QCEW: Big Data at the Local Level

David Talan
Chief, Division of Administrative Statistics and Labor Turnover
Bureau of Labor Statistics

Kevin Cooksey
Chief, Branch of Business Employment Dynamics
Bureau of Labor Statistics

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Salt Lake City, Utah
QCEW Overview

- Quarterly data (frequent)
- Released 6 months after reference period - timely
- 10 million records and growing
- 144 million in employment
- Units, employment and wages
- 6-digit NAICS and county, ownership
- UI based, mandatory collections to run UI
- Wages - 98% reported data
- Employment - 97% reported data
Coverage

- Quarterly census of employers covered under UI and federal employers covered under UCFE
- 98% of U.S. Employment
USES OF QCEW

**General Economic Uses**

- Gross Domestic Product (BEA)
- Personal Income (BEA) Largest single input
- State Revenue Projections
- Economic Forecasting

**Quarterly Census of Employment and Wages (QCEW)**

**Analytical Uses**

- UI Tax Rate & Actuarial Analysis
- UI-Covered Employment
- Local Area Unemployment
- Social Security Administration
- Federal Funds Allocation $321 Billion (HUD, USDA, HCFA/CHIP)

**Benchmarking (Employment Base)**

- Occupational Employment Statistics
- Occupational Safety and Health Statistics
- Jobs Openings & Labor Turnover Survey

**Programmatic Uses**

- Census Bureau Uses of QCEW
  - LEHD: QCEW is essential matching key and source of geography and industry and link to other datasets, and employment
  - Business Register: Sharing to reduce costs, burden and improve consistency
  - Industry Code Sharing (3 M/year)
  - COS: Multi-unit sharing reduces cost and improves consistency
  - CPS Redesign: QCEW used after decennial Census to improve sample design

- State and Local Government
  - Services Planning
  - Transportation planning
  - Emergency planning

- Economic Development Indicators
  - Cluster Analysis
  - Shift Share
  - Industry Diversity Indexes
  - Location Quotients
  - Local Impact analysis
  - Site planning decisions

- BLS Publications
  - QCEW: Quarterly Releases: County by detailed NAICS - 5 month lag
  - Annual Employment and Wages
  - Special publications/maps

**BED: Job Creation/Destruction**

- Quarterly and Annual
- Size Class Dynamics
- Firm and establishment births/deaths
- Business Survival Rates
- Monthly Labor Review

**Census Bureau Uses of QCEW**

- LEHD: QCEW is essential matching key and source of geography and industry and link to other datasets, and employment
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**Other Agencies and States**

- Energy Information Administration (EIA)
- NAWS/DOL
- NASS: Rural Innovation Survey
- States: Job Vacancies, Green Jobs Wage and Benefits Surveys

**BLS Publications**

- QCEW: Quarterly Releases: County by detailed NAICS - 5 month lag
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**BED: Job Creation/Destruction**

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- Business Survival Rates
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State and Local Uses

■ Input into the state and local occupational employment projects, for revenue projections, and by workforce information boards for job training.

■ Assist local economic developers in identifying occupational needs for attracting businesses.

■ Conduct longitudinal analysis of firms
State and Local Uses

- Cluster analysis (e.g., biotech, science, technology, engineering, and mathematics (STEM) jobs, healthcare, tourism, and high and low wage industries)

- High growth business analyses; plan for local services and local transportation; determine wage rates; and define UI extended benefit triggers.
QCEW Applications

- Many possible natural experiments
  - 1,109 NAICS industries x 3,000 counties = 3.3 million series
  - Local wages as alternate measure of labor market tightness
  - Wage Location Quotients as measure of local differential demand
  - Tale of two counties: break MSAs into component counties
Cleveland MSA 2017 Over-The-Year Percent Change for Average Annual Employment

(National: 1.4 %)

