

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

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June 11, 2013

Acknowledgements

- 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) SES-9978093, SES-0339191 and ITR-0427889; National Institute on Aging AG018854; and grants from the Alfred P. Sloan Foundation.
- The authors also acknowledge partial direct support by NSF grants CNS-0627680, SES-0820349, SES-0922005, and SES-0922494, by the Labor Dynamics Institute, and by the Census Bureau.
- No confidential data were used to prepare this paper.
- 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

- Abowd, John M. & Vilhuber, Lars (2011)
"National estimates of gross employment and job flows from the Quarterly Workforce Indicators with demographic and industry detail," *Journal of Econometrics*, Elsevier, vol. 161(1), pages 82-99, March, doi:10.1016/j.jeconom.2010.09.008.
- 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

	QWI	QCEW	BED	JOLTS	CPS
Hires	Yes			Yes	Yes*
Separation	Yes			Yes	Yes*
- By reason				Yes	Yes*
Job destruction	Yes		Yes		
Job creation	Yes		Yes		
Employment level	Yes	Yes			Yes
Estab. Birth	Yes*		Yes	Yes*	
Estab. Death	Yes*		Yes	Yes*	
Job openings				Yes	

Coverage

	QWI	QCEW	BED	JOLTS	CPS
National		Yes	Yes	Yes	Yes
State	Yes	Yes	Yes		
County	Yes	Yes			
NAICS Sector	Yes	Yes	Yes*	Yes	Yes
NAICS3	Yes	Yes			
Age	Yes				Yes
Gender	Yes				Yes
Race/Ethn.	Yes				Yes
Education	Yes				Yes

