The Quarterly Workforce Indicators (QWI)

QWI Basics and QWI Explorer Training

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Disclaimer

- Any opinions and conclusions expressed herein are those of the author and do not necessarily represent the views of the U.S. Census Bureau. All results have been reviewed to ensure that no confidential information is disclosed.
- Additionally, these opinions and conclusions are not representative of other data products or programs within the Census Bureau.



Training Outline

- Basics of LEHD Infrastructure, Data Products and Data Tools
- Characteristics of the QWI
- LED Extraction Tool and QWI Explorer Demos
- Case Studies and Example Scenarios



LEHD Infrastructure and Data Products/Tools



What are LEHD and LED?

- LEHD (Longitudinal Employer-Household Dynamics)
 - The LEHD Program at the US Census Bureau has constructed unique linked employer-employee data for the United States.
 - It connects administrative records with census and survey data to produce new public-use data products as well as microdata for research.
- LED (Local Employment Dynamics) Partnership
 - LEHD accesses state data through the LED Partnership a cooperative partnership with states and DC, PR, and USVI
 - State-provided data:
 - Unemployment Insurance (jobs/workers)
 - Quarterly Census of Employment and Wages (firms)
 - Other data available to the Census Bureau
 - Censuses, Surveys, and Tax Information



LEHD Data Infrastructure





Data Products

- Quarterly Workforce Indicators (QWI)
 - 32 indicators by
 - Industry (NAICS 2, 3, and 4-digit), Firm Age, Firm Size
 - Worker Age, Race, Ethnicity, Sex, Education
 - State, County, CBSA, WIB Area
 - >150 Million job records processed each quarter
 - Longitudinal series starts in 1990 for some states
- LEHD Origin-Destination Emp. Statistics (LODES)
 - Connects a job/worker's employment and residential locations
 - Data at census block detail
 - Less characteristic detail than QWI
- Job-to-Job Flows (J2J)
 - Flows between jobs as well as into/out of nonemployment
- Post-Secondary Employment Outcomes (PSEO) Experimental
 - Provides earnings and employment outcomes for select college/university graduates by degree level, degree major, and post-secondary institution. Some coverage in 17 states (plus 6 agreements for forthcoming data).
- Veteran Employment Outcomes (VEO) Experimental
 - Provides earnings and employment outcomes for recently discharged Army veterans.



Data Product Comparison

What do you want?	Scope	Data Product
Employment, hires, separations, turnover, or earnings by detailed firm and person characteristics; quarterly time resolution; relatively short data lag	32 Indicators published quarterly, 150 million jobs records processed each quarter.	QWI
Employment for detailed or customized geography; residential patterns of the workforce; relationship between worker employment and home locations	Connects employment and residential locations, census block level.	LODES
Transitions between jobs by timing and firm or worker characteristics; transitions to/from nonemployment	Worker characteristics by firm characteristics.	J2J
Labor market outcomes for specific degree programs at selected colleges/universities	Earnings percentiles for specific grad. cohorts at certain times.	PSEO (Experimental)
Labor market outcomes for recently discharged Army veterans	Earnings percentiles for specific cohorts at certain times.	VEO (Experimental)



Dissemination Tools/Applications

- J2J Explorer
 - j2jexplorer.ces.census.gov
 - Dashboard-style analysis tool for Job-to-Job Flows
- OnTheMap
 - onthemap.ces.census.gov
 - Map-based analysis tool for LODES
- OnTheMap for Emergency Management
 - onthemap.ces.census.gov/em.html
 - Integrates live feeds of emergency/disaster areas
- QWI Explorer
 - gwiexplorer.ces.census.gov
 - Dashboard-style analysis tool for QWI

- LED Extraction Tool
 - Iedextract.ces.census.gov
 - Provides precise extracts of data (QWI only for now)
- PSEO Explorer
 - Iehd.ces.census.gov/applications/pseo/
 - Dynamic bar/flow charts for Post-Secondary Employment Outcomes
 - VEO Explorer
 - Iehd.ces.census.gov/applications/veo/
 - Dynamic bar charts for Veterans Employment Outcomes