- Geauga County, Ohio
- Medina County, Ohio
- Lorain County, Ohio
- Lake County, Ohio
- Cuyahoga County, Ohio
Cleveland MSA 2017 Over-The-Year Percent Change for Total Annual Wages

(National: 4.7%)

- Geauga County, Ohio
- Medina County, Ohio
- Cuyahoga County, Ohio
- Lake County, Ohio
- Lorain County, Ohio
QCEW Applications:

- Research/reporting possibilities using published data:
  - Quick read on an unfamiliar location
  - Industry incidence
  - Industry concentration
  - Local trends
  - Employment and wages in hurricane flood zones
Investment in Quality

Sources of Quarterly Census of Employment and Wages (QCEW)

- Administrative data from Unemployment Insurance filings (UI)
- Huge investment in improving raw administrative data
- Two supplemental collections
  - ARS- Annual Refiling Survey
  - MWR- Multiple Worksite Report
Independent Validation Checks

- Current Employment Statistics Survey
  - Monthly Survey of Employment and Earnings
  - 651,000 establishments
  - Detailed industry and geographic estimates

- Individual Wage Records
  - National
  - State
Highly Accurate Data

- Thorough editing and review at the state, regional, and national levels each quarter
- QCEW staff contact businesses to validate or correct questionable data and/or provide missing data (probably unique in this respect)
- Development of new processing system with even more powerful editing and review capabilities
Quality Issues

- Timeliness
- Accuracy
- Relevance
Notable Achievements

- NAICS 2017 Revision
- Timelier Data
- New Customer
  - Energy Information Administration
NAICS 2017 Revision

Timelier Data

- Accelerated County Employment and Wages (CEW) News Release by two weeks
  - Effective with the 2017 Q4 release
  - Two parts: Press release and data release
Percent change in employment in counties with 75,000 or more employees, December 2016-17
(U.S. average = 1.5 percent)

Chart 3. Percent change in employment in counties with 75,000 or more employees, December 2016-17 (U.S. average = 1.5 percent)
New Customer: EIA

Energy Information Administration (EIA)

- **New** MOU with EIA to use QCEW as a sample frame
  - Weekly Motor Gasoline Price Survey
  - Petroleum Products Sales Identification Survey
  - Manufacturing Energy Consumption Survey
- This is partnership represents a savings for EIA
- EIA surveys are used by State agencies, nationwide!
QCEW Data Viewer

- **Input:** QCEW Open Data CSV files
- **Technology:** Javascript
- **Outputs:** Tables by area or industry
Data Viewer Home

Quarterly Census of Employment and Wages

Geographic Cross-Sections
1. All states, one industry
2. All counties, one industry
3. All counties in a state, one industry
4. All MSAs, one industry
5. All geographic areas, one industry

NAICS Industries by Geography
6. High-level industries, one area
7. NAICS sectors, one area
8. NAICS sub-sectors, one area
9. NAICS 4-digit industries, one area
10. NAICS 5-digit industries, one area
11. NAICS 6-digit industries, one area
12. All industry levels, one area

Data by Establishment Size Class
13. National, one industry group, by size
14. National, one industry, all sizes
15. All states, one industry, by size
16. One state, one industry group, by size
17. One state, one industry, all sizes

Multi-Year Data
Coming Soon

Search Industry: [Input field]

Get Table

Show records with suppressed employment and wages. Available for data from 2007 forward
### Quarterly Census of Employment and Wages

#### Private, NAICS 511 Publishing Industries, except Internet, All Counties

**2014 Second Quarter, All establishment sizes**

**Source:** Quarterly Census of Employment and Wages - Bureau of Labor Statistics

#### Table Filter (For Value)

**Table:** Quarterly Census of Employment and Wages

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<tr>
<th>County</th>
<th>Quarterly Establishments</th>
<th>Annual Employee</th>
<th>Annual Employer</th>
<th>Average Weekly Wages</th>
<th>Total Employer Location Quotient</th>
<th>Total Employer Location Quotient</th>
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</table>
QCEW Mapping

