

The Quarterly Workforce Indicators (QWI)

Infrastructure Overview and QWI Explorer Demo/Training

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Training Outline

- Basics of LEHD infrastructure and data sources
- Overview of 32 Quarterly Workforce Indicators (QWI), grouped in 4 categories:
 - Employment
 - Earnings
 - Individual-Level Employment Changes
 - Firm-Level Employment Changes
- Detailed information and uses of selected indicators
- QWI Explorer demo and example scenarios

Reference Materials

- **“QWI 101”**
 - Introduction to basic structures and uses of QWI
 - Excellent reference for new users
 - http://lehd.ces.census.gov/doc/QWI_101.pdf

- **“The LEHD Infrastructure Files and the Creation of the Quarterly Workforce Indicators”**
 - Detailed methodology, intended for advanced users
 - http://lehd.ces.census.gov/doc/technical_paper/tp-2006-01.pdf

Where to Find QWI Data?

- Longitudinal Employer-Household Dynamics Program (LEHD)
 - Variety of access points for QWI data
 - QWI Explorer
 - LED Extraction Tool
 - Data Tab - <http://lehd.ces.census.gov/data/#qwi>
 - HTTP Access - <http://lehd.ces.census.gov/pub/>

LEHD Infrastructure and Basic Concepts

Primary Unit of Analysis: *Job*

- Association of: **Worker–Employer–Year–Quarter**
- Workers can have multiple jobs within a quarter
 - **“Primary Job”** – job with greatest earnings, not defined separately in QWI, but is in LODES/OnTheMap
- In contrast, most other surveys and censuses are:
 - Household-based (ACS, CPS, Decennial), or
 - Employer-based (QCEW, Current Employment Statistics)
- Advantage of Job-based frame: can produce tabulations by both worker **and** firm characteristics

Core Data Input:

UI Earnings Records

- UI = **U**nemployment Insurance
- Administrative record of individual earnings for covered jobs, **not** claims data
- Collected for operation of state UI program
 - UI benefits are based on historical earnings
- Includes:
 - Total quarterly earnings for each job
 - Firm identifier = State UI account number (SEIN)
 - Worker identifier = Protected Identification Key (PIK)
 - Census identifier based on SSN