Choosing Among LED Data Access Points

Data Product	Explore the data, answer questions, or get visualizations	Bulk data for use in analysis process/software	Live queries for building web applications
QWI	<u>QWI Explorer</u>	LED Extraction Tool Raw data download	<u>Census Bureau API</u>
LODES	OnTheMap OnTheMap for Emergency Management	Raw data download LED Extraction Tool – Coming in 2023	Future development
J2J	Job-to-Job Explorer	Raw data download LED Extraction Tool – Coming in 2022	Future Development
PSEO	PSEO Explorer	Raw data download	Census Bureau API
VEO	VEO Explorer	Raw data download	Future Development



Basic Concepts in the QWI



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
- Some indicators are special-purpose measures used in calculation of various rates
- Files and applications organized by state



Primary Unit of Analysis: Job

- Association of: Worker–Employer–Year–Quarter
- Workers can have multiple jobs within a quarter
 - "Primary Job" (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 = Unemployment Insurance
- Record of individual earnings for covered jobs
 - Administrative wage records, not UI 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 (as per QCEW standard)
- State and local government also in system, though some reporting inconsistencies
- Federal worker data from Office of Personnel Management (OPM) not yet available in QWI (have been incorporated into LODES/OnTheMap)
- Self-employed not available



Additional Data Inputs

- UI wage records are linked to a variety of other data sources
- Sources of establishment information:
 - Quarterly Census of Employment and Wages (QCEW)
 - Longitudinal Business Database (LBD)
- Sources of demographic information:
 - Decennial Census
 - Federal Tax Records
 - Social Security Administration Records
 - Other census and administrative records
- This additional information enables tabulations by detailed worker and firm characteristics



Where to Find QWI Data?

- QWI Explorer <u>qwiexplorer.ces.census.gov</u>
- LED Extraction Tool <u>ledextract.ces.census.gov</u>
- Census API <u>census.gov/data/developers/data-</u> <u>sets/qwi.html</u>
- Download Widget -<u>lehd.ces.census.gov/data/#qwi</u>
- HTTPS Access <u>lehd.ces.census.gov/data/qwi/</u>



Reference Materials

QWI 101

- Introduction to development and use of QWI
- Excellent reference for new users
- lehd.ces.census.gov/doc/QWI_101.pdf

QWI Data Notices

- Release-specific notices about data availability/improvements
- lehd.ces.census.gov/doc/QWI_data_notices.pdf
- "The LEHD Infrastructure Files and the Creation of the Quarterly Workforce Indicators"
 - Detailed methodology, intended for advanced users
 - Iehd.ces.census.gov/doc/technical_paper/tp-2006-01.pdf



LED Extraction Tool

Live Demo



QWI Explorer

Live Demo



Case Studies/Examples with QWI Explorer

Download the following document to following along: <u>QWI Research Examples 2022</u>

https://lehd.ces.census.gov/doc/workshop/2022/QWI Research_Examples_2022.pdf



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 characteristics and worker demographics
- The LEHD program has developed multiple webbased tools for accessing the QWI.
- Contact us:
 - CES.QWI.Feedback@census.gov
 - Patrick.hayward@census.gov



Local Employment Dynamics Partnership Workshop Training Session

Break

Reconvene for the next set of training sessions (J2J, LODES/OnTheMap, or VEO) at 1:30pm (check agenda for MS Teams links to those sessions).

The next QWI training session will begin here at 3pm.