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

$$WRR_{agstk} = \frac{A_{agstk} + S_{agstk}}{(B_{agstk} + E_{agstk})/2}$$

- 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

$$JRR_{agst} = \frac{JC_{agst} + JD_{agst}}{(B_{agst} + E_{agst})/2}$$

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

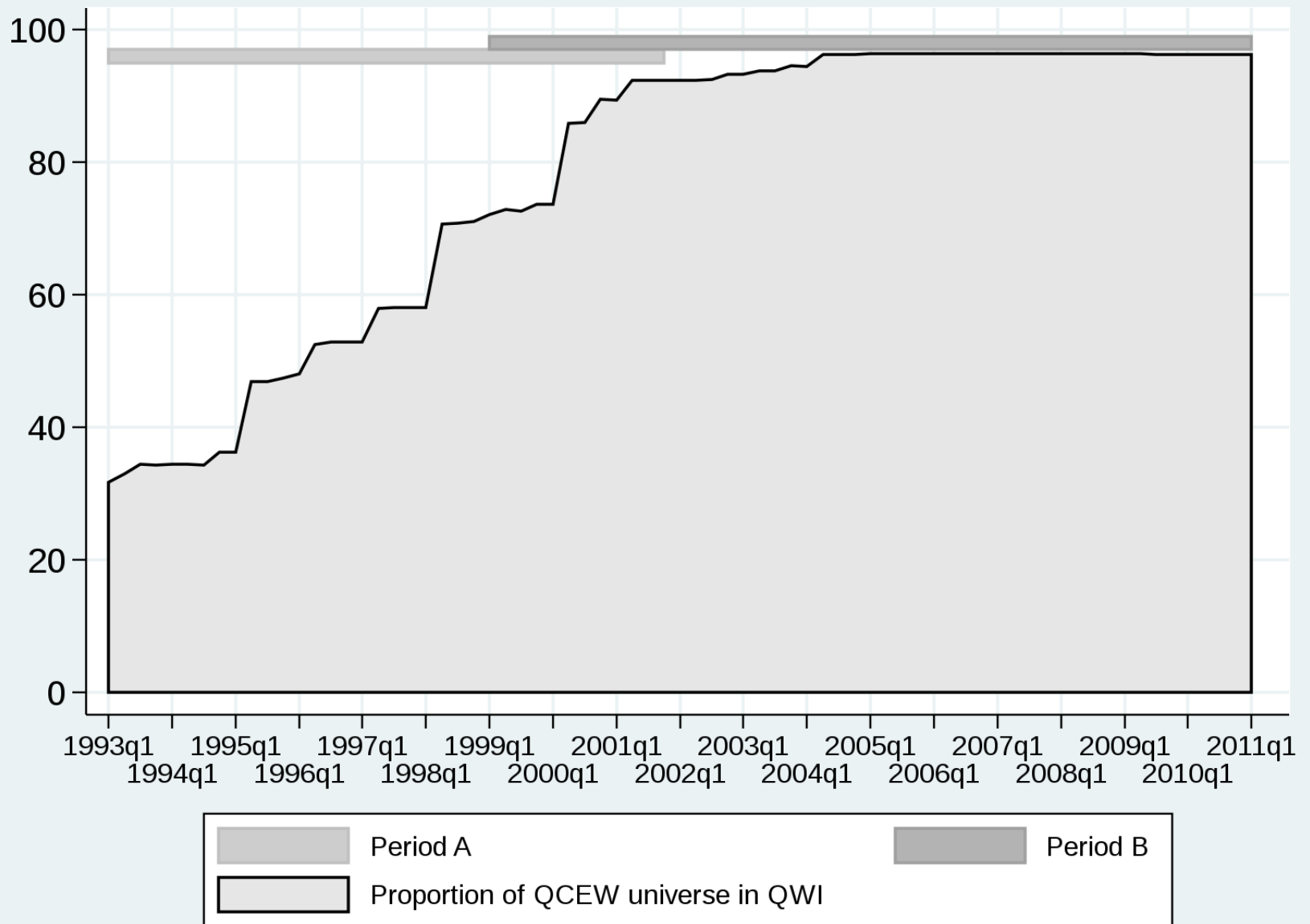
Excess Reallocation Rate

- $ERR = WRR - JRR$
- 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

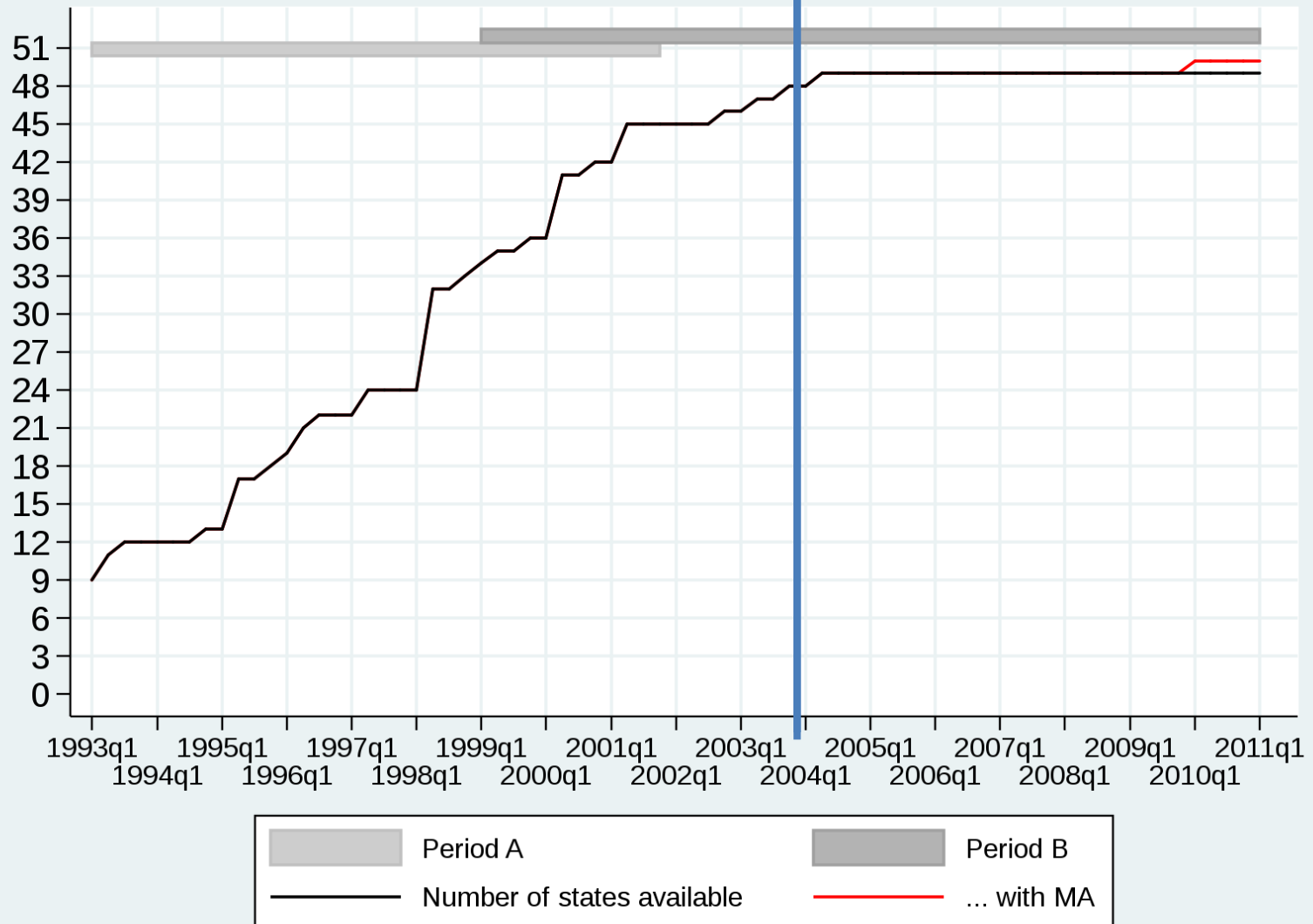
Motivation

- 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



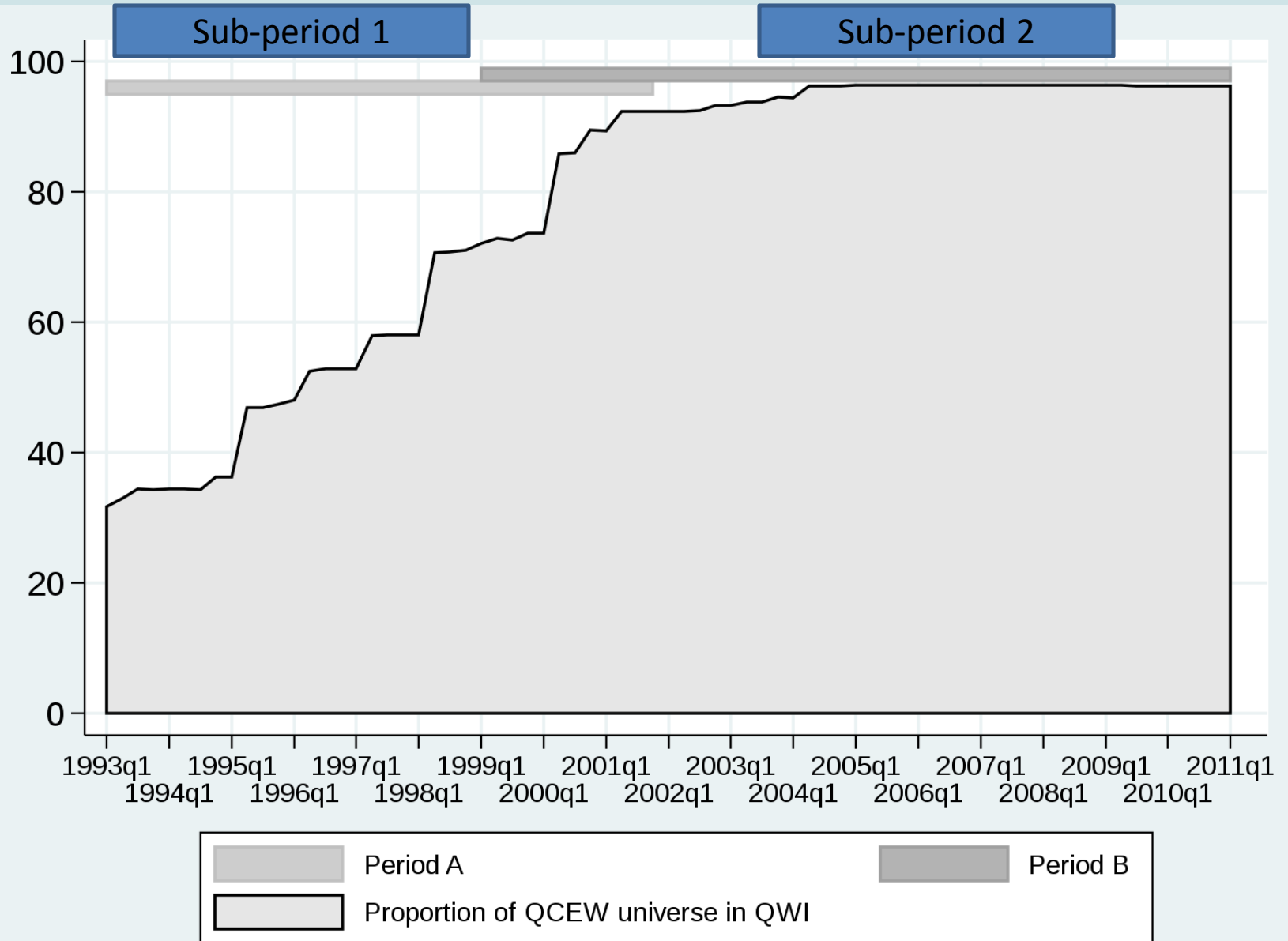
State availability in QWI + MA



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



Statistical Methodology

- 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

$$\begin{aligned} WRR_{agt} &= \frac{A_{agt} + S_{agt}}{(B_{agt} + E_{agt})/2} \\ &= \frac{2}{B_{agt} + E_{agt}} \left[\sum_{k,s} \left(\frac{B_{agkst} + E_{agkst}}{2} \right) WRR_{agkst} \right] \end{aligned}$$

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

Implicate Combining Formulae I

$$\overline{WRR}_{agkt} = \frac{1}{M} \sum_{\ell=1}^M \left[\sum_{\forall s} \frac{\left(\frac{B_{agskt}^{(\ell)} + E_{agskt}^{(\ell)}}{2} \right) WRR_{agskt}^{(\ell)}}{\sum_{\forall v} \frac{B_{agvkt}^{(\ell)} + E_{agvkt}^{(\ell)}}{2}} \right]$$

$$\widehat{WRR}_{agkt}^{(\ell)} = \sum_{\forall s} \frac{\left(\frac{B_{agskt}^{(\ell)} + E_{agskt}^{(\ell)}}{2} \right) WRR_{agskt}^{(\ell)}}{\sum_{\forall v} \frac{B_{agvkt}^{(\ell)} + E_{agvkt}^{(\ell)}}{2}}$$

Implicate Combining Formulae II

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

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

$$T[\overline{WRR}_{agkt}] = \frac{1}{M} \sum_{\ell=1}^M V^{(\ell)}[\widehat{WRR}_{agkt}^{(\ell)}] + \frac{M+1}{M} B[\overline{WRR}_{agkt}]$$