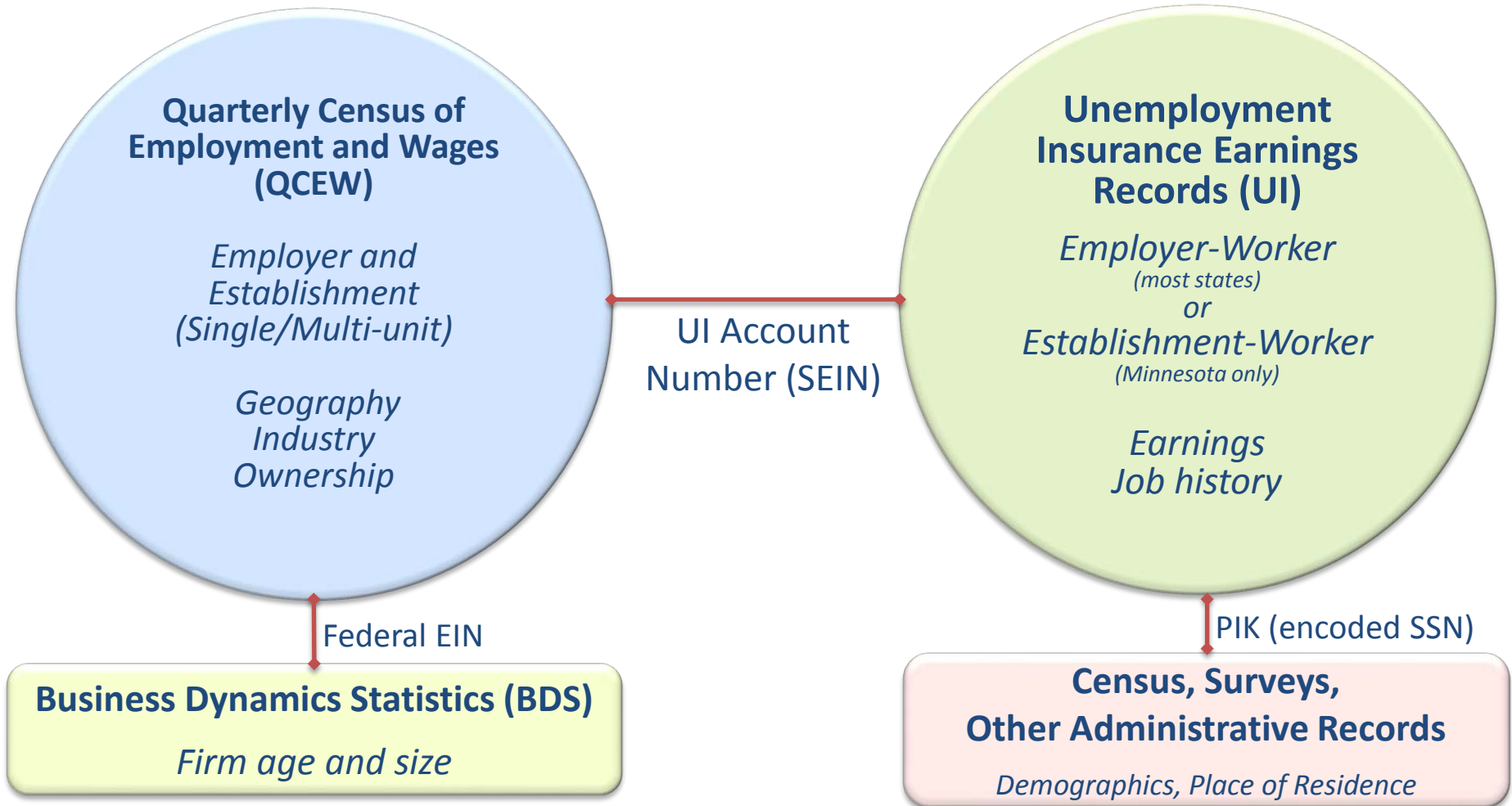
Job Coverage in UI Earnings Data

- Most private sector jobs covered
 - For-profit and not-for-profit classified together, per QCEW standard
- State and local government also in system, though some reporting inconsistencies
- Not yet available in QWI:
 - Federal worker data from Office of Personnel Management (OPM)
 - Have been incorporated into LODES/OnTheMap
 - Self-employed
 - Massachusetts

Additional Data Inputs

- UI wage records are linked to a variety of other data sources
- Sources of firm/establishment information:
 - Quarterly **C**ensus of **E**mployment and **W**ages (QCEW)
 - **B**usiness **D**ynamics **S**tatistics (BDS)
- Sources of worker characteristics:
 - Decennial Census
 - Federal Tax Records
 - Social Security Administration Records
 - Other census and administrative records

LEHD Processing: Merging Data



QWI Measures

- 32 indicators on:
 - **Employment**
 - Counts of jobs (Individual)
 - Hiring and Separation counts and rates (Individual)
 - Job Creation and Destruction (Firm)
 - **Earnings**
 - Average monthly earnings for selected job histories
 - Total quarterly payrolls
- Files and applications organized by state
 - Quarters available vary by state
 - Initial (Beta) version of National QWI just released!

QWI Aggregation Levels:

Firm / Establishment

■ Characteristics of national-level firm:

- **Firm Age** (years)
 - 0-1, 2-3, 4-5, 6-10, 11+
- **Firm Size** (employees)
 - 0-19, 20-49, 50-249, 250-499, 500+
- Available only for **private** ownership
- **Source:** Business Dynamics Statistics (BDS)

■ Establishment-level characteristics:

- **Geography**
 - State totals
 - County, Metro, Workforce Investment Board (WIB) areas
- **Industry**
 - All industries
 - NAICS Sectors, Sub-sectors (3-digit), Industry groups (4-digit)
- **Ownership**
 - All (Public + Private)
 - Private-only
- **Source:** Quarterly Census of Employment and Wages (QCEW)

QWI Aggregation Levels: *Age and Sex*

- **Age**
 - 14-18, 19-21, 22-24, 25-34, 35-44, 45-54, 55-64, 65-99
- **Sex**
 - Male, Female
- Based on Workforce Investment Act (WIA) categories
- Cross-tabulated in QWI
- **Source:** Decennial Census, surveys and administrative records

QWI Aggregation Levels: *Education*

- Categories:
 - Less than high school
 - High school or equivalent, no college
 - Some college or Associate degree
 - Bachelor's degree or advanced degree
 - Educational Attainment Not Available (age 24 or younger)
- Available only for individuals **age 25 and up**
- Reflects person's maximum education level
- Crossed with Sex in QWI
- **Source:** Decennial Census where available; otherwise imputation

QWI Aggregation Levels:

Race and Ethnicity

■ Race

- White alone
- African-American or Black alone
- Asian alone
- Native Hawaiian or Other Pacific Islander alone
- American Indian or Alaska Native alone
- Two or More Races

■ Ethnicity

- Hispanic or Latino
- Not Hispanic or Latino

- Categories defined by Office of Management and Budget (OMB)

- Cross-tabulated in QWI

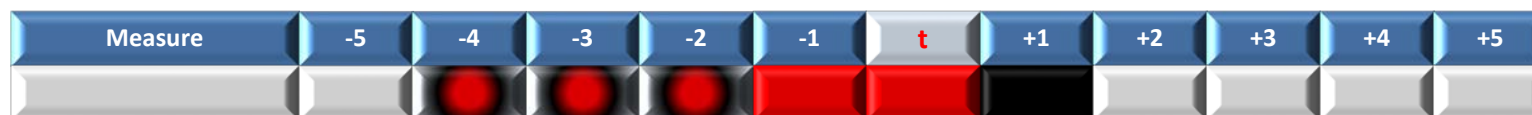
■ Source:

- Decennial Census
- Otherwise impute using Census file provided by Social Security Administration (SSA)

