

# Methods for Calculating the Number of Full-time Equivalent Employees by Industry Using ACS and Other Data Sources

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# Issue and Research Question

- Issue: Many denominators require calculating the number of full-time equivalent (FTE) employees
  - But most states do not collect employees' hours worked from employers.
- Research question: For these states, what's the best possible data source and calculation method to estimate FTE employees?

# Outline

- Motivation
- Proposed data sets
- Methods
- Criteria for an FTE employee denominator (injury and illness incidence rates)
- Compare various data series for
  - Employees, FTE Employees, Adjustment Ratio (FTE / Employees)
  - using data from CA, WA, US

# Example of an incidence rate using an FTE denominator

- $$\frac{\# \text{ Injuries and Illnesses}}{\# \text{ Full-time equivalent employees (FTE)}} \times 100 = \text{Rate per 100 FTE}$$
- BLS Survey of Occupational Injuries & Illnesses (SOII) incidence rates

# FTE Employee Counts

- FTE = Total Hours Worked/2,000 hours
  - 2,000 hours = 40 hrs/wk x 50 weeks/year
- FTE provide more meaningful incidence rates
  - 100 employees, all working 20 hrs/wk, had 5 injuries

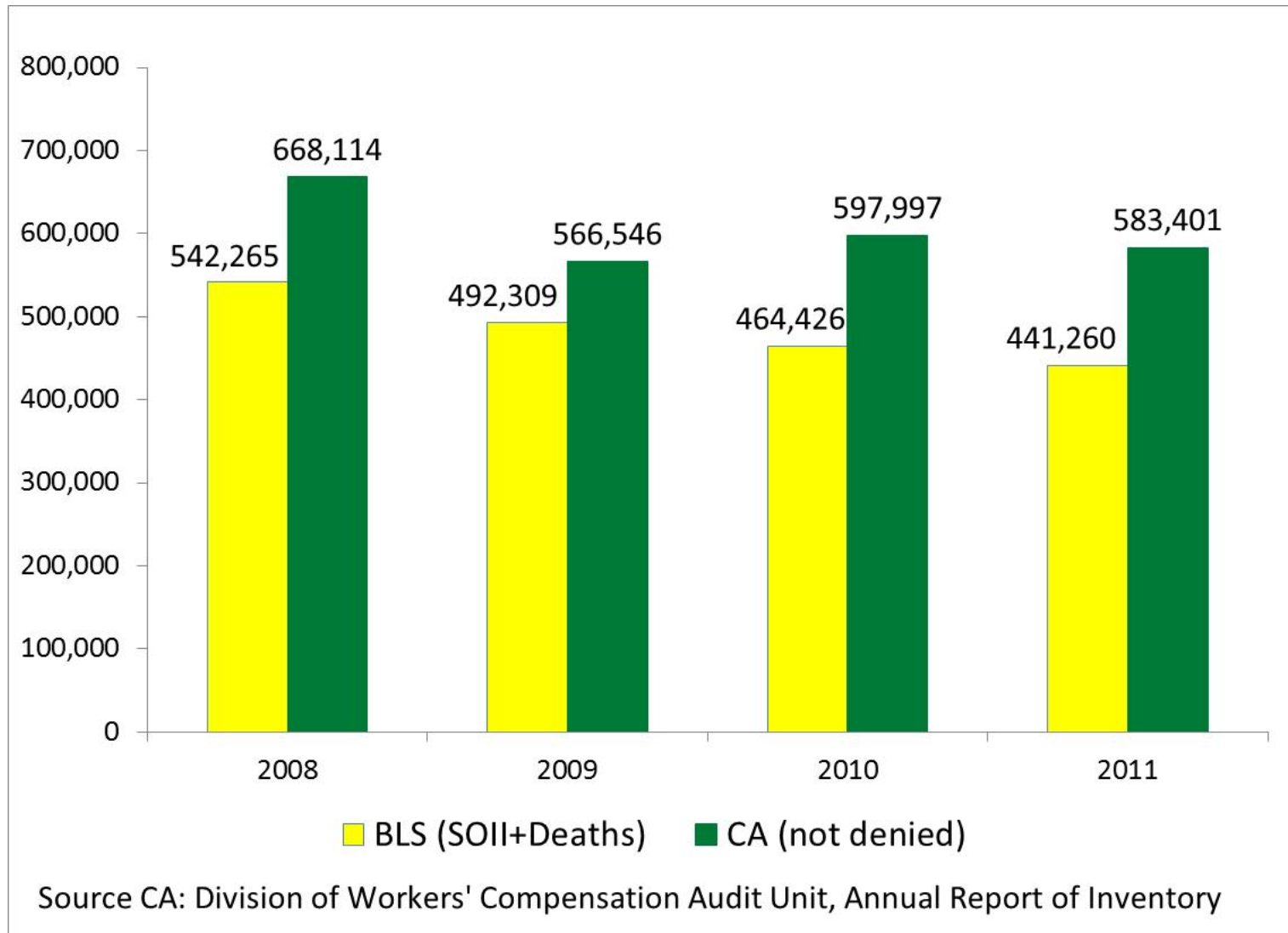
$$\frac{5 \text{ Injuries}}{100 \text{ Employees}} \times 100 = 5$$

