People

Firms and establishments
New Entity: Jobs

People

Jobs

Firms and establishments
The View from the People Side
CPS, ACS, ...
The View from the Firm Side
Economic Census, QCEW

People

Jobs

Firms and establishments

- 3
- 2
- 1
The View from the Firm Side: Occupational Employment Statistics

People
- Plumber, $x
- Manager, $y
- Designer, $z

Jobs

Firms and establishments
- 3
- 2
- 1
Dynamics of Jobs

People  Jobs  Firms and establishments

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Other Establishment Censuses and Surveys

• Quarterly Census of Employment and Wages (QCEW)
  – Quarterly count of workers and wage earnings from employers (about 98% of all workers), a “near census”
  – Collected through state-federal partnership from administrative data (state UI systems, Unemployment Compensation for Federal Employees)
  – The base frame for BLS-managed surveys of establishments and firms
QCEW Detail

• Key record is a employer-filed mandatory record on covered workers and wages

• Establishment detail provided by mandatory Multiple Worksite Report, breaking out employment by establishment
  – However, compliance is not universal
  – Exception: Minnesota

• Information on location, industry, employment, wages
QCEW-based Surveys

• Job Openings and Labor Turnover Survey (JOLTS)
  – Data on vacancies, hires, separations
  – Survey of ~16,000 establishments

• Current Employment Statistics (CES)
  – Monthly survey of ~145,000 firms on hours, employment, earnings
  – Basis of monthly “Employment Situation”, together with CPS-derived household statistics
QCEW-based Statistics

• Occupational Employment Statistics (OES)
  – Sample of firms, and occupations within firms
  – Bi-annual, provides estimates of employment and wages for ~800 occupations
  – Published at national, state, metropolitan levels as well as for certain industries

What’s Missing?

• Employers and establishment report on characteristics of their workers they know of
  – Occupation
  – Fact of employment
  – Wages
  – Tasks
  – Hiring/firing in general

• Workers report on characteristics of their employers and jobs that they know of
  – Industry
  – Occupation
  – Wages
  – Hiring and firing as it affects them
  – Their family structure (marriage, children, health)
Linking Workers to Employers

• Validation studies
  – Mellow & Sider (1983), Bound & Krueger (1991), etc.

• Unemployment insurance wage records for specific states
  – Anderson & Meyer (1992, 1994, etc.)
National Studies Linking Universe Worker to Universe Firms/Establishments

• Late 1990s
  – Including Abowd, Kramarz, Margolis (1999) for France
  – Bingley & Westergård-Nielsen (1996), Belzil (2000) for Denmark
  – Others

• See Haltiwanger, Lane, Spletzer, Theeuwes and Troske (1999), *The Creation and Analysis of Employer-Employee Matched Data*
United States

• 1999: start of the LEHD program
• Resulting infrastructure links
  – Worker-level wage records from UI systems
  – Establishment-level QCEW reports
  – Demographic information available at the U.S. Census (including extracts of IRS 1040 and SSA Numident, augmented by Census Bureau staff)
  – Firm-level information from the Business Register and economic censuses and surveys
LEHD Program

• Support from NSF and other agencies

• Public-use products:
  – Quarterly Workforce Indicators
    • New amount of detail on workforce and the dynamics of the workforce at county/MSA/WIB level (by gender, by age, by detailed industry)
  – OnTheMap/LODES
    • Detail on links between workplaces and residences, at Census block level, with workplace and residence block detail on workforce (LODES is public-use data from OnTheMap graphical application)

• Restricted-access data:
  – LEHD Snapshot (S2004, S2008, soon S2012) in RDCs
Part 1:
Overview of Methodology

BASIC CONCEPTS OF THE LEHD INFRASTRUCTURE
Underlying Concepts: Construction of the LEHD Infrastructure

• Goals:
  • Understand concepts, basics of construction of LEHD infrastructure and processing
  • Understand QWI measures, how data is used in LEHD products
  • Understand differences between QWI measures and other measures
    • Related to definitions
    • Related to data sources/construction
Reference Materials

• QWI Comprehensive Index
  – Provides crosswalk between various naming conventions
  – Indicates how measures are used in online products

• Comparison of employment definitions
  – CPS vs. QCEW vs. LEHD

• QWI Cheatsheet
  – Reference for the structure of the public released QWI files
Additional References

• The *LEHD Infrastructure Files and the Creation of the Quarterly Workforce Indicators* — Primary reference for LEHD methodology

• Technical papers also available in the (historical) [LEHD technical paper](#) and [CES working paper](#) series on various topics

• Resources on the VirtualRDC for the Quarterly Workforce Indicators, OnTheMap, and the LEHD Infrastructure File System
Basic Concepts and Definitions