Detailed Definitions of QWI Measures

Concept: Employment History

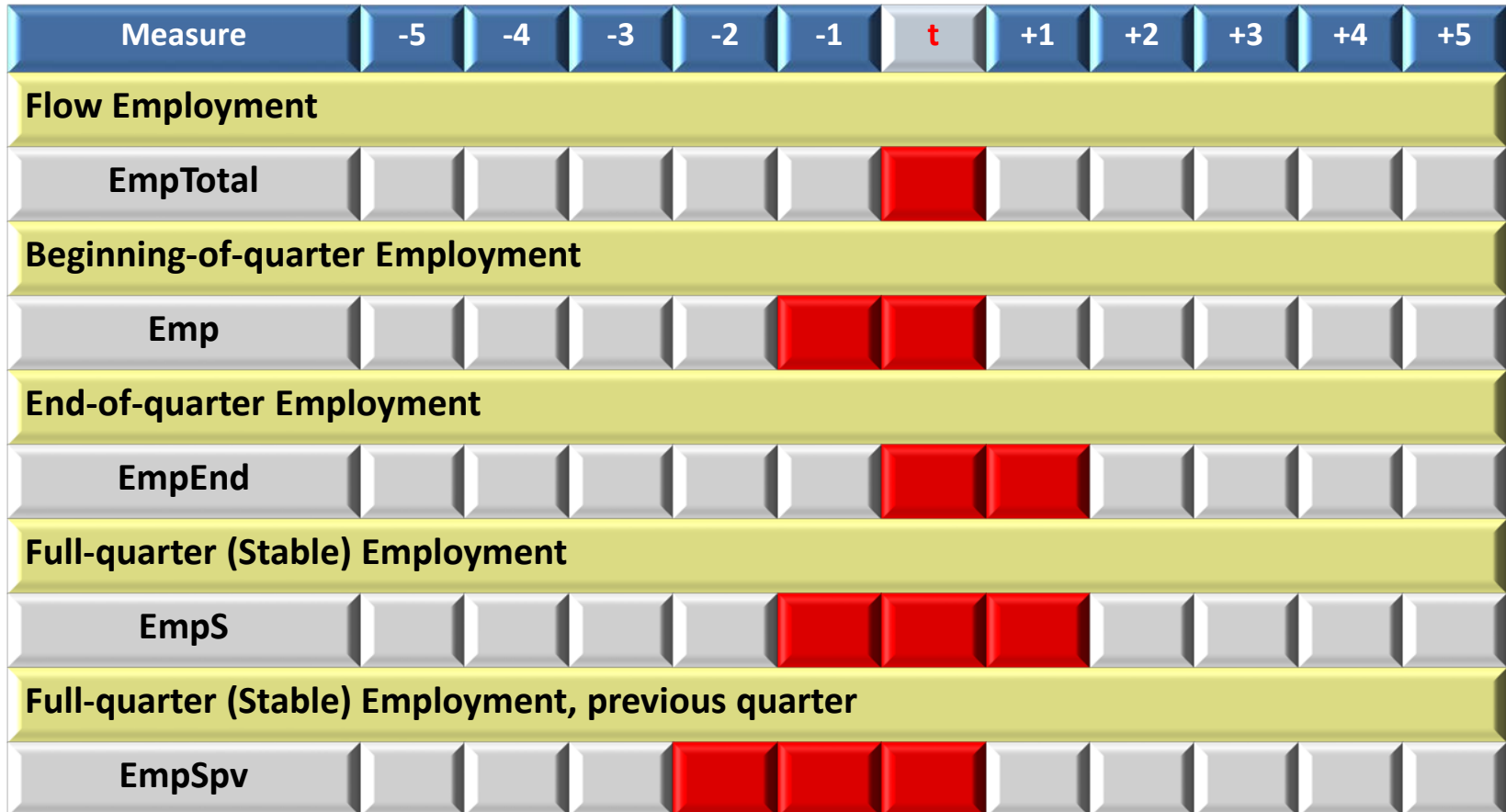
- Jobs are linked across quarters
- Diagram illustration:



- Diagram legend:
 - Reference quarter *t*
 - Earlier quarters (-), later quarters (+)
 - **RED:** positive earning
 - **BLACK:** zero earning
 - **COMBINED:** earning in at least one of the quarters
 - **GREY:** quarters not referenced

Employment Measures (5)

Overview: Employment Measures



Details: Employment Measures

Flow Employment (**EmpTotal**)

Measure	-5	-4	-3	-2	-1	t	+1	+2	+3	+4	+5
Flow Employment											
EmpTotal											

- Anyone who receives positive earnings from a particular employer, at ANY POINT during the quarter
- Workers not necessarily employed for the whole quarter
- Uniqueness of this measure:
 - Includes many very short, temporary jobs
 - May double count people transiting between jobs
 - Does not correspond to other employment measures in the Federal statistical system

Details: Employment Measures

Beginning-of-quarter Employment (**Emp**)

Measure	-5	-4	-3	-2	-1	<i>t</i>	+1	+2	+3	+4	+5
Beginning-of-quarter Employment											
Emp											

- Primary employment measure for QWI and OnTheMap
 - Similar to QCEW Month 1 employment
- Job present in both current (*t*) and previous (*t-1*) quarter
 - Employed on **first day** of quarter *t*
 - Workers may have more than one Beginning-of-quarter job
- *“How can I use this?”*
 - *Our best indicator for point-in-time employment*