$$\frac{5 \text{ Injuries}}{50 \text{ FTE Employees}} \times 100 = 10$$

# Why states might want to calculate their own injury and illness incidence rates

1. Provide better information to employers for injury and illness prevention purposes (BLS data are published at the industry level only)
2. Target employers in high-hazard industries for Occupational Safety and Health Administration (OSHA) inspections
3. BLS SOII illness and injury rate undercount – are SOII incidence rates too low?
4. Some states would like to calculate rates at the sub-state level (BLS data are at the state level)

# BLS, California injury & illness counts, 2008-11



# Calculating Full-Time Equivalent Employees



# Data Sources on Employment and Hours Worked

## Employer data:

- Quarterly Census of Employment and Wages (QCEW)
- Current Employment Statistics (CES)
- BLS Industry Productivity Studies (IPR) – national data only; based on CES and CPS

## Household data:

- American Community Survey, Public Use Micro Sample (ACS PUMS)
- Current Population Survey (CPS) - monthly
- CPS Annual Social and Economic Supplement (CPS ASEC, March CPS)

# Analyses on Data Sources for Hours Worked

- Harley Frazis and Jay Stewart, “Why do BLS Hours Series Tell Different Stories about Trends in Hours Worked?” Labor in the New Economy, Oct. 2010.
- Divergent trends in CPS vs CES
  - Differences in workers covered
    - CPS all; CES production and non-supervisory
  - CPS person-based; CES jobs-based
  - CPS hours worked; CES hours paid

# Compare sample sizes

## Employer-based employment counts

- QCEW (census): ~9.0 million establishments.
- CES survey: ~557,000 worksites
- BLS SOI survey: ~230,000 private establishments

## Household-based employment counts

- ACS 2011 sample size, interviews: US (2.1m HH), CA (193,800 HH), WA (43,300 HH)
- CPS survey: ~60,000 U.S. households

# Methods for calculating an FTE denominator

Method #1 : Divide “hours worked” from survey data by 2,000 hours to obtain FTE employee estimate by industry

## Method #2 - Estimating FTEs by industry using survey data and calculate an adjustment factor: FTE/EE

$$\text{Estimated FTEs} = \text{Employees} \times \text{FTEs per Employee}$$



Data from QCEW  
(On employer level)

Data from Surveys  
(On industry level)

FTE = 2000 hours/year

Advantage of method #2: more detailed industry-level data.      Examples:

CA QCEW adjusted by U.S. IPR (FTE/Employees)

CA QCEW adjusted by CA ACS (FTE/Employees)

CA QCEW adjusted by CA CPS ASEC (FTE/Employees)

CA QCEW adjusted by CA CPS monthly (FTE/Employees)

Method #3 to calculate FTE employees –  
Use payroll data to estimate hours worked?

Hours worked = total payroll/pay per hour

Then use Method #1 to calculate FTE  
employee estimates

# Criteria for FTE Employee Denominator

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1. Need hours worked data to calculate FTE employee counts
2. Similar data universe as numerator (similar coverage as workers' comp, i.e. exclusions and inclusions – exclude federal employees, self-employed, etc.)
3. Detailed NAICS industry-level data available
  - North American Industry Classification System (NAICS)
  - 11 Agriculture, Forestry, Fishing and Hunting
  - 111 Crop Production
  - 111211 Potato Farming
4. Minimize Relative Margin of Error for Survey Data
5. Timeliness
6. Availability at state and/or local level



