

# Linking Foreign Direct Investment Data (FDI) to the BLS Business Register

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# Outline

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- Motivation
- Background on the BLS Business Register: QCEW
- Foreign Direct Investment Data: BEA
- Matching Process
- Match Quality
- Next Steps

# Motivation

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- Fill in a data gap on foreign direct investment (FDI)
- BLS used to have a FDI program in the early 1990s
- Matches two of the best data sources in the U.S. Statistical System

# QCEW – Quarterly Census of Employment and Wages

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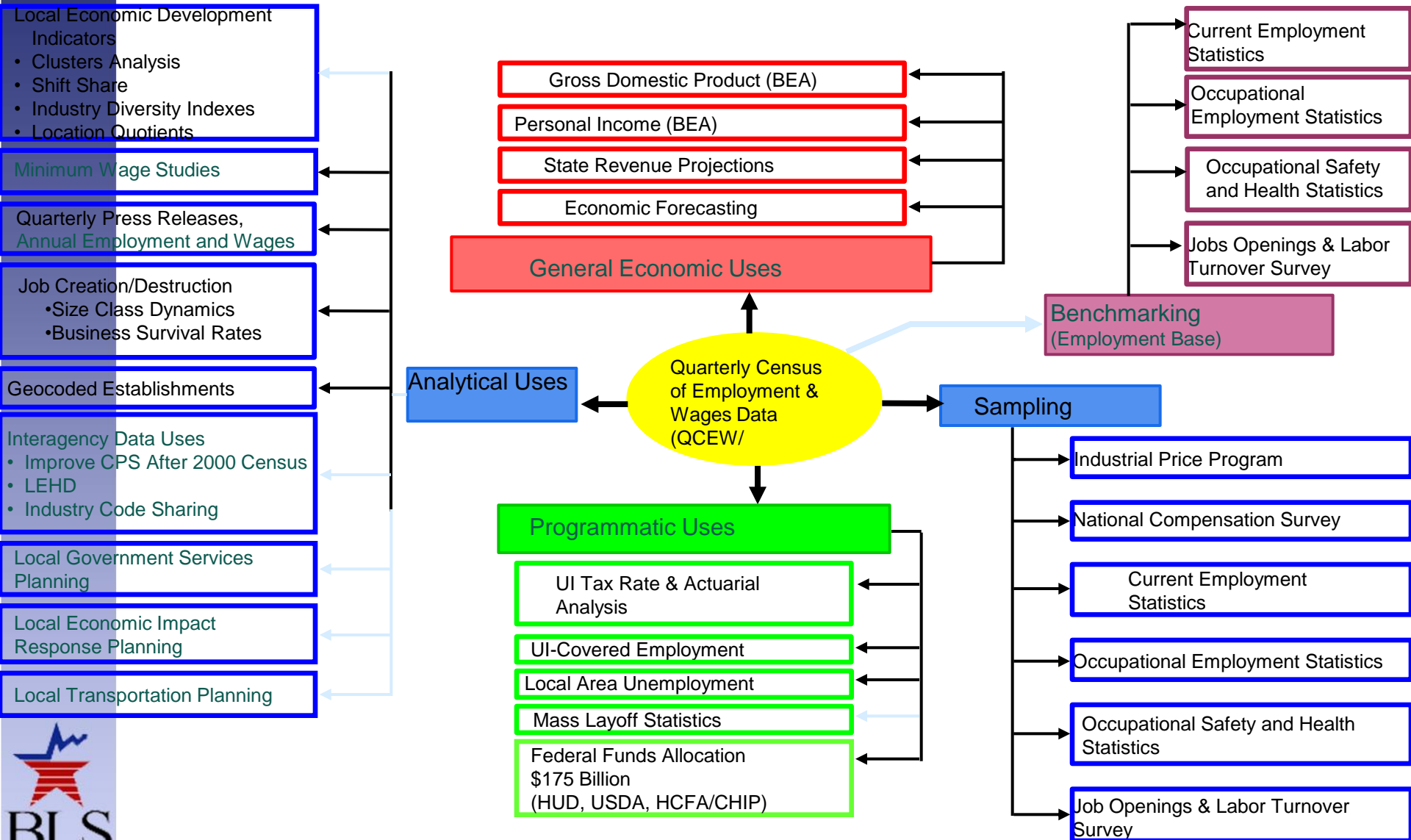
- Quarterly data (frequent)
- Released 6.5 months after reference period - timely
- 9.4 million records and growing
- 139 million in employment
- Units, employment and wages
- 6 digit NAICS and county, ownership
- UI based, mandatory collections to run UI
  - ▶ Wages - 98% reported data
  - ▶ Employment - 97% reported data
  - ▶ Units - 95% reported data

# Investment in Quality

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- Source: BLS 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

# Uses Of Quarterly Census of Employment and Wages Data (QCEW)



# Why Match BEA FDI Enterprises to QCEW Establishments?

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- Leverages existing data, reducing respondent burden
- BLS establishment data augment BEA enterprise data, allowing:
  - ▶ Detailed distribution of employment by industry (6-digit NAICS level) and geographic location
  - ▶ Detailed distribution of employment and wage distributions by occupation (6-digit SOC level)

# Survey of Foreign Direct Investment in the United States

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- Annual and Benchmark (every 5 years) surveys conducted by the Bureau of Economic Analysis
- Benchmark survey is mandatory for all business enterprises that have 10%+ ownership stake by a foreign entity
  - ▶ Foreign entity: Individual, corporation, estate, trust, or government
  - ▶ Annual survey collects data on a subset of the Benchmark survey