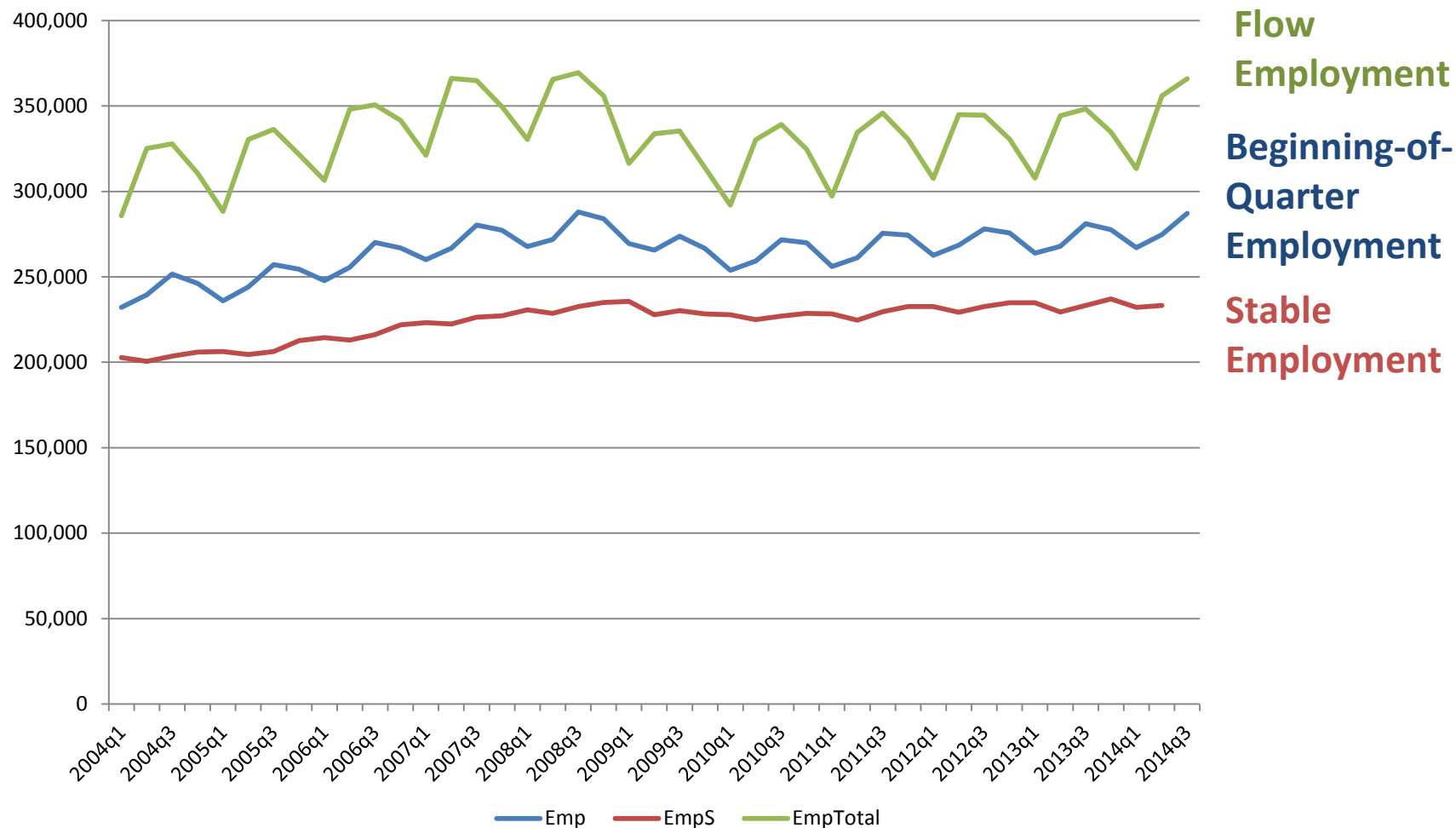
Details: Employment Measures

Full-Quarter Stable Employment (**EmpS**)



- Job is present in previous, current, and next quarter
 - Employed on the **first and last day** of quarter t
- Reflects stable, ongoing employment
- *"How can I use this?"*
 - *"Which industry has the most stable workers?"*
 - *Used as reference for calculating earnings measures*

Example: Comparing Employment Measures for Wyoming, 2004 - 2014



Source: US Census Bureau, LEHD Program, Quarterly Workforce Indicators, 2015Q2 Release

Earnings Measures for Employment Counts (3)

Overview: Earnings Measures for Employment Counts

Measure	-5	-4	-3	-2	-1	t	+1	+2	+3	+4	+5
Average Monthly Earnings for Beginning-of-quarter Jobs											
EarnBeg						\$					
Average Monthly Earnings for Full-quarter Jobs											
EarnS						\$					
Total Reported Earnings											
Payroll						\$					

- Earnings reported on UI records for each job
- Mix of full-time and part-time jobs (**not** adjusted for hours)
- Average monthly earnings are based on quarterly wage records, divided by 3

Details: Earnings for Employment Counts

Average Monthly Earnings for Full-Quarter Jobs (**EarnS**)