# Denominator Comparison Results

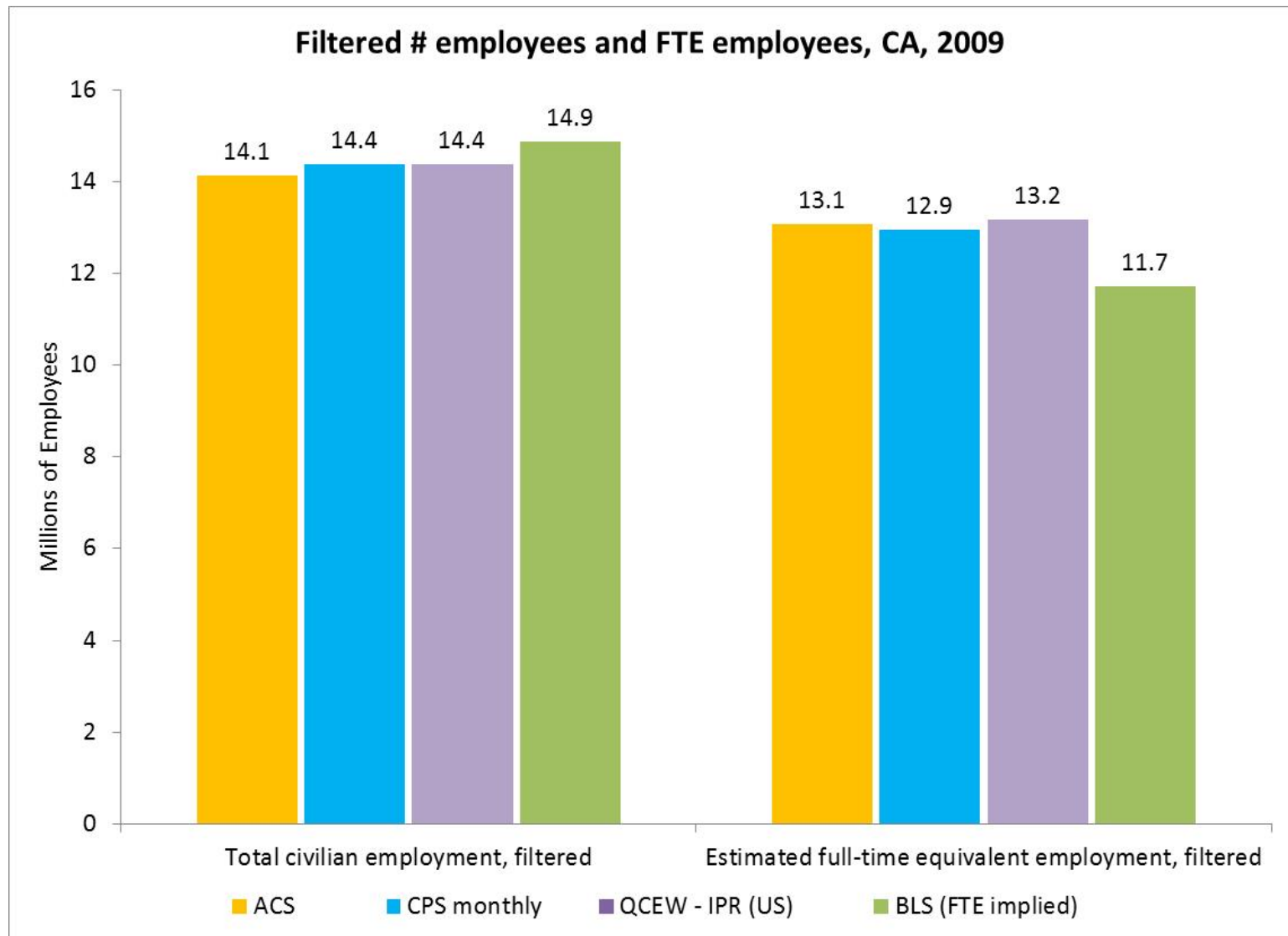
	State-level Data Available?	FTE EE counts or hours worked data	Filtered, WC Data Universe?	Broad Industry Categories	Detailed NAICS Categories
<b>ACS</b>	<b>Yes</b>	<b>Yes</b>	<b>~Yes</b>	<b>Yes</b>	<b>~No, census</b>
BLS SOII	For most states	~No (implied)	~Yes	Yes	~Yes, 3-digit
CPS	For large states	Yes	~Yes	Yes	~No, census
QCEW	Yes	No	~Yes	Yes	Yes
IPR	No	Yes	~Yes, request	Yes	Yes
CES	Yes	Yes	?	Yes	~No, supersector