- Detailed, descriptive maps
- Allow visualization of disaster areas
- QCEW establishment data paired with designated flood zones
- Scope: 18 states and District of Columbia
- Counties along the Atlantic and Gulf Coasts
Katrina - 2005

- Geocoded
- GIS - State/Fed cooperation
- Produced after event
QCEW Hurricane Maps - 2018

Employment in Hurricane Storm Surge Flood Zones, Hudson County, NJ

Note: Flood zones represent a conservative estimation of areas that would experience flooding in the event of a hurricane. Zone 1 is the area that would be flooded by a Category I hurricane. A Category II hurricane would cause flooding in Zones 1 and 2. The hurricane categories reference the Saffir-Simpson Hurricane Scale.

Each black dot represents at least one establishment.

Data Source: U.S. Bureau of Labor Statistics, Quarterly Census of Employment and Wages; 2017 Third Quarter
https://www.bls.gov/cew

Flood Zone Source: National Hurricane Program.

<table>
<thead>
<tr>
<th>Area</th>
<th>Establishments</th>
<th>Average Monthly Employment</th>
<th>Total Quarterly Wages</th>
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<td>Zone 1</td>
<td>3,565</td>
<td>108,800</td>
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<td>Zone 3</td>
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<td>Zone 4</td>
<td>762</td>
<td>16,098</td>
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<td>Total Affected</td>
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<td>Unaffected</td>
<td>8,697</td>
<td>97,244</td>
<td>1,147,874,057</td>
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</table>

0  | 5  | 10 miles

New York, NY
Bergen
Hudson
Essex
Open Data Home
QCEW Open Data Files

- QCEW response to May 2013 Open Data directive

- **CSV format:** 33,400 tiny files per year
  - Sliced by area: US, State, MSA, County
  - Sliced by industry: Every industry, every level

- **Directly addressable:** Effectively a static API. Slices can be read directly by apps.

- **Code samples:** R, SAS, VBA/XL, JS, PHP, Perl, Python, C#
## Flat File Home

### Quarterly Census of Employment and Wages -- Data Files

**Website:** [bls.gov](http://bls.gov)

**Description:**

- **QCEW NAICS-Based Data Files (1975-2013):**
  - Excel Files
  - CSVs By Area
  - CSVs By Industry
  - CSVs Single Files
  - CSVs By Size
  - Legacy Flat Files

**Table:**

<table>
<thead>
<tr>
<th>County High-Level</th>
<th>CSVs By Area</th>
<th>CSVs By Industry</th>
<th>CSVs Single Files</th>
<th>CSVs By Size</th>
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<td>1984</td>
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</table>
QCEW Links

- Home page: http://www.bls.gov/cew
- Zipped flat files: http://www.bls.gov/cew/datatoc.htm
- QCEW Data Viewer: http://www.bls.gov/cew/apps/data_views/data_views.htm#tab=Tables
- QCEW Open Data: http://www.bls.gov/cew/opendata.htm
- BLS Regional Press Offices: http://www.bls.gov/regions/contacts.htm
QCEW the Foundation of Big Data at BLS

Kevin Cooksey
Outline

- Business Employment Dynamics (BED) data
  - What are the BED and what does it measure?
  - Business Employment Dynamics data is *timely, accurate*, and *relevant*
- Business Register research data
  - Nonprofit Sector
  - Foreign Direct Investment
Business Employment Dynamics
What are the BED?

Data Source: Longitudinal, linked microdata from the Quarterly Census of Employment and Wages (QCEW)

- QCEW covers 98% of all non-farm payrolls
- QCEW microdata consist of employment and wage reports by business establishments, and are collected by state unemployment insurance (UI) programs
- BLS staff review UI administrative data for outliers and longitudinal linkages (including mergers/acquisitions)
- Businesses are assigned a unique numeric identifier when they are loaded to the Longitudinal Database (LDB) that allows us to track them over time
BED Scope

- BED Scope: U.S. private sector, excludes government and private household employees
  - 8.1 million establishments
  - 120.1 million employees

- Establishments that gain or lose jobs over the quarter
  - BED statistics measure job flows which comprise the net change in employment
  - Approximately 50% of establishments report no change
What does the BED measure?