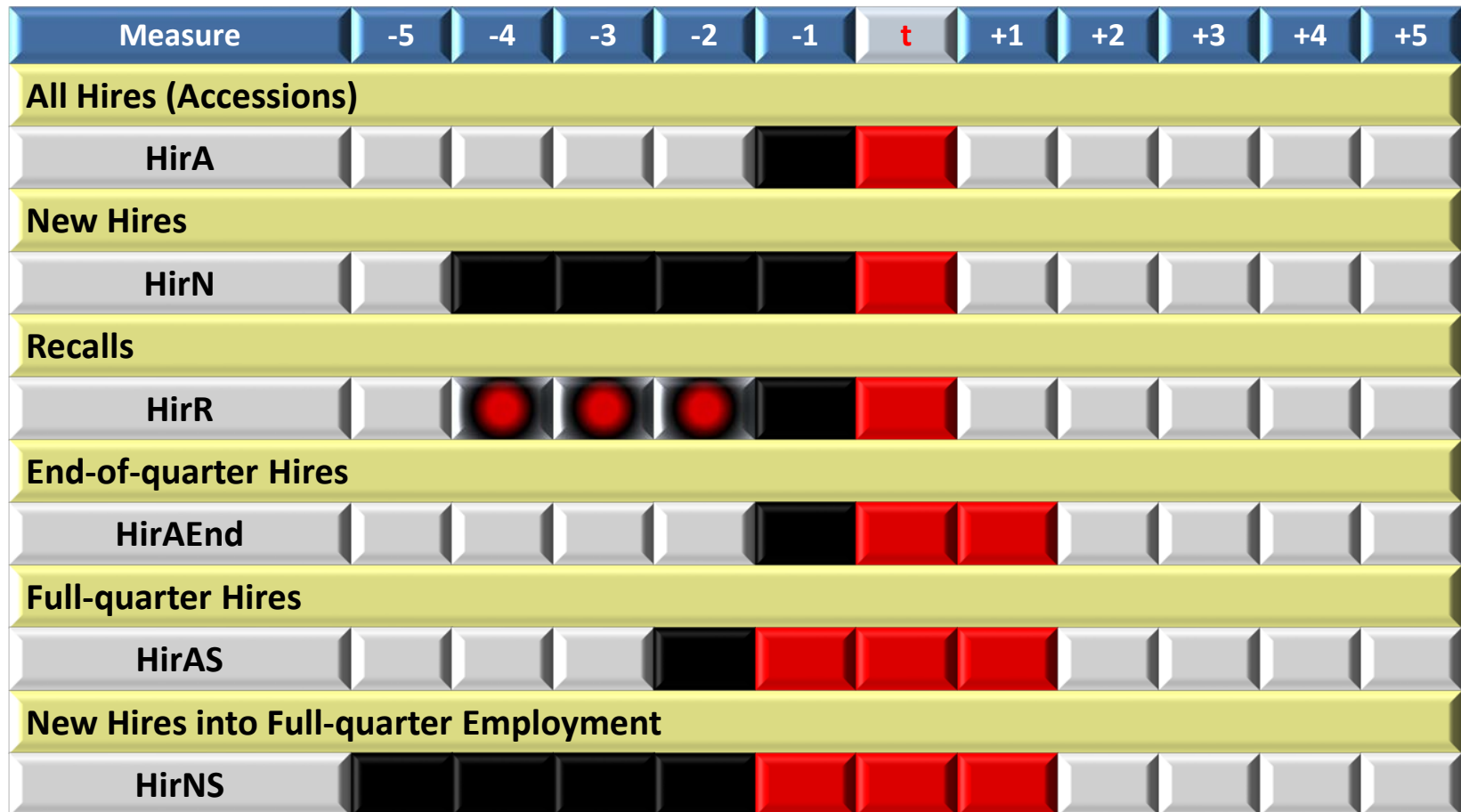
- Our preferred average earnings measure
 - References stable jobs
 - Less biased by part-quarter jobs
- Average earning for jobs held on the **first and last day** of quarter t
- *“How can I use this?”*
 - *“Highest paying industry?”*
 - *“Average earning by metro area?”*

Worker Flows

- Use longitudinal job history to identify changes in employment status:
 - Accessions
 - Separations
- In combination with indicators on employment counts, associated **rates** are also produced
- Average earnings are also calculated for some full-quarter worker flow measures

Worker Flows Measures – Accession (6)