# Advantages

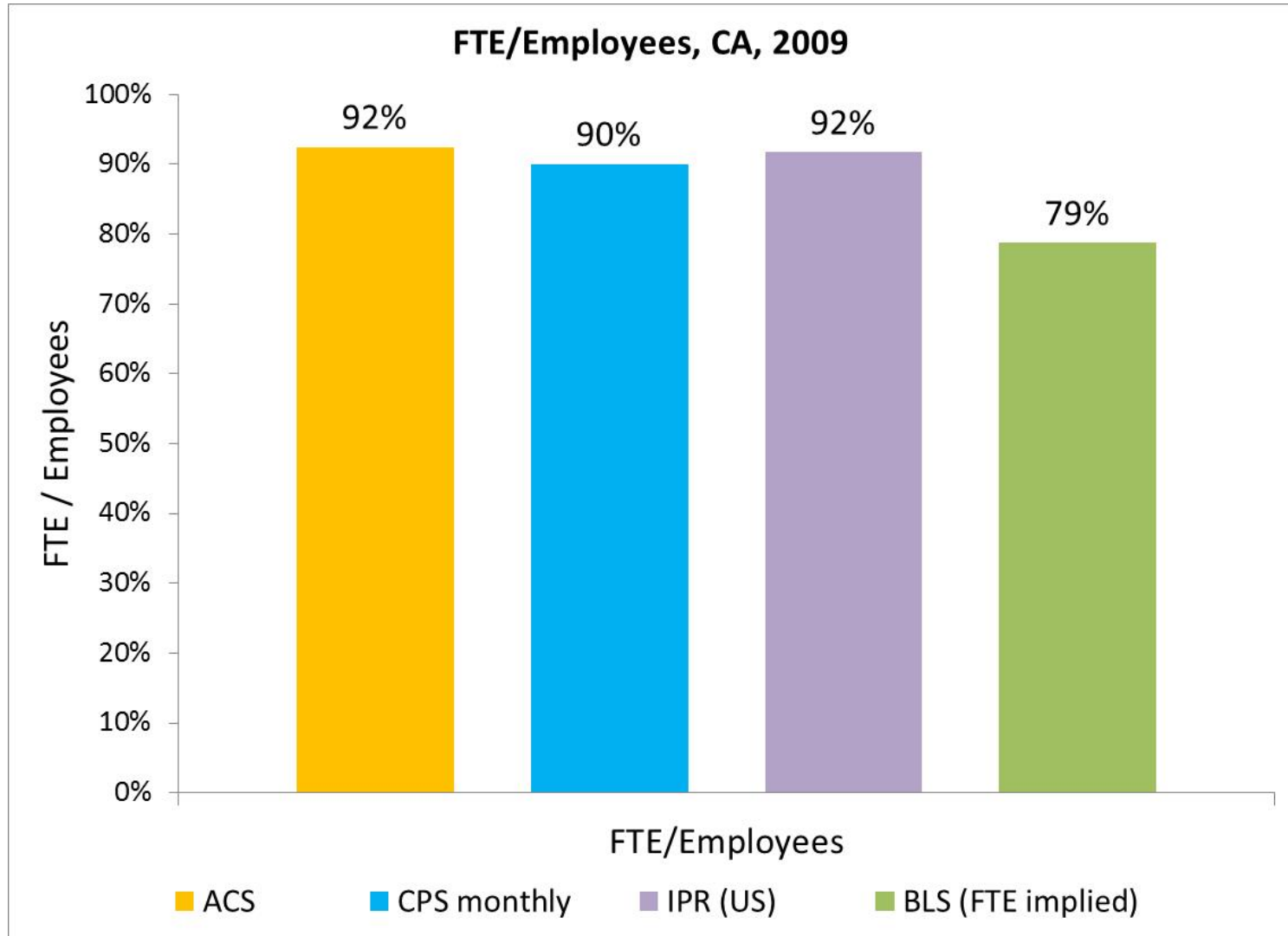
- ACS PUMS – large sample size, available for states
- CPS monthly – better question wording for hours worked than ACS; data on primary and secondary jobs; NIOSH ELF online tool (BETA) for FTE and number of workers
- IPR – detailed industry data (US) for hours worked and employee counts using 4-digit NAICS codes