- Business Employment Dynamics (BED) is a set of statistics measuring changes in employment at the establishment level on a quarterly basis
  - Job churn
  - Creative destruction

- Changes in employment are measured as:
  - Gross job flows: gains and losses
  - Openings and closings, births and deaths
  - Available by state, industry, age, and size
BED Data Series Available

- Entrepreneurship Measures
  - Birth/Death
  - Establishment Age & Survival

- Job Creation and Destruction Measures
  - National: Total Private, NAICS Sector, NAICS Subsector
  - State: Total Private, NAICS Sector

- Firm Size Measures
  - Small (1-49 emp.), Medium (50-249 emp.), Large (250+ emp.)
  - Nine Size Classes
Timely, Accurate, Relevant

- **Timely**
  - Available 7 months after the reference quarter

- **Accurate**
  - Zero sample error
  - Multiple layers of review to ensure data accuracy
  - Minimal Revisions

- **Relevant**
  - Let me show you some examples
Gross Job Gains and Losses

Notice the reduction in dynamism after the last recession.

Left axis in thousands, Total private sector, Seasonally adjusted

Source: U.S. Bureau of Labor Statistics

Note: Shaded area represents NBER defined recession period
Components of Gross Job Gains and Losses

Expansions and contractions make up the majority of employment dynamics.

Left axis in thousands, Total private sector, Seasonally adjusted

Source: U.S. Bureau of Labor Statistics

Note: Shaded area represents NBER defined recession period
BED Entrepreneurship Measures
The Decline of Job Reallocation or “Churn” - Rate

Job Reallocation Rate (%) = Total jobs created plus total jobs destroyed, divided by total jobs in the economy.
Over time, the number of startups has remained relatively stable while the jobs created by those startups has declined. The result is a lower average establishment “birth weight.”
Age data: Startups Are the Major Source of Net Employment Growth in the U.S.

Startups (establishments < 1 year old)

Net Change in Employment

Existing Businesses

Net Employment Change

-10,000,000
-7,500,000
-5,000,000
-2,500,000
0
2,500,000
5,000,000
7,500,000

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22
# Age and Survival Matrix

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<tbody>
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<td>Less than one year</td>
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<td>275,267</td>
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<td>171,477</td>
<td>170,442</td>
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<td></td>
<td>136,978</td>
<td>145,015</td>
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<td>17 years</td>
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<td>Total</td>
<td>5,530,080</td>
<td>5,678,783</td>
<td>5,785,530</td>
<td>5,925,348</td>
<td>6,026,365</td>
<td>6,175,475</td>
<td>6,298,332</td>
<td>6,364,632</td>
<td>6,411,440</td>
<td>6,519,661</td>
<td>6,640,944</td>
<td>6,776,523</td>
<td>6,981,676</td>
<td>7,105,044</td>
<td>7,164,456</td>
<td>7,060,981</td>
<td>6,977,945</td>
<td>7,037,848</td>
</tr>
</tbody>
</table>
The Survival Curve: Survival Rates of Establishments by Birth Cohort

On average 78.4% of businesses will survive the first year, and by the end of the fifth year less than half of all businesses will have survived.
Business Register Research Data
2016 Nonprofit Update

- Continuation of 2007-2012 QCEW nonprofit research data methodology
  - Match between QCEW and publicly available IRS “exempt organization” file
  - Tabulations include annual average count of establishments, average employment, and total wages
- Includes finer geographic and industrial detail
Nonprofit employment as a percentage of total private employment, 2016

Total United States = 10.2%

Hover over a state to see data.
Hover over legend items to see states in a category.
## Counties with 30% or higher nonprofit employment - 2016