Appendix



QWI Aggregation Levels: *Firm*

- Firm-level characteristics:
 - Based on 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+
- Firm Age and Size available only for private ownership
- Reduced detail on geography/industry tabulations (3- and 4- digit NAICS are only available for state-level totals)



QWI Aggregation Levels: Establishment

- 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
- All crossings of these characteristics reported (with a few exceptions for firm age and firm size)



QWI Aggregation Levels: Employee Age/Sex

- Age (years)
 - 14-18, 19-21, 22-24, 25-34, 35-44, 45-54, 55-64, 65-99
- Sex
 - Male, Female
- We use the age categories specified in the Workforce Investment Act (WIA)
- Data comes from a variety of sources (Decennial Census, surveys and administrative records)



QWI Aggregation Levels: Employee Education

- 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)
- Valid only for individuals age 25 and up
 - Reflects person's maximum education level
- Crossed by Sex in QWI tabulations
- Sourced from Decennial Census and ACS where available; otherwise, imputed using multinomial logit model



QWI Aggregation Levels: Employee Race/Ethnicity

- Tabulated according to categories defined by the Office of Management and Budget:
 - Race
 - White alone
 - African-American or Black alone
 - Asian or Pacific 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
 - Race and Ethnicity are cross-tabulated in public QWI data
 - Use data from Decennial Census and ACS where available; otherwise, impute using Census file provided from Social Security Administration (SSA)



Firm Job Flows: Be Careful about Aggregation

- Note that for worker demographic categories (such as age and sex), the published net job flows for the subcategories will sum to the margin
- But for gross Job Creation and gross Job Destruction, this is not true
- (Job Creation for men) + (Job Creation for women) does not equal (total Job Creation)
 - Why? Consider this example: A job could be created at a firm and filled by a woman, while another job at the same firm is destroyed, previously filled by a man
 - Job Creation and Job Destruction should be 0, since these are defined at the firm level. Summing across characteristics would produce the wrong totals.
- QWI Explorer has built-in rules to prevent these incorrect aggregations

	Men	Women	Incorrect Total (sum across characteristics)	Correct Total
Job Creation	0	1	1	0
Job Destruction	1	0	1	0
Net Job Flows	-1	+1	0	0



Noise Infusion ("Fuzzing")

- Why infuse noise into data?
 - Reduce the amount of cell suppression while preserving confidentiality and analytic validity
- Properties of noise
 - Every data item is distorted by a minimum amount
 - For a given workplace, data are always distorted in the same direction, by the same percentage in every period and release of QWIs
 - When aggregated, the effects of the distortion cancel out for the vast majority of the estimates
- QWI statistics are flagged when the value is significantly distorted
- See <u>infrastructure document</u>, section 6, for more details



QWI Status Flags

Each data item in the QWI is assigned a status flag.

Status flags indicate why data items are missing, or whether they are significantly distorted:

- -2 No data available in this category for this quarter
- -1 Data not available to compute this estimate
- 1 OK, fuzzed value released
- 5 Value suppressed because it does not meet US Census Bureau publication standards
- 9 Data significantly distorted, distorted value released
- 10 Aggregate of cells, no significant distortion
- 11 Aggregate of cells not released because component cells do not meet US Census Bureau publication standards
- 12 Aggregate of cells, some of which have significantly distorted data
 *Note that suppression does not mean zero



LEHD Processing: Weighting

- QWI Beginning-of-Quarter Employment is benchmarked against QCEW Mon1 employment
- Release-specific weighting changes can be found in our Data Notices document. See <u>lehd.ces.census.gov/doc/QWI data notices.pdf</u>
- Weighting methodology adjusted as of R2021Q1 release. See <u>lehd.ces.census.gov/doc/QWI-Weight-</u> <u>Adjustment-R2021Q2.pdf</u> for more details.