# Preliminary Results

# Filtered: Total & FTE Employees, CA 2009



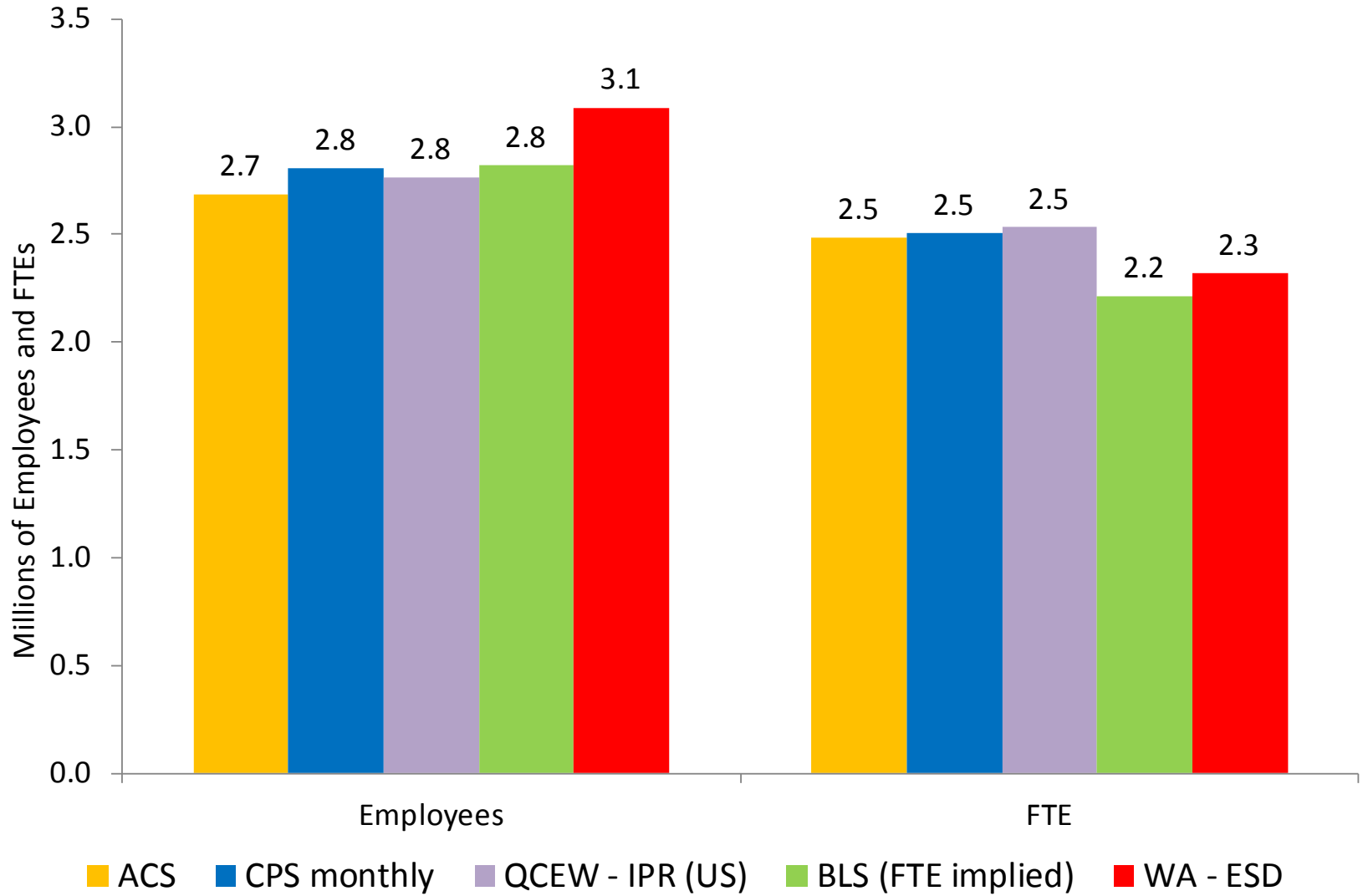