• Dates
  – Year and quarter
  – Boundary between quarters is the employment reference date

• Employer (SEIN)
  – single Unemployment Insurance (UI) account in a given state’s UI wage reporting system

• Location (SEINUNIT) - work place location

• Employee (PIK)
  – at least one employer reports earnings of at least one dollar of UI-covered earnings for an individual
Basic Concepts: Job

• Job (PIK-SEIN-SEINUNIT)
  – coupling of specific individual with specific employer and location in a given year/quarter

• The job is the basic unit of analysis within the LEHD Infrastructure

• Jobs are linked across years and quarters to develop longitudinal measures
Basic Concepts: Employment

• Level of measurement
  – Job (PIK-SEIN-SEINUNIT)

• Level of estimation
  – Worker’s job (PIK-SEIN-SEINUNIT)
  – Primary job (OnTheMap PIK-SEIN-SEINUNIT most earnings)
  – All jobs in a firm (SEIN) and location (SEINUNIT)
  – All jobs for a worker (PIK)

• Employment status
  – Point-in-time
  – Full quarter (continuous during quarter- stable)
Basic Concepts: Beginning of Period Employment

• Will reference as “b” or “B”
  • lowercase b – job level
  • uppercase B – jobs aggregated to establishment or higher level

• Primary measure of employment for QWI and OnTheMap

• Developed from job history
  – Defined when job is present in previous and current quarter

• Conceptually and empirically similar to QCEW Month 1 employment (Mon1)
  – Definitions, data sources, and methodology result in differences
Employment History

• Jobs are linked across years and quarters to develop an individual’s employment history with a firm
  – PIK-SEIN-SEINUNIT level
• The reference quarter is noted at $t$
  – Earlier quarters are negative, later positive
• For calculation of measures,
  – RED indicates positive earnings
  – BLACK indicates zero earnings
  – BLUE (background) indicates time period not referenced
Details: Jobs

- See $m$ and $M$ on comprehensive index
- This variable is turned on ($m=1$) for every wage record in a state’s UI system that reports earnings of at least $1$ in $t$
- This is a job for $m$ (PIK-SEIN-SEINUNIT)
- This is a count of all persons ever paid by an employer at a location
  - By itself, it is not comparable to any other job-based statistic in the US system
- Released in QWI public use files as “EmpTotal” and labeled as “Employment reference quarter: Counts”
- Not reported in QWI Online, Industry Focus
Details: Employment – Beginning of Period

• See $b$ and $B$ on comprehensive index

• This variable is turned on whenever an individual has positive earnings in both the previous and current quarters
  – $m=1$ for last quarter ($t-1$) and this quarter ($t$)

• $b=1$ means an individual was employed at a particular employer and location (PIK-SEIN-SEINUNIT) on the first calendar day of the quarter

• $B$ is the count of beginning of quarter employment for an employer location (SEIN-SEINUNIT)

• This is the main employment measure used in QWI and OnTheMap
Details: Employment – End of Period

• See $e$ and $E$ on comprehensive index

• This variable is turned on whenever an individual has positive earnings in both the current and next quarters
  – $m=1$ for this quarter (t) and next quarter (t+1)

• $e=1$ means an individual was employed at a particular employer and location (PIK-SEIN-SEINUNIT) on the last calendar day of the quarter

• $E$ is the count of end of quarter employment for an employer location (SEIN-SEINUNIT)

• This variable is only reported in the QWI public use files, as EmpEnd.
Details: Employment – Full Period

• See $f$ and $F$ on comprehensive index

• This variable is turned on whenever an individual has positive earnings in the last, current and next quarters

  $m=1$ for last quarter $(t-1)$, this quarter $(t)$ and next quarter $(t+1)$

• $f=1$ means an individual was employed at a particular employer and location (PIK-SEIN-SEINUNIT) throughout the current quarter

• $F$ is the count of full quarter employment for an employer location (SEIN-SEINUNIT)

• This variable is reported in the QWI public use files as EmpS and on OnTheMap as “Employment, Stable Jobs”
QWI Estimates: Employment Measures
48 States, Private Sector Only

Employment (Millions)
- Flow employment
- Beginning-of-period employment
- Full-quarter employment

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QWI Estimates:
Employment Percent Change
48 States, Private Sector Only
Basic Concepts: Earnings

• Point in time earnings
  – Defined for a reference group meeting a particular employment definition at a point in time (End-of-quarter employment)

• Full-quarter earnings
  – Defined for a reference group of full-quarter employment (Full-quarter employment, Full-quarter hires, Full-quarter new hires, Full-quarter separations)

• Average earnings based on wage record earnings for the indicated quarter divided by 3 (monthly estimate)
  • In graphics, dollar sign ($) indicates reference quarter for earnings
Details: Earnings – End-of-Quarter