# Survey of Foreign Direct Investment in the United States, cont.

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- Comprehensive set of data:
  - ▶ Balance sheet details; value added; employment and employee compensation; sales, expenditures and trade in goods; and expenditures in research and development
  - ▶ For purposes of matching BEA data on US affiliates of foreign-owned enterprises to QCEW establishment data, employment totals for each affiliate provides a target to determine match quality

# BEA FDI Dataset

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- BEA provided the microdata from the 2012 Benchmark Survey
  - ▶ BLS is focusing on the US affiliates of foreign-owned multinationals in 2012 for which there is non-zero employment
  - ▶ The average employment of these affiliates is 688.50 (standard deviation is 4,627.01)

# Size Distribution of US Affiliates of Foreign-owned Enterprises

Total number of employees	Percent of affiliates	Percent of employment
1 – 9	35.82%	0.18%
10 – 19	9.87%	0.20%
20 – 99	22.78%	1.61%
100 – 249	10.33%	2.40%
250 – 999	12.32%	9.20%
1,000 – 2,499	4.50%	10.61%
2,500+	4.38%	75.82%

# Top 3 Areas of Ultimate Beneficiary Ownership

Country Group	Ranking	Percent of affiliates	Percent of employment	Average number of employees (Standard deviation)
Europe	1	44.28%	63.48%	987.21
				(6,126.76)
Asia and Pacific	2	31.13%	17.44%	385.79
				(1,930.61)
Canada	3	13.03%	11.94%	631.07
				(4,734.33)

# Top 4 Sectors for Affiliates of Foreign-owned Enterprises

Rank	Ranking based upon:			
	Number of affiliates		Employment of affiliates	
	Sector	Percent	Sector	Percent
1	Manufacturing	28.82%	Manufacturing	36.86%
2	Wholesale trade	21.72%	Retail trade	10.74%
3	Financial activities	13.27%	Wholesale trade	9.17%
4	Professional, scientific, and technical services	10.20%	Financial activities	7.83%

# Top 10 States with the Most Employment Related to FDI

State	US affiliate employment	
	Ranking	Percent
California	1	10.42%
Texas	2	8.13%
New York	3	7.73%
Pennsylvania	4	4.84%
Illinois	5	4.54%
Florida	6	4.14%
New Jersey	7	4.08%
Ohio	8	4.03%
Michigan	9	3.79%
North Carolina	10	3.52%

# Matching Process

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- Employment Identification Numbers (EINs) are used to identify the set of establishments that comprise a business enterprise
  - ▶ Each US affiliate we match has 1+ EIN(s)
  - ▶ Each QCEW establishment has 1 EIN
- Matching is a two-step process:
  - ▶ Automated using the provided EINs
  - ▶ Then a manual step where analysts verify and complete automated matches

# Automated Matching

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- Uses the EINs provided for each US affiliate to find establishments with identical EINs in the QCEW
- Insufficient to completely match affiliates to QCEW establishments:
  - ▶ Could be using different EINs in the two data sources
  - ▶ Reference periods may differ



# Analyst Matching

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- After automated matching, we assign affiliates to an analyst to review:
  - ▶ If the matched establishments are legitimate components of the affiliate
  - ▶ If there are any establishments that are missing from the match
- This step is resource-intensive:
  - ▶ In particular, finding missing establishments

# Analyst Matching, Cont.

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- To maximize resources, larger affiliates and particularly large affiliates that are over-matched (BLS employment  $>$  BEA employment) are assigned first:
  - ▶ Over-matched affiliates take less time to review compared to under-matched (BLS employment  $<$  BEA employment)
  - ▶ Review time increases as affiliate employment increases but there is considerable fixed time regardless of size

# Analyst Matching, Cont.

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- To facilitate review of automated match results, analysts are provided:
  - ▶ A comparison of BEA affiliate employment and QCEW establishment employment
  - ▶ BEA provided affiliate data such as employment, EINs, company names, and addresses
  - ▶ The establishments (employment, EINs, industries, company names, and addresses) that are automatically matched

# Analyst Matching, cont.

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- Reviewers typically:
  - ▶ 1) Review the matched establishments first and remove invalid matches
    - The necessary information is already present given the list of affiliate company names and addresses and establishment names and addresses
  - ▶ 2) Compare affiliate employment to that of the remaining establishments

# Analyst Matching, cont.

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- ▶ 3) If under-matched, determine if establishments are missing by reviewing secondary sources such as:
  - Affiliate websites
  - U.S. Securities and Exchange Commission 10-K filings
  - Other sources: Wikipedia, Bloomberg, etc.
- ▶ 4) If establishments are determined to be missing, find additional EINs to match to by doing company name and/or address matching of QCEW establishments

# Using EINs to Match BEA Affiliates to QCEW Establishments

Time of match	Percent of affiliates	Mean number of EINs (Standard deviation)	Mean number of removed EINS (Standard deviation)	Mean number of added EINS (Standard deviation)
Before automated matching	100.00%	3.20 (14.69)	NA	NA
After automated matching	64.71%	1.90 (3.69)	NA	NA
After some analyst review	40.76%	3.62 (7.53)	0.06 (0.58)	1.28 (5.35)

# Match Quality

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- The quality of the match can be measured by comparing reported BEA employment for each affiliate to total employment of each matched QCEW establishment.
  - ▶ A simple rule: If total QCEW establishment employment is within 20% of BEA employment, the match is “close”

# Match Quality, cont.

Time of match		"Close" matches	"Not close" matches
After automated matching	Affiliates	39.59%	60.41%
	Employment	55.78%	44.22%
With analyst matching	Affiliates	45.54%	54.46%
	Employment	80.28%	19.72%



# Next Steps

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- Finish reviewing all of the automated matches for 2012
- Look at a subset of the 2013 data to determine if updating already matched affiliates is less time consuming
- Determine publication plans for 2012 matched data
- Research improvements to matching process and tools

# Contact Information

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