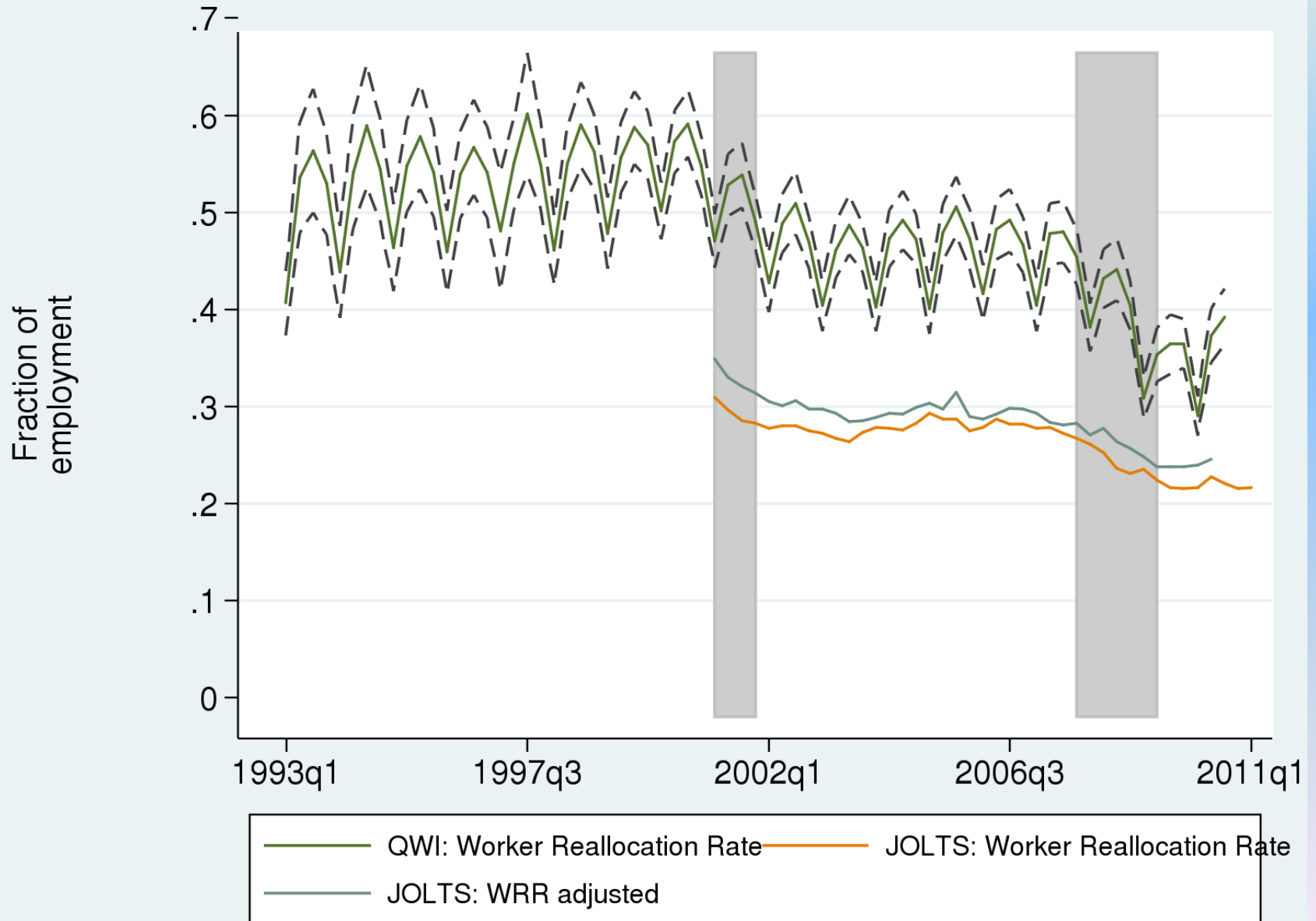
Implicate Combining Formulae III

$$MR[\overline{WRR}_{agkt}] = \frac{B[\overline{WRR}_{agkt}]}{T[\overline{WRR}_{agkt}]}$$