Overview: Worker Flows Measures – Accessions



Details: Worker Flows – Accessions

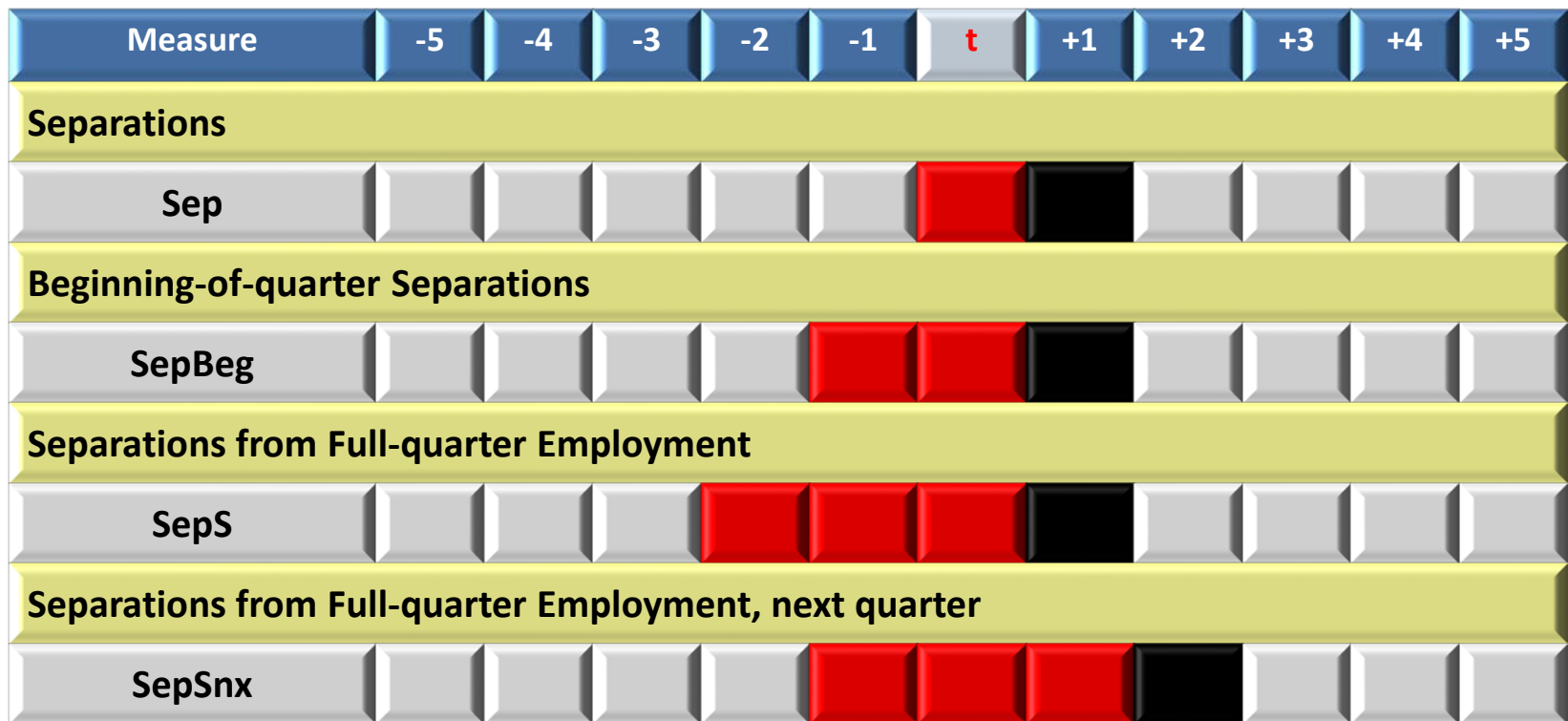
End-of-Quarter Hire (**HirAEnd**)

Measure	-5	-4	-3	-2	-1	t	+1	+2	+3	+4	+5
End-of-quarter Hires											
HirAEnd											

- Accession in quarter **t**, and also receives earnings from that job in quarter **t+1**
 - Hire into a job that continues into next quarter
- *“How can I use this?”*
 - *“How many Construction workers employed at the end of this quarter were also just hired this quarter?”*
 - *Used to calculate hiring rates*

Worker Flows Measures – Separation (4)

Overview: Worker Flows Measures – Separations



- Separations include both quits and layoffs

Details: Worker Flows – Separations

Beginning-of-Quarter Separation (**SepBeg**)



- Separation from jobs for which workers are Beginning-of-Quarter employed in *t*
- Leaving jobs with at least 2 consecutive quarters of earnings
- *“How can I use this?”*
 - *“How many employees working on the 1st day of the quarter also left the job during the quarter?”*
 - *Used to calculate separations rate*

Average Earnings for Worker Flow Measures (3)

Overview: Earnings for Worker Flow Measures



- All are based on full-quarter stable jobs
 - less biased by part-quarter or short-term jobs
- Average earnings are based on quarterly wage record, divided by 3 (monthly estimate)

Details: Earnings for Worker Flow Measures

Average Monthly Earnings for New Hires into Full-Quarter Employment (**EarnHirNS**)

Measure	-5	-4	-3	-2	-1	t	+1	+2	+3	+4	+5
Average Monthly Earnings for New Hires to Full-Quarter Employment											
EarnHirNS						\$					

- Average earning for **NEW** hires that are full-quarter employed in current quarter **t**
- *“How can I use this?”*
 - *“What are the best paying regions in the state for new hires?”*

Hiring and Separation Rates

Hiring Rate

- Share of employees that were hired and/or recalled in quarter t (continuing into $t+1$)
- End-of-Quarter hires divided by the average of Beginning-of-Quarter and End-of-Quarter employment

$$\text{HirAEndR}_t = \frac{\text{HirAEnd}_t}{\frac{1}{2}(\text{Emp}_t + \text{EmpEnd}_t)}$$