<table>
<thead>
<tr>
<th>Geographical Title</th>
<th>Percent Nonprofit</th>
<th>QCEW Total Employment</th>
<th>Total Wages</th>
<th>Wages per Employee</th>
<th>Nonprofits Employment</th>
<th>Total Wages</th>
<th>Wages per Employee</th>
</tr>
</thead>
<tbody>
<tr>
<td>Montour County, Pennsylvania</td>
<td>63.1%</td>
<td>13,881</td>
<td>949,308</td>
<td>68,389</td>
<td>8,764</td>
<td>720,993</td>
<td>82,268</td>
</tr>
<tr>
<td>Tompkins County, New York</td>
<td>47.1%</td>
<td>44,332</td>
<td>2,226,730</td>
<td>50,228</td>
<td>20,888</td>
<td>1,225,611</td>
<td>58,675</td>
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<tr>
<td>Franklin County, New York</td>
<td>40.5%</td>
<td>10,630</td>
<td>377,092</td>
<td>35,475</td>
<td>4,310</td>
<td>170,430</td>
<td>39,543</td>
</tr>
<tr>
<td>Otsego County, New York</td>
<td>37.3%</td>
<td>19,133</td>
<td>766,841</td>
<td>40,080</td>
<td>7,143</td>
<td>362,552</td>
<td>50,756</td>
</tr>
<tr>
<td>Grafton County, New Hampshire</td>
<td>35.9%</td>
<td>46,689</td>
<td>2,638,714</td>
<td>56,516</td>
<td>16,764</td>
<td>1,259,496</td>
<td>75,131</td>
</tr>
<tr>
<td>Bronx County, New York</td>
<td>34.7%</td>
<td>238,210</td>
<td>11,255,565</td>
<td>47,251</td>
<td>82,616</td>
<td>4,738,737</td>
<td>57,359</td>
</tr>
<tr>
<td>Deer Lodge County, Montana</td>
<td>34.1%</td>
<td>2,317</td>
<td>81,791</td>
<td>35,302</td>
<td>790</td>
<td>39,232</td>
<td>49,660</td>
</tr>
<tr>
<td>Yates County, New York</td>
<td>33.2%</td>
<td>5,821</td>
<td>184,031</td>
<td>31,615</td>
<td>1,930</td>
<td>60,814</td>
<td>31,510</td>
</tr>
<tr>
<td>Sullivan County, New York</td>
<td>33.0%</td>
<td>20,371</td>
<td>702,266</td>
<td>34,474</td>
<td>6,731</td>
<td>214,249</td>
<td>31,830</td>
</tr>
<tr>
<td>Baltimore City, Maryland</td>
<td>31.4%</td>
<td>268,372</td>
<td>16,799,637</td>
<td>62,598</td>
<td>84,309</td>
<td>5,442,613</td>
<td>64,556</td>
</tr>
<tr>
<td>St. Lawrence County, New York</td>
<td>30.3%</td>
<td>24,927</td>
<td>976,339</td>
<td>39,168</td>
<td>7,547</td>
<td>341,912</td>
<td>45,304</td>
</tr>
</tbody>
</table>

2016 Data Here
Counties with a greater proportion of nonprofits pay more to those nonprofits

<table>
<thead>
<tr>
<th>Nonprofit share of total county employment</th>
<th>Wage Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 10%</td>
<td>0.93</td>
</tr>
<tr>
<td>10-20%</td>
<td>1.08</td>
</tr>
<tr>
<td>20-30%</td>
<td>1.16</td>
</tr>
<tr>
<td>30%+</td>
<td>1.35</td>
</tr>
</tbody>
</table>
Any Questions?
Contact Information

Kevin Cooksey
Chief, Branch of Business Employment Dynamics
Cooksey.kevin@bls.gov
202-691-6483

David Talan
Chief, Division of Administrative Statistics and Labor Turnover
Bureau of Labor Statistics
talan.david@bls.gov
202-691-6467