• See $Z_{W2}$ on comprehensive index
• Earnings in quarter $t$ are accumulated into W2 whenever an individual has positive earnings in the current and next quarter
  – $m=1$ for this quarter ($t$) and next quarter ($t+1$)
• $Z_{W2}$ is the average monthly earnings of end-of-quarter employees for an employer location (SEIN-SEINUNIT)
• This variable is reported in the QWI public use files as “EarnEnd”
Details: Earnings – Full Quarter

- See $Z_{W3}$ on comprehensive index.
- Earnings in quarter $t$ are accumulated into $W3$ whenever an individual has positive earnings in the last, current and next quarters:
  
  $m=1$ for last quarter ($t-1$), this quarter ($t$) and next quarter ($t+1$).
- $Z_{W3}$ is the average monthly earnings of full quarter employees for an employer location (SEIN-SEINUNIT).
- This variable is reported in the QWI public use files as “EarnS”, on QWI Online as “Avg Monthly Earnings”, in Industry Focus as “Average monthly earnings for all workers” (and for growth), and on OnTheMap as “Average Monthly Earnings, Stable Jobs”. 

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Details: Earnings Total Payroll

- See \( w1 \) and \( W1 \) on comprehensive index
- Earnings in quarter \( t \) are accumulated into \( W1 \) whenever an individual has positive earnings current quarter
  \[ m=1 \text{ for this quarter (t)} \]
- \( W1 \) is the total quarterly earnings of employees for an employer location (SEIN-SEINUNIT)
- This variable is reported in the QWI public use files as “Payroll”
- This variable covers the **same** concept as “Total Quarterly Wages” on public-use QCEW.
QWI Estimates:
Average Monthly Earnings
48 States, Private Sector Only

Average earnings of full-quarter employees
Average earnings of end-of-period employees
Job-Based Measures: Employment Flows

• Measures use longitudinal job history to identify employment patterns
  – Previous and following quarters are referenced to check for positive earnings
Details: Employment Flows - Accessions

- See $a_1$ and $A$ on comprehensive index
- An accession ($a_1$) is turned on whenever an individual has positive earnings in the current and not in the previous quarter
  
  $m=0$ for last quarter (t-1) and $m=1$ this quarter (t)
- $a_1=1$ means an individual was newly employed at a particular employer and location (PIK-SEIN-SEINUNIT) during the current quarter
- $A$ is the count of all accessions for an employer location (SEIN-SEINUNIT)
- This variable is reported in the QWI public use files as HirA
Details: Employment Flows—New Hires

- See $h1$ and $H$ on comprehensive index
- A new hire ($h1$) is turned on whenever an individual has an accession, with no earnings from the employer during the previous four quarters
  
  
  
  \[ m=0 \text{ for last four quarters (t-4 to t-1) and } m=1 \text{ this quarter (t)} \]
- $h1=1$ means an individual was newly hired at a particular employer and location (PIK-SEIN-SEINUNIT) during the current quarter
- $H$ is the count of all new hires for an employer location (SEIN-SEINUNIT)
- This variable is reported in the QWI public use files as “HirN” and on QWI Online as “New Hires”
Details: Employment Flows - Recalls

• See $r1$ and $R$ on comprehensive index
• A recall ($r1$) is turned on whenever an individual has an accession, and also received earnings from the employer during the earlier three quarters
  \[ m = 1 \text{ for at least one of quarters } (t-4, t-3, t-2), \quad m = 0 \text{ for last quarter } (t-1) \text{ and } m = 1 \text{ this quarter } (t) \]
• $r1=1$ means an individual was recalled at a particular employer and location (PIK-SEIN-SEINUNIT) during the current quarter
• $R$ is the count of all recalls for an employer location (SEIN-SEINUNIT)
• This variable is reported in the QWI public use files as “HirR”
Details: Employment Flows - Separations

• See $s1$ and $S$ on comprehensive index
• A separation ($s1$) is turned on whenever an individual has no wage record in the next quarter but is present this quarter
  
  $m=1$ for current quarter (t) and $m=0$ next quarter (t+1)
• $s1=1$ means an individual was separated at a particular employer and location (PIK-SEIN-SEINUNIT) during the current quarter
• $S$ is the count of all separations for an employer location (SEIN-SEINUNIT)
• This variable is reported in the QWI public use files as “Sep,” and on QWI Online as “Separations”
QWI Estimates:
Accessions, Separations, and New Hires
48 States, Private Sector Only

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QWI Estimates:
Accessions, Separations, New Hires
Percent Change
48 States, Private Sector Only
Details: Employment Flows-
Full Quarter Accessions