Detailed Definitions of QWI Measures



Concept: Employment History

- Jobs are linked across time
- Diagram illustration:



Diagram Legend:

- Reference quarter t
 - Earlier quarters (-), Later quarters (+)
- RED: positive earning
- BLACK: zero earning
- **COMBINED**: earning in ANY ONE of the quarter
- GREY: quarters not referenced



Employment Measures (5)


Overview: Employment Measures

Measure	-5	-4	-3	-2	-1	t	+1	+2	+3	+4	+5
Count of Jobs (Flow Employment)											
EmpTotal											
Beginning-of-quarter Employment											
Emp											
End-of-quarter Employment											
EmpEnd											
Full-quarter (Stable) Employment											
EmpS											
Full-quarter (Stable) Employment, previous quarter											
EmpSpv											



Details: Employment Measures (1 of 5)

Flow Employment (EmpTotal)



- Anyone who receives positive earnings from a particular employer in the quarter
- Not a count of jobs
- Drawbacks to this measure:
 - May double count people transiting between jobs
 - Many very short jobs
- How can I use this?



Details: Employment Measures (2 of 5)

Beginning-of-quarter Employment (Emp)



- Primary employment measure for QWI and OnTheMap
- Job present in both current and previous quarter
 - Employed on first day of quarter t
- Similar to QCEW Month 1 employment
 - Precise definitions, data sources, and methodology result in differences
- How can I use this?
 - Our best indicator for point-in-time quarterly employment



Details: Employment Measures (3 of 5)

End-of-quarter Employment (EmpEnd)



- Job is present in both current and next quarter
 - Employed on the last day of quarter t
- Symmetric concept to Beginning-of-quarter (Emp)
- How can I use this?
 - Special-purpose
 - Used in calculations of various job flows and accession/separation rates



Details: Employment Measures (4 of 5)

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



Details: Employment Measures (5 of 5)

Full-Quarter Stable, Previous Quarter (EmpSpv)



- Job is present in current and previous two quarters
- Stable jobs in the quarter **before** the reference quarter *t*
- How can I use this?
 - Special-purpose
 - Reported for particular estimates related to full quarter job growth



Demonstration: Comparing Employment Measures in Prince George's County, MD



- EmpTotal is greater than Emp; both are greater than EmpS
- The three measures track each other pretty closely note the drop in 2020 and rebound in 2021
- EmpTotal has the most seasonal variation (typically lowest in Q1)



Earnings Measures for Employment Counts (2)



Overview: Earnings Measures for Employment Counts



- All income amounts reported for UI wages
- Mix of full-time and part-time jobs (not adjusted for hours)
- Average earnings are based on quarterly wage record, divided by 3 (monthly estimate)



Details: Earnings for Employment Counts (1 of 2)

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 on the first and last day of quarter t
- How can I use this?
 - "Highest paying industry?"
 - "Average earning by metro area?"



Details: Earnings for Employment Counts (2 of 2)

Average Monthly Earnings for Beginning-of-Quarter Jobs (EarnBeg)



- Average earning for jobs on the first day of quarter t
- Includes earnings from jobs that may not have lasted the entire quarter t
- How can I use this?



Details: Earnings for Employment Counts (3 of 3)

Total Quarterly Payroll (Payroll)



- Sum, not average, of all earnings for all jobs in quarter t
 - Total earnings for Flow Employment (EmpTotal)
- How can I use this?
 - "Total payroll by industry?"
- Note: Currently suppressed



Demonstration: Monthly Earnings (Stable) by Worker Age in QWI Explorer



- Average monthly earnings (for full-quarter employees) in Prince George's County, MD is highest for workers in the 55-64 age category, exceeding \$5,700
- Potential analysis: Compare Prince George's County to the state of Maryland as a whole. Or, compare to other counties (Montgomery, Fairfax, etc.)



Worker Flows Measures – Accession (6)



Worker Flows - Background Knowledge

- Use longitudinal job history to identify changes in employment status
- Average earnings are calculated for some fullquarter measures
- Turnover is as a composite measure based on aggregates of flow measures



Overview: Worker Flows Measures – Accessions





Details: Worker Flows – Accessions (1 of 6)

All Hires/Accession (HirA)



- What is an Accession?
 - Positive earnings from a particular employer in current quarter *t*, but not the previous quarter
- How can I use this?
 - "Which industry is hiring the most?"