# FTE/Total Employees, CA 2009



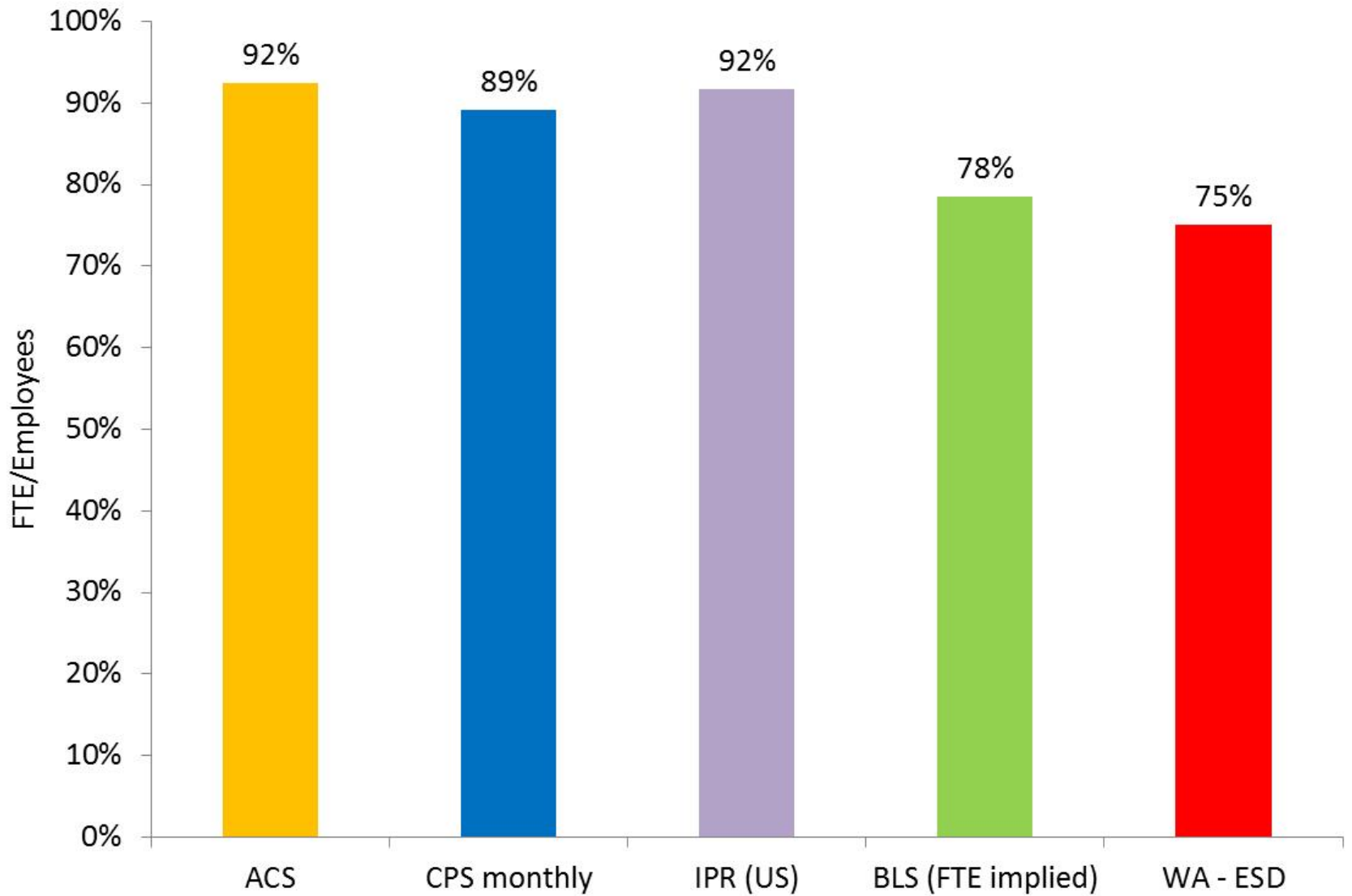
# Add employer wage data FTE counts for the State of Washington