• See \( a3 \) and \( FA \) on comprehensive index
• A full-quarter accession (\( a3 \)) is turned on whenever an individual is full-quarter employed this quarter, but not last quarter
  – \( m=0 \) for quarter \( (t-2) \) and \( m=1 \) last quarter \( (t-1) \), this quarter \( (t) \) and next quarter \( (t+1) \)
• \( a3=1 \) means an individual was full-quarter employed at a particular employer and location (PIK-SEIN-SEINUNIT) during the current quarter for the first time
• \( FA \) is the count of all full-quarter accessions for an employer location (SEIN-SEINUNIT)
• This variable is reported in the QWI public use files as “HirAS”
Details: Employment Flows-
Full-Quarter New Hires

- See $h_3$ and $H_3$ on comprehensive index
- A full-quarter new hire ($h_3$) is turned on whenever an individual has a full-quarter accession, with no association with the employer during the four quarters preceding hire
  
  $m=0$ for four quarters ($t-5$ to $t-2$) and $m=1$ last quarter ($t-1$), this quarter ($t$) and next quarter ($t+1$)

- $h_3=1$ means an individual was newly hired at a particular employer and location (PIK-SEIN-SEINUNIT) last quarter and became a full-quarter employee during the current quarter

- $H_3$ is the count of all new full-quarter hires at an employer location (SEIN-SEINUNIT)

- This variable is reported in the QWI public use files as “HirNS”, on Industry Focus as “Number of New Hires” and on OnTheMap as “New Hires, Stable Jobs”
Details: Employment Flows—Full Quarter Separations

- See $s_3$ and $FS$ on comprehensive index
- A full-quarter separation ($s_3$) is turned on whenever an individual has no wage record in the next quarter but was full-quarter employed in the previous quarter
  - $m=1$ for quarter (t-2), last quarter (t-1), current quarter (t) and $m=0$ next quarter (t+1)
- $s_3=1$ means an individual was separated at a particular employer and location from a job that was full-quarter during the previous quarter (can’t be full-quarter this quarter)
- $FS$ is the count of all full-quarter separations for an employer location (SEIN-SEINUNIT)
- This variable is reported in the QWI public use files as “SepS” and on OnTheMap as “Separations, Stable Jobs”
QWI Estimates – Full Quarter: Accessions, Separations, and New Hires
48 States, Private Sector Only

(in Millions)

- Flow into full-quarter employment
- Full-quarter new hires
- Flow out of full-quarter employment

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QWI Estimates – Full Quarter:
Accessions, Separations, New Hires
Percent Change
48 States, Private Sector Only

Year-to-Year % Change

Delta Flow into full-quarter employment
Delta Full-quarter new hires
Delta Flow out of full-quarter employment

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Firm-Based Measures: Flows, Creations, Destructions

• Calculated at the establishment (SEIN-SEINUNIT) level
  – Also calculated at establishment level for each demographic segment

• Use Emp (B), EmpEnd (E), and EmpS (F) employment measures as inputs

• Measures are aggregated across establishments
  – Separately aggregated by demographic segment (caution to follow)
Firm Job Flows: What is being measured?

- These measures display dynamics at the firm (or establishment) level, which is between the individual level and the top level aggregates.

- Measures may be related as follows:
  - Even if an industry is declining in total employment, individual firms may be growing.
    - Net Job Flows < 0, Job Creation > 0
  - Even if a firm is shrinking, it still may be hiring individuals.
    - Job Destruction > 0, New Hires > 0
Details: Firm Job Flows – Job Creations

• See JC on comprehensive index
• A job creation is only defined at the employer-location level. A job is created when an employer has greater end of period employment than beginning of period employment

\[
JC = \max(E - B, 0)
\]
• JC is the count of all job creations for an employer location (SEIN-SEINUNIT)
• This variable is reported in the QWI public use files as “FrmJbGn,” on QWI Online as “Job Creation,” and on OnTheMap in the QWI report as “Firm Job Gain”
Details: Firm Job Flows – Job Destructions

- See \( JD \) on comprehensive index
- A job destruction is only defined at the employer-location level. A job is destroyed when an employer has greater beginning of period employment than end of period employment
  \[ JD = \max(B - E, 0) \]
- \( JD \) is the count of all job destructions for an employer location (SEIN-SEINUNIT)
- This variable is reported in the QWI public use files as “FrmJbLs” and on OnTheMap in the QWI report as “Firm Job Loss”

• See $JF$ on comprehensive index

• Net flows are the difference between creations and destructions
  
  \[ JF = JC - JD = E - B \]

• $JF$ is the count of all net job flows for an employer location (SEIN-SEINUNIT)

• This variable is reported in the QWI public use files as “FrmJbC” and on QWI Online as “Net Job Flows”
QWI Estimates: Firm Job Flows
48 States, Private Sector Only

Employment (Millions)

- Job creation
- Job destruction
- Net job flows

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