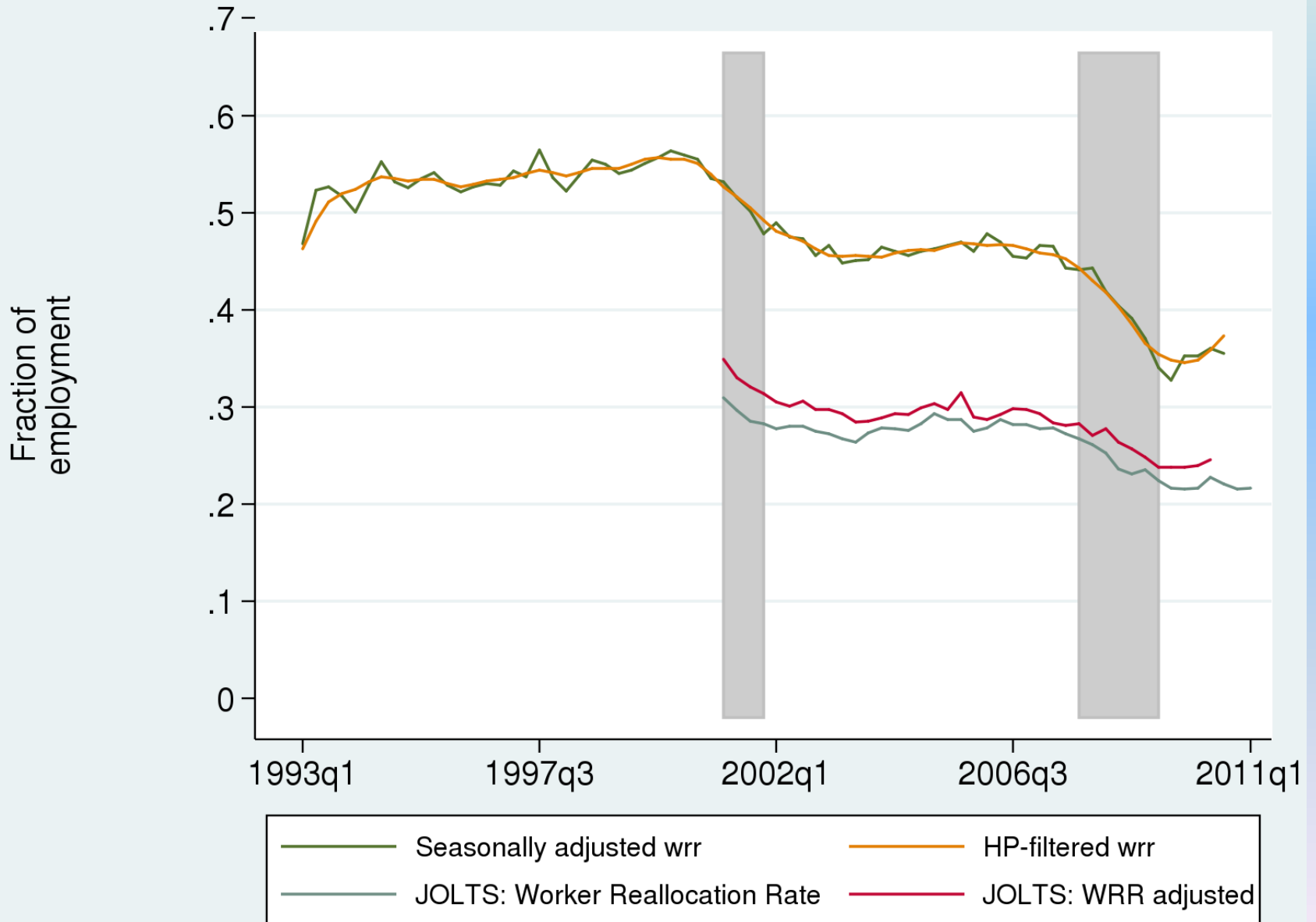
Results

- Comparison of *WRR* between QWI and JOLTS
- Comparison of *JRR* between QWI and BED
- Demographic detail
- Industry detail