- *“How can I use this?”*
 - *“Hiring rates by industry, by county?”*

Measure	-5	-4	-3	-2	-1	t	+1	+2	+3	+4	+5
HirAEnd											
Emp											
EmpEnd											

Separation Rate

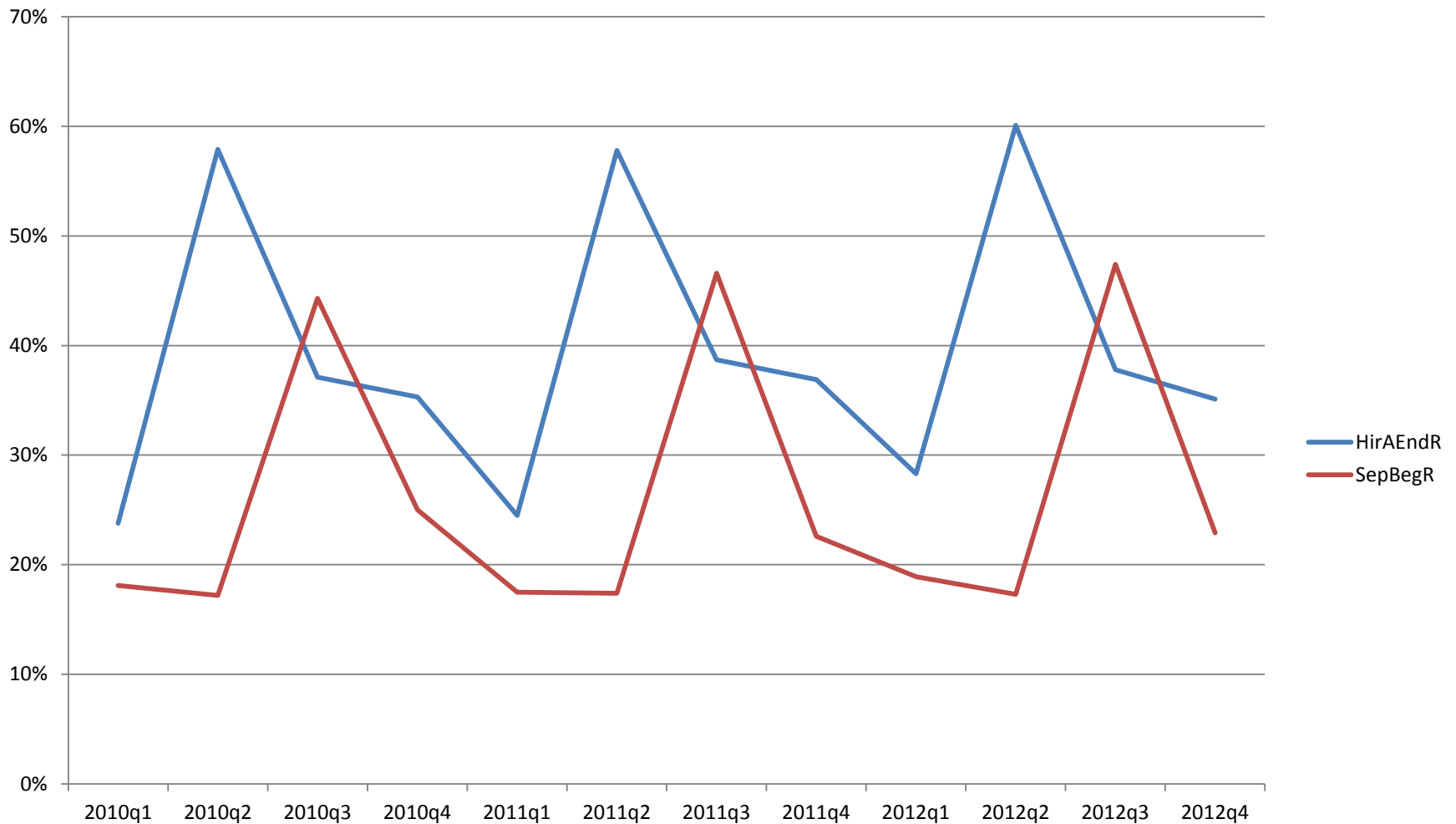
- Share of employees employed on the **first day** of quarter t who separated from the firm during that quarter
- Beginning-of-Quarter separations divided by the average of Beginning-of-Quarter and End-of-Quarter employment

$$\text{SepBegR}_t = \frac{\text{SepBeg}_t}{\frac{1}{2}(\text{Emp}_t + \text{EmpEnd}_t)}$$

- *“How can I use this?”*
 - *“What fraction of the workers in Manufacturing are leaving their jobs?”*

Measure	-5	-4	-3	-2	-1	t	+1	+2	+3	+4	+5
SepBeg											
Emp											
EmpEnd											

Example: Hiring and Separations Rates in New Jersey, 2010-2012 Age Group 14-18



Source: US Census Bureau, LEHD Program, Quarterly Workforce Indicators, 2015Q2 Release

Firm-Based Measures (8)

Firm-Based Worker Flows

- Calculated at the establishment level, for both stable and non-stable employment (2 sets of measures)
- **Job Creation**
 - Growth in net employment, or establishment births
 - End of Quarter Emp – Beginning of Quarter Emp
 - 0 if negative
- **Job Destruction**
 - Reduction in net employment, or establishment deaths
 - Beginning of Quarter Emp – End of Quarter Emp
 - 0 if negative
- **Net Job Change** = Job Creation – Job Destruction
 - Can be “+” or “-”

Replacement Hiring

- Hiring is necessary for job creation, but does not imply job creation
 - Job Creation means increase in establishment employment
 - But, there could be additional hires that do NOT contribute to overall employment growth – hires that replace workers that are leaving
- **Replacement Hires** are hires in excess of job creation:

$$\text{HirAEndRepl} = \text{HirAEnd} - \text{FrmJbGn}$$

- **Replacement Hiring Rate** is replacement hires as a percentage of average employment:

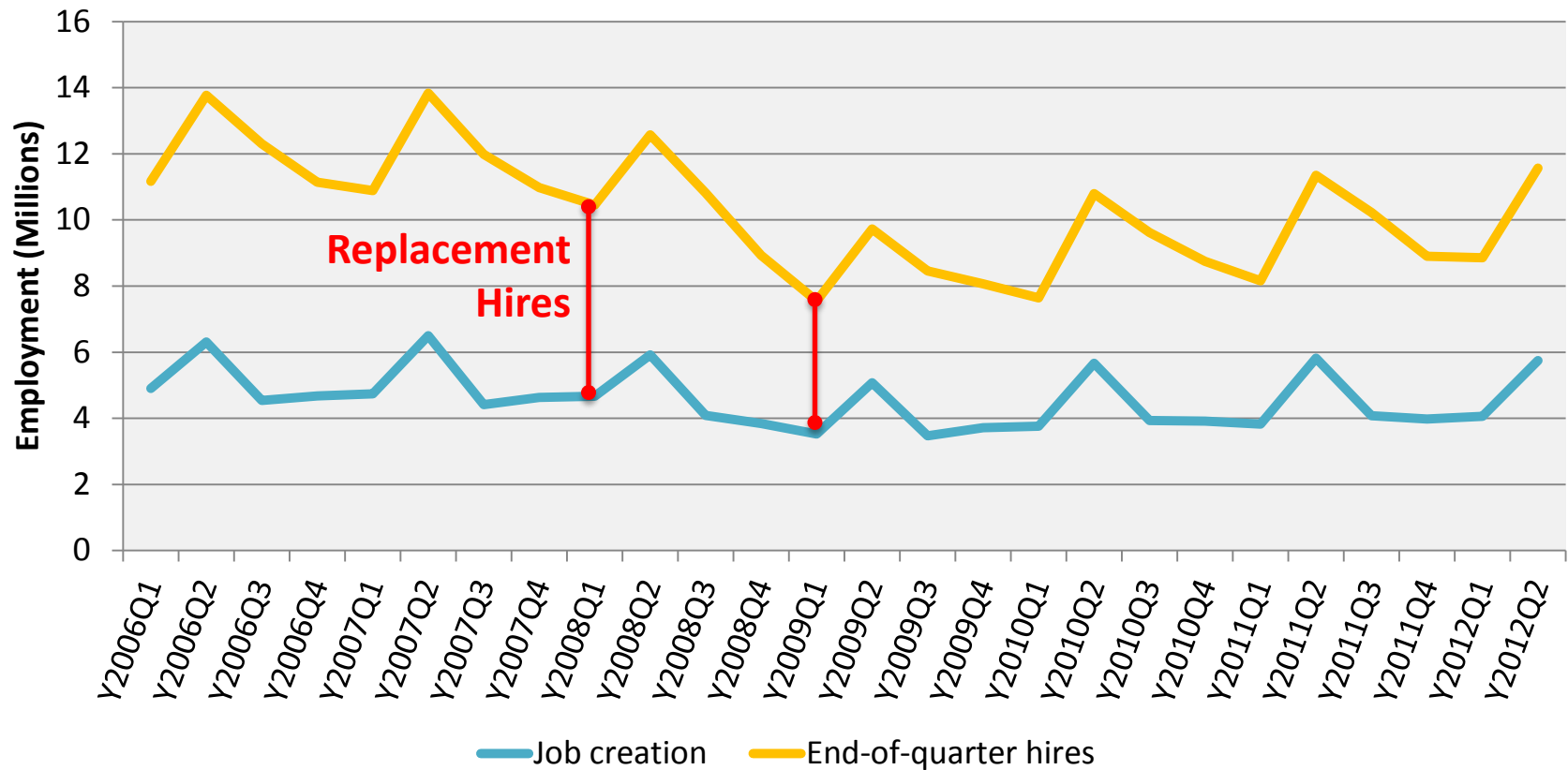
$$\text{HirAEndReplR}_t = \frac{\text{HirAEndRepl}_t}{\frac{1}{2}(\text{Emp}_t + \text{EmpEnd}_t)}$$

Example: Replacement Hiring

Measure	-3	-2	-1	t	+1	+2	+3	# of Workers
Emp								10
EmpEnd								20
HirAEnd								15

- 10 workers on the first day of quarter
- 20 workers on the last day of quarter
 - Job Creation (*FrmJbGn*) = $20 - 10 = 10$ workers
- 15 of those working on the last day were also just hired this quarter
- Replacement Hires (*HirAEndRepl*) = $15 - (20 - 10) = 5$ workers
- Replacement Hiring Rate (*HirAEndReplR*) = $\frac{5}{\frac{1}{2}(10+20)} = 0.33 = 33\%$
- “What does this mean?”
 - “5 of the 15 hires this quarter were replacements for the other 5 people that left.”
 - “33% of the workers were replaced this quarter.”

QWI Estimates: Source of Replacement Hires



Data: QWI pooled across all available states

Summary

- The QWI provide 32 measures of employment counts, employment flows, and earnings
- By linking to a variety of data sources, the QWI can be tabulated by detailed geography, firm and worker characteristics
- Depending on your specific needs, the different indicators offer many choices for customized analyses
- The LEHD program continues to innovate and improve our web-based tools for accessing the QWI. **The QWI Explorer** will now be demonstrated
- Contact us: CES.QWI.Feedback@Census.gov