Details: Worker Flows – Accessions (2 of 6)

New Hire (HirN)



- Accession with earnings from the employer in quarter *t*, but not in the previous *four* quarters
- How can I use this?
 - "Number of workers that started NEW jobs?"
 - "Which age group gets hired the most into NEW jobs?"



Details: Worker Flows – Accessions (3 of 6)

Recall Hire (HirR)



- An accession in quarter *t*, but also received earnings from the employer during one of the last three quarters
- How can I use this?
 - "Which industry tends to rehire or recall workers?"
 - "Age, education of rehired workers?"
 - "Seasonality patterns in recalls?"



Details: Worker Flows – Accessions (4 of 6)

End-of-Quarter Hire (HirAEnd)



- Accession in quarter *t*, and also receives earnings from that job in quarter *t+1*
- End-of-Quarter employed in t
- How can I use this?
 - Special-purpose
 - Used to calculate hiring rate



Details: Worker Flows – Accessions (5 of 6)

Full-Quarter Hires (HirAS)



- Flow into Full-Quarter Employment
- Accession into 3 consecutive quarters of employment. Reference period (quarter t) is the first quarter of full-quarter (stable) status
- How can I use this?
 - "Which industry is hiring stable workers?"
 - "How does Education level affect hiring into stable jobs?"



Details: Worker Flows – Accessions (6 of 6)

New Full-Quarter Hires (HirNS)



- New Hires into Full-Quarter Employment
- Full-Quarter (stable) hire to a firm that did not employ that worker in previous 4 quarters
- How can I use this?
 - Same as full-quarter hires, but emphasizes NEW hires



Worker Flows Measures – Separation (4)



Overview: Worker Flows Measures – Separations





Details: Worker Flows – Separations (1 of 4) Separation (Sep)



- Positive earning from an employer in current quarter *t*, but not the next quarter
- Job ended in quarter t
- How can I use this?
 - "Which Workforce Investment Area has the highest number of separations"?
 - "From which industries are workers leaving?"



Details: Worker Flows – Separations (2 of 4)

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?
 - Special-purpose
 - Used to calculate separations rate



Details: Worker Flows – Separations (3 of 4)

Full-Quarter Separation (SepS)



- Separation from jobs with at least 3 consecutive quarters of earnings
- Full-Quarter employment status is in the quarter before that of the separation
 - Separation in t
 - Full-quarter status in t-1
- How can I use this?
 - "What industries are STABLE workers leaving?"



Details: Worker Flows – Separations (4 of 4)

Full-Quarter Separation, next quarter (SepSnx)



- Full-quarter employment in *t*, separation in the **next quarter** after full-quarter status (*t*+1)
 - Special-purpose
 - Used to calculate turnover rate
 - Used as the base for EarnSepS



Average Earnings for Worker Flow Measures (3)



Overview: Earnings for Worker Flow Measures



- All are based full-quarter counts, which are less biased by jobs that began or ended part-way through the quarter
- Average earnings are based on quarterly wage record, divided by 3 (monthly estimate)



Details: Earnings for Worker Flow Measures(1 of 3)

Average Monthly Earnings for Hires into Full-Quarter Employment (EarnHirAS)



- Average earning for hires that are full-quarter employed in current quarter t
- How can I use this?
 - "What is the average starting salary in an industry?"
 - "Which metro area in the state offers the highest starting salary?"



Details: Earnings for Worker Flow Measures(2 of 3)

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



- Average earning for NEW hires that are fullquarter employed in current quarter t
- How can I use this?
 - "What are the best paying regions in the state for NEW hires?"
 - "How do starting wages rank by firm age or size?"



Details: Earnings for Worker Flow Measures(3 of 3)

Average Monthly Earnings for Separations from Full-Quarter Employment (EarnSepS)



- Average earning for workers leaving stable jobs for which they are full-quarter employed in current quarter t
- How can I use this?
 - "How much are workers aged 25-34 earning, on average, when they leave stable jobs?"