- Hours worked are reported to the State of Washington's
  - Department of Labor and Industry (L&I), workers' compensation
  - Employment Security Department on wage reports from employers ("WageFile" data)
- The following charts use WageFile data

# Filtered # Employees and FTEs, WA 2009

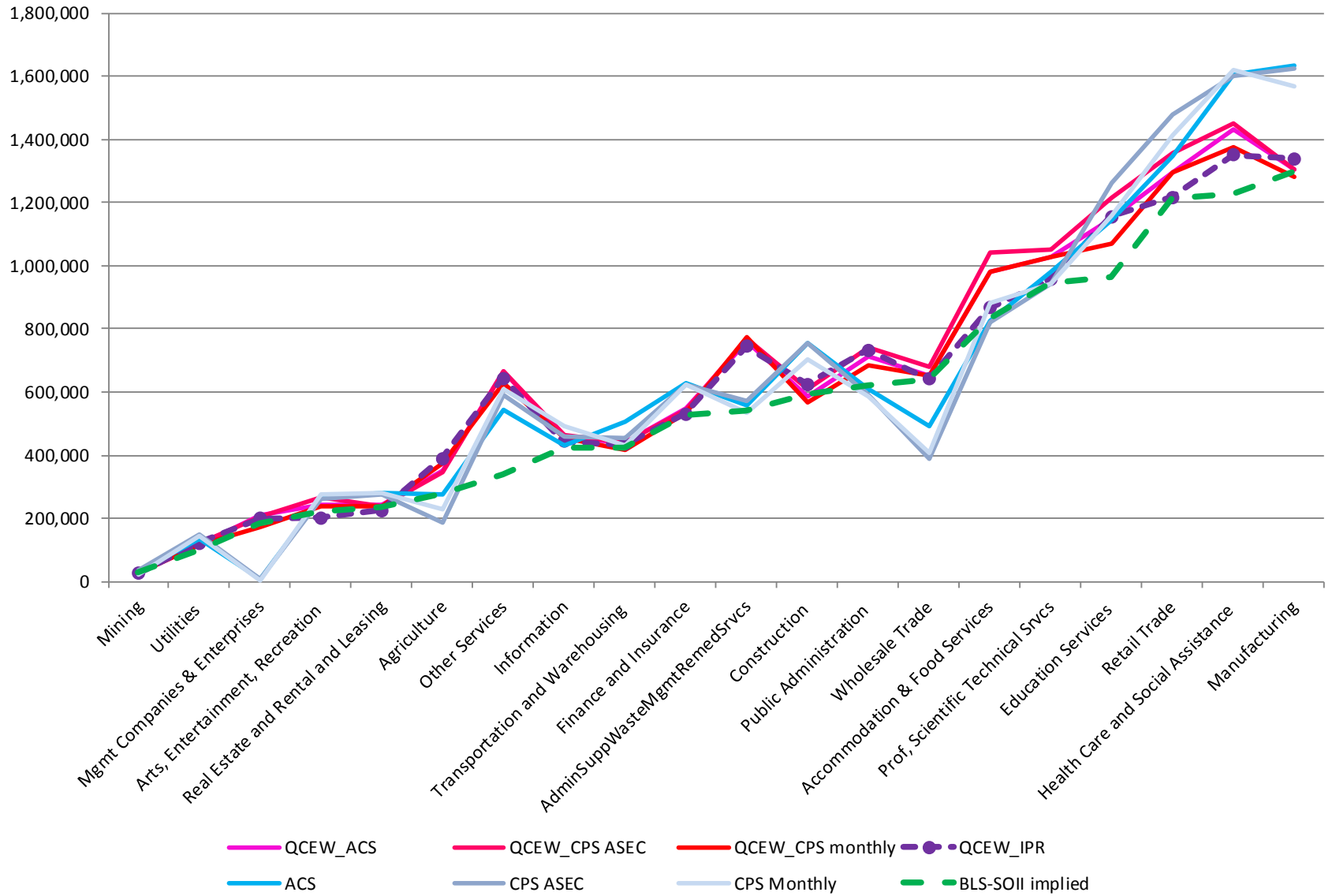


# FTE/Employees, WA 2009



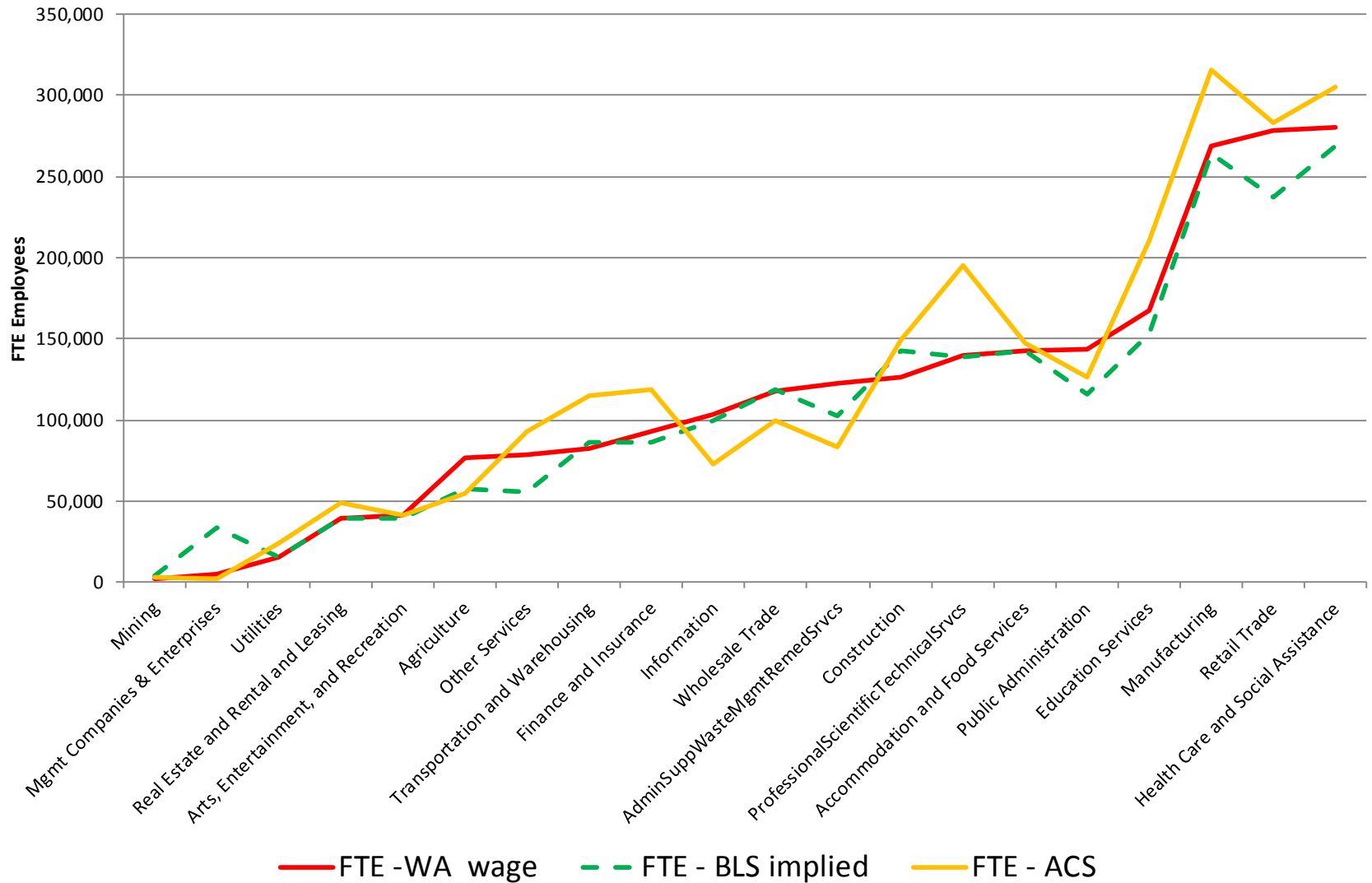


# FTE Estimates, sort by BLS SOII, CA 2009



## FTE Employee estimates, Washington 2009, sort by WA wage

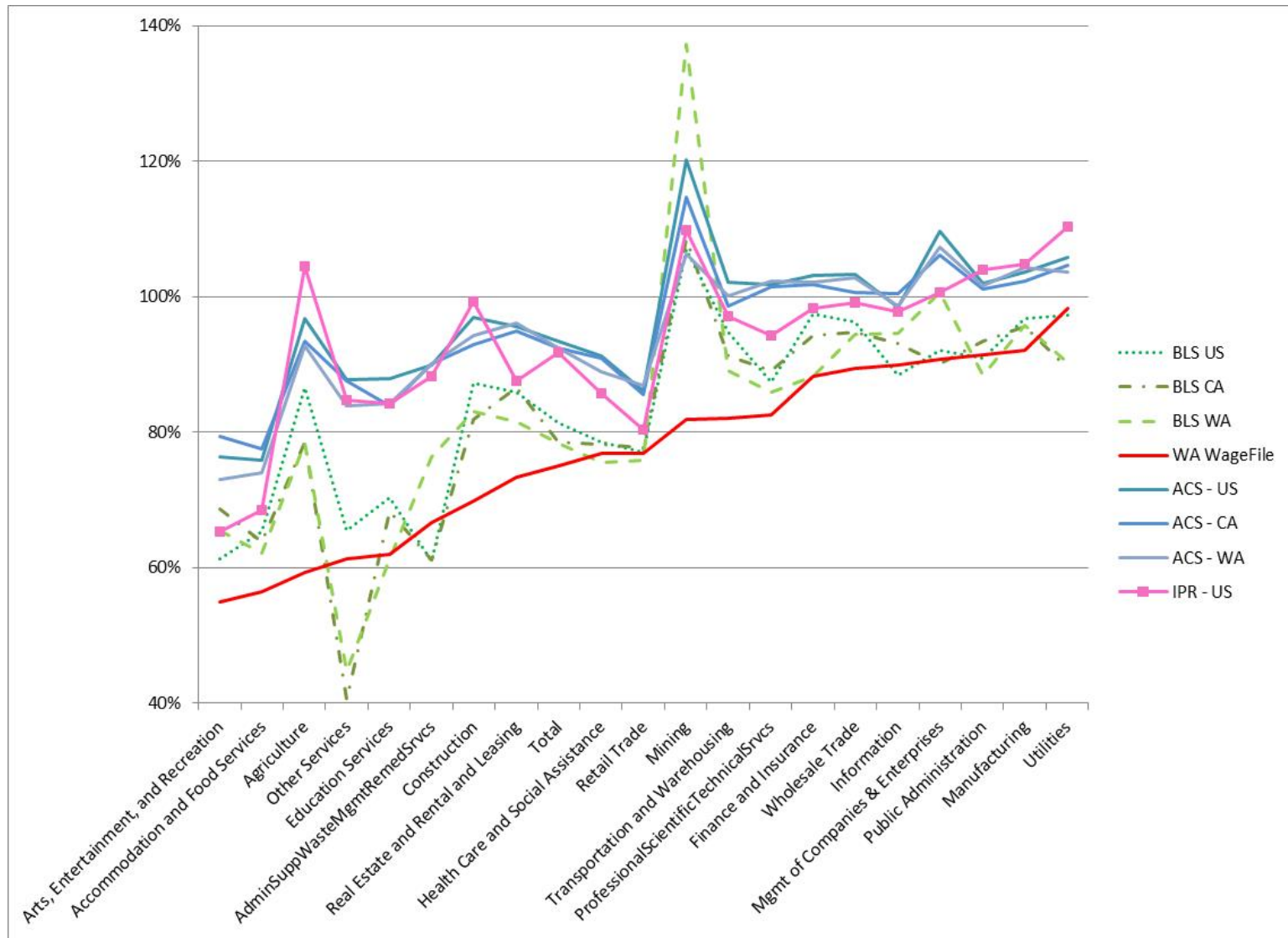
Sources: WA wage, BLS implied, ACS PUMS



# Next:

- Using Method #2, should QCEW data be adjusted with national- or with state-level FTE adjustment factors?

# FTE/Employees, sort by WA Wagefile, 2009



# Concluding Remarks

- Method #2 (adjusting QCEW data) provides more industry detail at the employer level than Method #1
- Differences: data reported by HH vs ERs
  - Household surveys: Over-report hours worked?
  - Employers: Incentives to underreport hours paid?
- Tradeoffs: industry detail, sample size (margin of error), state-specific data vs national data

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