td>10</td>
<td>20100</td>
<td>Dover, DE</td>
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**Lowest JRR eblup**

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<td>Binghamton, NY</td>
</tr>
<tr>
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<td>Cape Coral-Fort Myers, FL</td>
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<td>7</td>
<td>19660</td>
<td>Deltona-Daytona Beach-Ormond Beach, FL</td>
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<tr>
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<td>21300</td>
<td>Elmira, NY</td>
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<td>Fargo, ND-MN</td>
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<td>10</td>
<td>23540</td>
<td>Gainesville, FL</td>
</tr>
</tbody>
</table>
Reminder: Unemployment rate, 2009Q2, by MSAs
Geographic distribution of $\tilde{u}_{jet}$: WRR
Geographic distribution of $\hat{u}_{jet}$: JRR

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Education and flows
WRR by education groups

For Group 1
- Recessions
- Avg. Marginal prediction (no RE)
- Avg. Full prediction
- Avg. Actual
WRR by education groups

For Group 2

- Recessions
- Avg. Full prediction
- Avg. Marginal prediction (no RE)
- Avg. Actual
WRR by education groups

For Group 3

- Recessions
- Avg. Marginal prediction (no RE)
- Avg. Full prediction
- Avg. Actual

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Education and flows
JRR by education groups

For Group 1

- Recessions
- Avg. Full prediction
- Avg. Marginal prediction (no RE)
- Avg. Actual
JRR by education groups

For Group 2

- Recessions
- Avg. Full prediction
- Avg. Marginal prediction (no RE)
- Avg. Actual

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Education and flows
JRR by education groups

For Group 3

- Recessions
- Avg. Full prediction
- Avg. Marginal prediction (no RE)
- Avg. Actual

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Education and flows
Preliminary conclusions

- MSAs that have had a (locally) worse reaction in labor markets are distinctly different over several dimensions.
Preliminary conclusions

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- Local effects matter quite a bit
Preliminary conclusions

- MSAs that have had a (locally) worse reaction in labor markets are distinctly different over several dimensions
- Local effects matter quite a bit
- Education does not seem to have a differential effect - is primarily a national effect
Caveats, Outlook

▶ Not yet estimated with a more flexible (time-varying) random effect
▶ Effect on average wages, rather than on employment-based measures
Thank you.
Acknowledgments

This research uses data from the Census Bureau’s Longitudinal Employer Household Dynamics (LEHD) Program, which was partially supported by the following grants: National Science Foundation (NSF) SES9978093, SES0339191 and ITR0427889; National Institute on Aging AG018854; and grants from the Alfred P. Sloan Foundation.

Both authors acknowledge support by NSF Grants SES-0820349, SES-0922005, Edmund Ezra Day chair at the Department of Economics, Cornell University.

Partially supported by the Census Bureau.
Further links

- Labor Dynamics Institute
- VirtualRDC @ Cornell
- Center for Economic Studies, U.S. Census Bureau
Quarterly Workforce Indicators

Definitions

- **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 $t+1$ ($S$)
- **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

Abowd, Vilhuber
Some concepts

Accession rates

$$\text{AR}_{egkst} = \frac{A_{egkst}}{(B_{egkst} + E_{egkst})/2}$$

where

$$B_{egkst} \equiv \text{beginning-of-quarter employment}$$
$$E_{egkst} \equiv \text{end-of-quarter employment}.$$ 

Separation rates

$$\text{SR}_{egkst} = \frac{S_{egkst}}{(B_{egkst} + E_{egkst})/2}.$$ 

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Education and flows
Some concepts

Gross job flow measures are defined at an establishment, not job, level.

\[ JC_{egjt} \equiv \max (E_{egjt} - B_{egjt}, 0) \]
\[ JD_{egjt} \equiv \max (B_{egjt} - E_{egjt}, 0) \]

(Davis and Haltiwanger, 1992)

Gross job flow rates

\[ JCR_{egkst} = \frac{JC_{egkst}}{(B_{egkst} + E_{egkst}) / 2} \]

and

\[ JDR_{egkst} = \frac{JD_{egkst}}{(B_{egkst} + E_{egkst}) / 2} \]
Alternate sources

- Business Employment Dynamics (BED)
- Job Openings and Labor Turnover Survey (JOLTS)
- Current Population Survey (CPS) with adjustments (Fallick-Fleischman, Abowd-Zellner)
Stacking them up

Fraction of employment

1995q1  2000q1  2005q1  2010q1

Seasonally adjusted WRR  CPS WRR (seas adj)  JOLTS: WRR adjusted
Different sources, same analysis?

- Seasonally adjusted QWI JRR
- Seasonally adjusted BED JRR

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Education and flows
Business Employment Dynamics (BED)

- Source: BLS
- Derived from establishment-level data (same basic universe as QWI)
- Gross job gains (job creations) and gross job losses (job destructions)
- Detail: state-level, NAICS sector (collapsed)
Alternative sources

Job Openings and Labor Turnover Survey (JOLTS)

- Source: BLS
- Monthly survey of continuing establishments
- Accessions, Separations (split into quits, layoffs, discharges, and other reasons)
- Timely information, and only source for reasons of separations
- Detail: National data only, NAICS sectors
Current Population Survey (CPS)

- Source: BLS/Census
- For flows, only measures (change in) labor market states, some measurement of job change
- BLS-provided flows series: *Accessions* measures as change from un-/non-employed to employed, corrected for margin changes (but not classification errors!)
- Fallick-Fleischman: also include job-to-job changes
- Detail: Nationally representative, no industry, gender available in published series, age+ education if computing from micro-data (Fallick-Fleischman)
Distorted maps