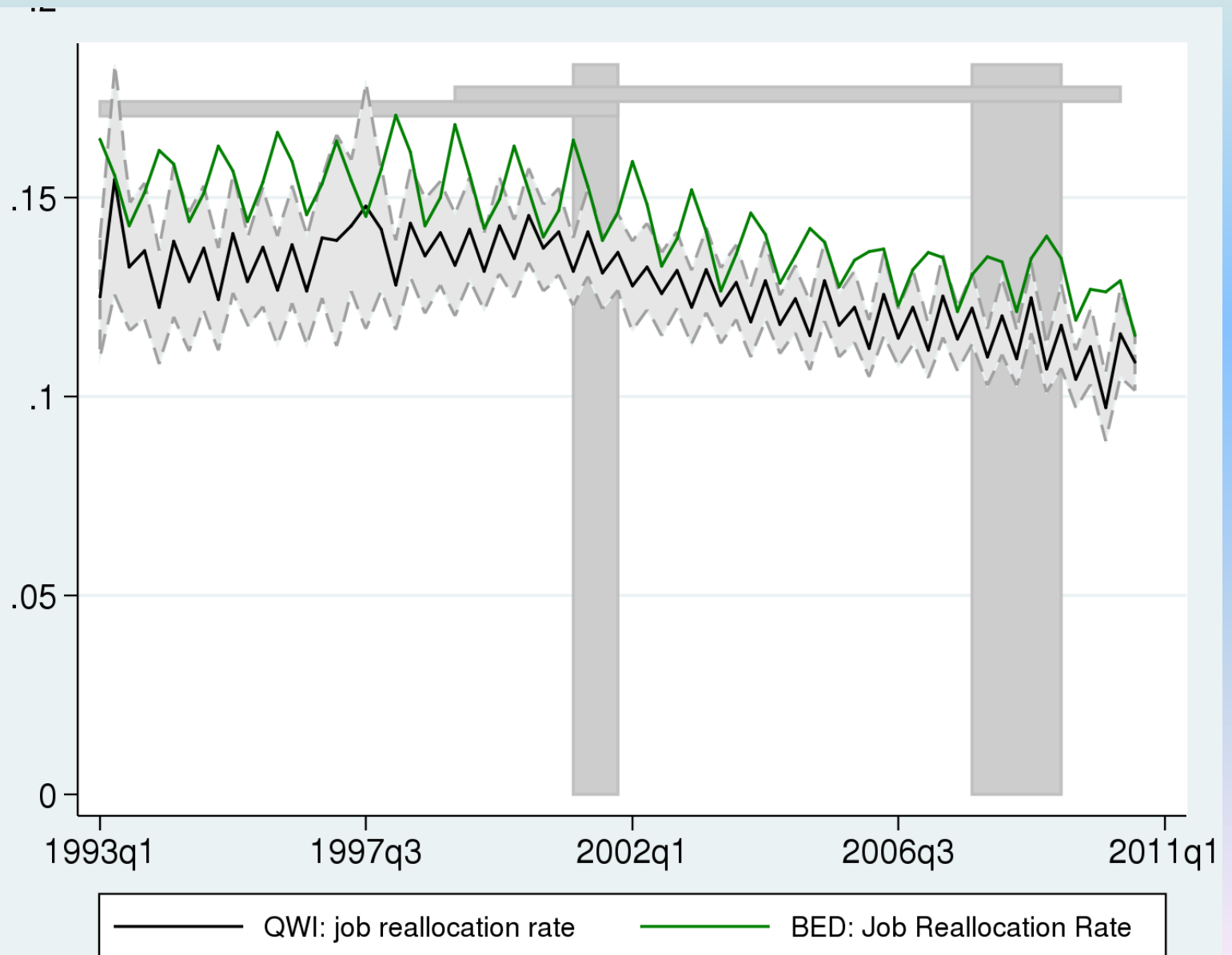
WRR: QWI v. JOLTS



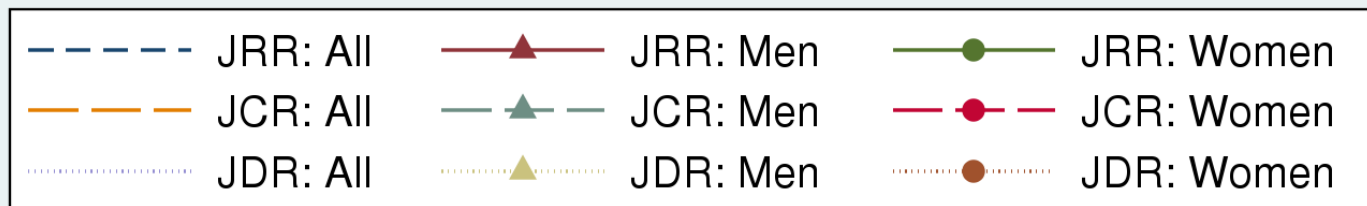
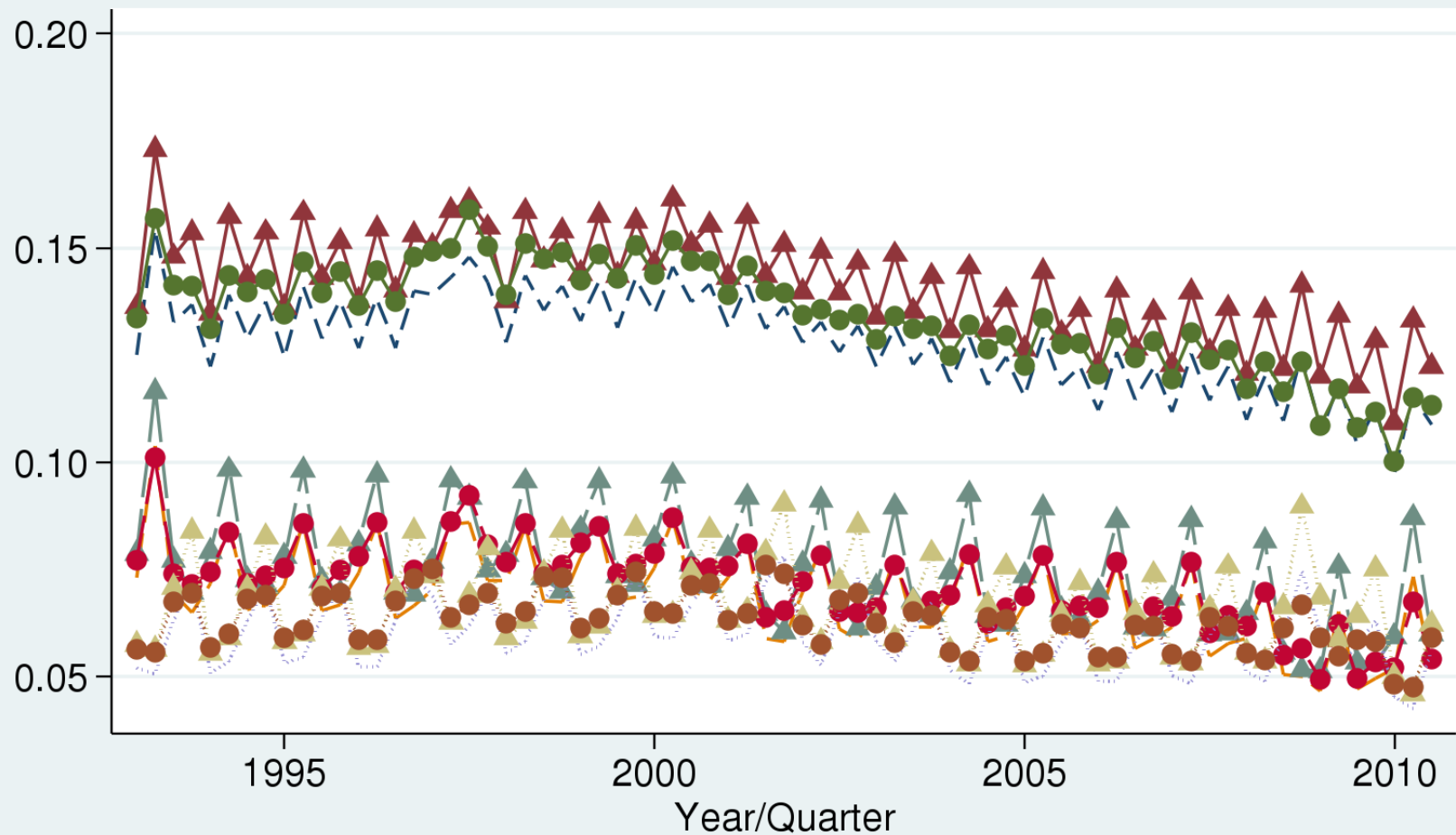
WRR: QWI (sa) v. JOLTS