Hiring, Separation, and Turnover Rates



Hiring Rate

 End-of-Quarter hires divided by the average of Beginning-of-Quarter and End-of-Quarter employment

$$HirAEndR_{t} = \frac{HirAEnd_{t}}{\frac{1}{2}(Emp_{t} + EmpEnd_{t})}$$

- Bounded by 0% and 200%
- How can I use this?
 - "What fraction of the workforce are starting or returning to new jobs?"

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



Separation Rate

 Beginning-of-Quarter separations divided by the average of Beginning-of-Quarter and End-of-Quarter employment

SepBegR_t =
$$\frac{\text{SepBeg}_{t}}{\frac{1}{2}(\text{Emp}_{t} + \text{EmpEnd}_{t})}$$

- Bounded by 0% and 200%
- How can I use this?
 - *"What fraction of the workforce are leaving their jobs?"*

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


Turnover Rate

- Measure of worker reallocation ("churn")
- Measure of employment volatility
 - Incorporates both hires and separations

 $\mathbf{TurnOvrS}_{t} = \frac{(\mathrm{HirAS}_{t} + \mathrm{SepSnx}_{t})}{\mathbf{TurnOvrS}_{t}}$

- If a firm of 100 individuals has 10 separations, and replaces them with 10 hires => 10% turnover
- How can I use this?
 - "Which age group has the most employment volatility?"
 - "Which industry has the highest employment churning?"





Firm-Based Measures (8)



Overview: Firm-Based Measures: Flows, Creations, Destructions

Measure	Description	Category
FrmJbGn	Job Creation (Gain)	Creations
FrmJbGnS	Full-quarter Job Creation	
FrmJbLs	Job Destruction (Loss)	Destructions
FrmJbLsS	Full-quarter Job Destruction	
FrmJbC	Net Job Flows	Flows
FrmJbCS	Net Full-quarter Job Flows	
HirAEndRepl	Replacement Hires	
HirAEndReplR	Replacement Hire Rate	



Measuring Firm-Level Worker Flows

- Firm job flows display dynamics at the establishment level
 - Job creation
 - Establishments that grow over the quarter
 - Establishment births
 - Job destruction
 - Establishments that shrink over the quarter
 - Establishment deaths
 - Net Job Change = Job Creation Job Destruction



Firm Job Flow Measures (1 of 2)

- Calculated at establishment level
 - Job Gain (FrmJbGn)
 - Difference between End-of-quarter and Beginning-of-quarter employment (EmpEnd - Emp)
 - zero if negative
 - Job Loss (FrmJbLs)
 - Difference between Beginning-of-quarter and End-of-quarter employment (Emp - EmpEnd)
 - zero if negative
 - Net Job Flows (FrmJbC)
 - Difference between End-of-quarter and Beginning-of-quarter employment (EmpEnd - Emp)
 - Can be positive (net job creation) or negative (net job destruction)





Firm Job Flow Measures (2 of 2)

- Full-Quarter measures are defined similarly:
 - Full-Quarter Job Creation (FrmJbGnS)
 - Difference between Full-Quarter employment (EmpS EmpSpv)
 - zero if negative
 - Full-Quarter Job Destruction (FrmJbLsS)
 - Difference between Full-Quarter employment (EmpSpv EmpS)
 - zero if negative
 - Full-Quarter Net Job Flows (FrmJbCS)
 - Difference between Full-Quarter employment (EmpS EmpSpv)
 - Can be positive (net job growth) or negative (net job destruction)





Replacement Hiring

- Hiring and Job Creation are not necessarily equal:
 - Job Creation means more end-of-quarter employment than beginning-of-quarter employment at a firm
 - But there may be high levels of "churn" at firms, even without net employment growth
- To capture this, we define replacement hires:
 - Replacement Hires (HirAEndRepl) are hires in excess of job creation:

HirAEndRepl = HirAEnd – FrmJbGn



QWI Estimates: Source of Replacement Hires



Data: QWI pooled across all available states