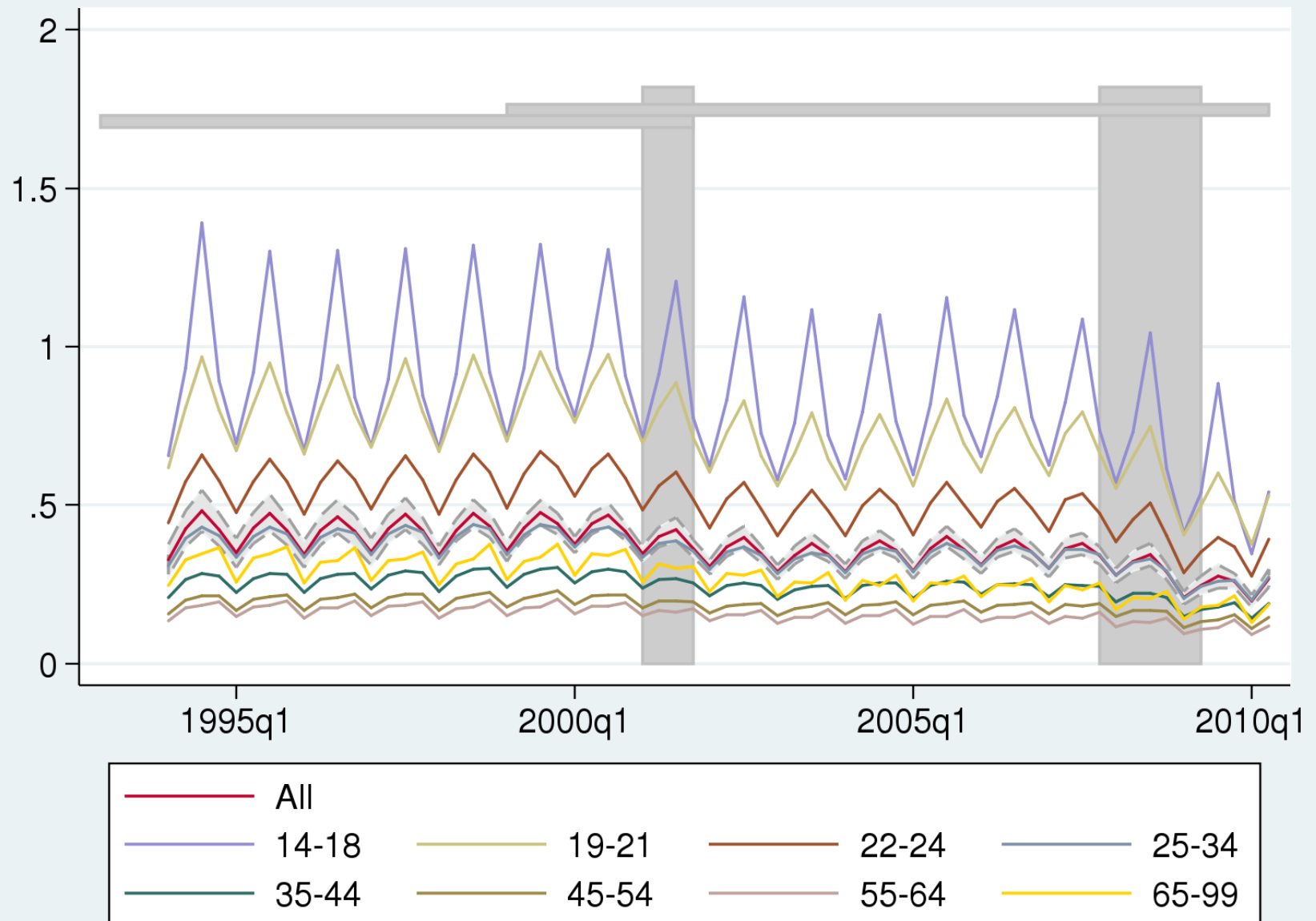
JRR: QWI v. BED



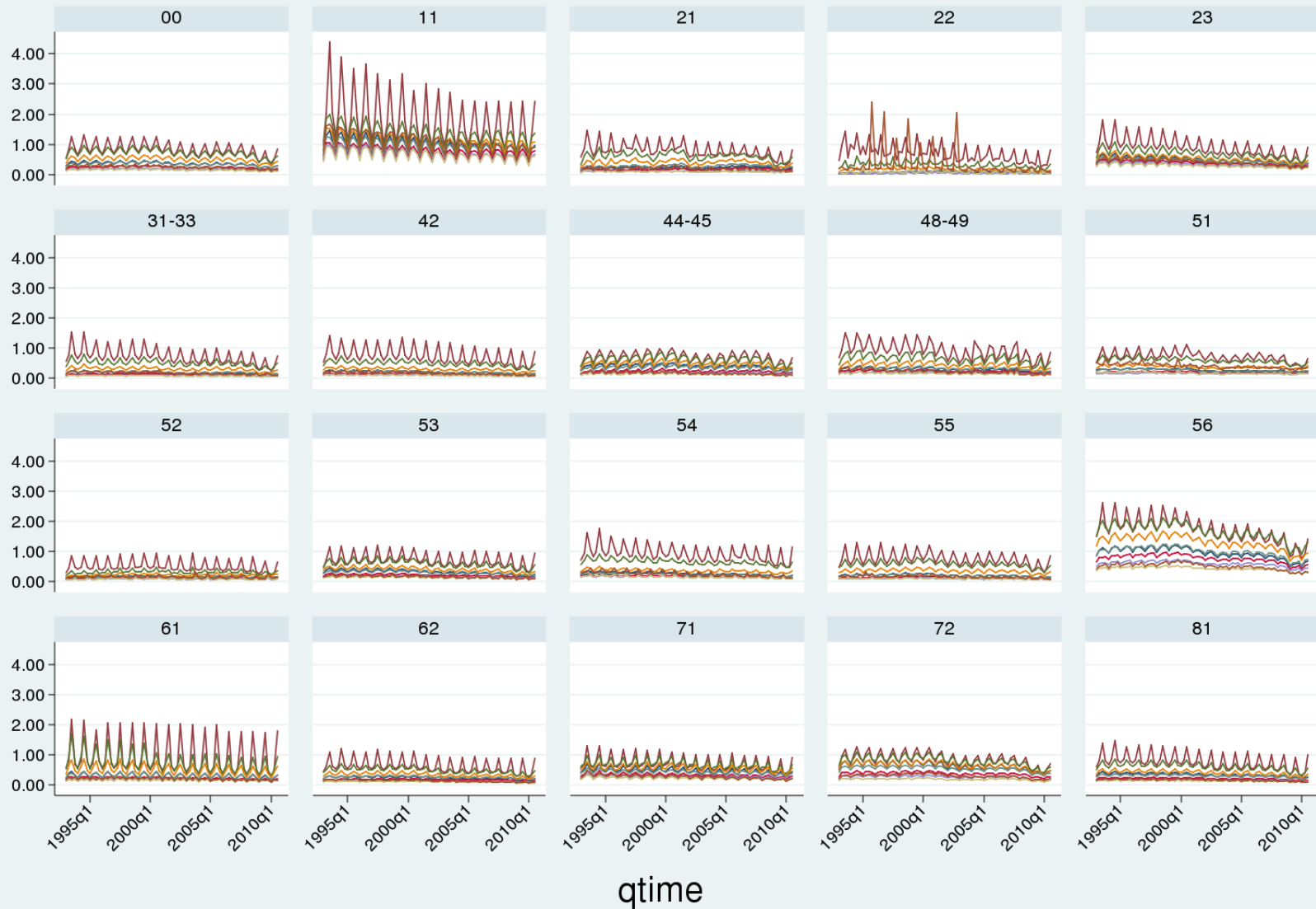
JRR WRR ERR by Gender



ERR (Churning) by Age Group



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!



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SEARCH CORNELL:

go

Pages People more options



VirtualRDC @ Cornell

Social Science Gateway, Synthetic Data Server, and more

INFORMATION ✕ SOCIAL SCIENCE GATEWAY ✕ SYNTHETIC DATA SERVER ✕ DATA ✕ DOCUMENTATION ✕ HELP ✕ LABOR DYNAMICS INSTITUTE

Request access to the Social Science Gateway

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- VirtualRDC Wiki

Our other sites

- INFO 7470
- Labor Dynamics Institute
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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, unreleased 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

John Abowd and Lars Vilhuber, "National Estimates of Gross Employment and Job Flows from the Quarterly Workforce Indicators with Demographic and Industry Detail", draft [February 10, 2010 \(updated\)](#).

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

The paper was published in *Journal of Econometrics*, Elsevier, vol. 161(1), pages 82-99, March 2011 (black-and-white graphs). A working paper version appeared in 2010 as Center for Economic Studies Working Paper 10-11 (local copy), U.S. Census Bureau (color graphs).

Data

The most current data can be downloaded from

<http://www.rdc.cornell.edu/data/national>

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- Available resources
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 - Prototype National QWI
 - OnTheMap/LODES
 - Synthetic Data
 - QWI Public Use Data
 - SIPP Synthetic Beta file
 - LBD Synthetic Data v2
 - Data archives

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>

