

Using the American Community Survey to Construct a Labor Composition Measure

Justin Harper (BEA)

Andrew Kato (BLS)

Jon D. Samuels (BEA)

Michael Sverchkov (BLS)

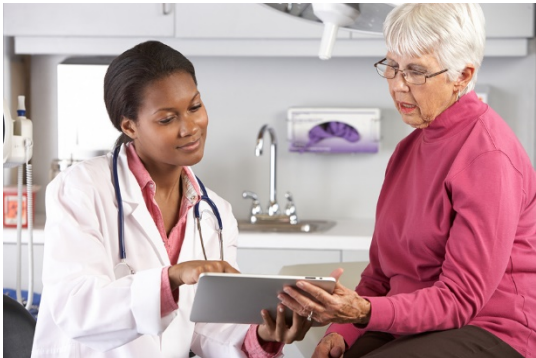
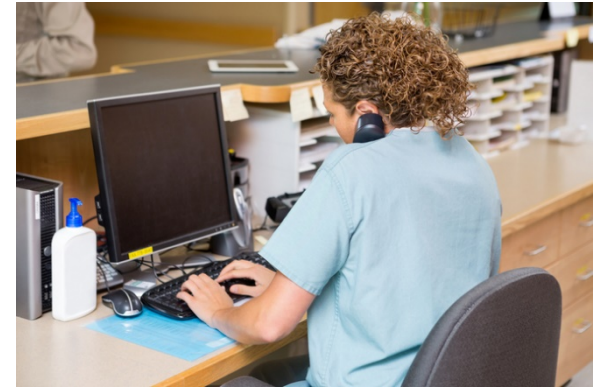
Michael Jadoo (BLS)

Jerin Varghese (BLS)

Corby Garner (BLS)

March 17, 2021

Disclaimer: The views expressed in this presentation are solely those of the authors and are not necessarily those of the Bureau of Economic Analysis, U.S. Department of Commerce or the Bureau of Labor Statistics, U.S. Department of Labor.



Project Overview

- Labor composition used in:
 - ▶ BLS multifactor productivity (MFP) by industry
 - ▶ BEA-BLS industry-level production accounts (ILPA)
- Improved and shared methodology
 - ▶ Combines information from both the ACS and CPS
 - ▶ Small area estimation to handle thin cells



The Model*

1. Define industry cohorts: age by education by sex by class
2. Calculate growth in hours worked
 - a) Unweighted
 - b) Weighted by share of labor cost
3. Labor composition = Weighted Growth – Unweighted Growth

*D.W. Jorgenson, F.M. Gollop, and B. Fraumeni, *Productivity and U.S. Economic Growth*

Cohorts

- A unique combination of the following:
 - ▶ 63 industries
 - ▶ 8 age groups
 - ▶ 6 education groups
 - ▶ 2 sex groups
 - ▶ 2 class of worker groups

Age	Definition
1	< 16
2	16-17
3	18-24
4	25-34
5	35-44
6	45-54
7	55-64
8	65+

Education	Definition
1	Grades 0-8
2	Grades 9-12
3	HS Diploma
4	Some college
5	Bachelor's
6	More than a bachelor's

Sex	Definition
1	Male
2	Female

Class	Definition
1	Payroll
2	Self-employed



Published Methodology – Data Source

■ BLS

- ▶ Basic Monthly Current Population Survey (CPS)

■ ILPA

- ▶ Decennial Census
- ▶ CPS Annual March Supplement (CPS ASEC)
- ▶ Iterative proportional fitting (RAS)
 - Maintains cohort proportions from Census
 - Adjusts levels to match marginal totals in ASEC

Current Issues

- Missing wage data
- Cohorts that drop in and out of the time-series
- **Thin cells** – cohorts with low number of observations
- Changes to Decennial Census starting in 2010
 - ▶ Income, education, and employment information moved to annual American Community Survey (ACS)

ACS vs. CPS - Similarities

- Household surveys
- Data collected monthly
- Data released annually (CPS ASEC)
- Industry, age, sex, education, class of worker available
- Hours and wages available

ACS vs. CPS - Differences

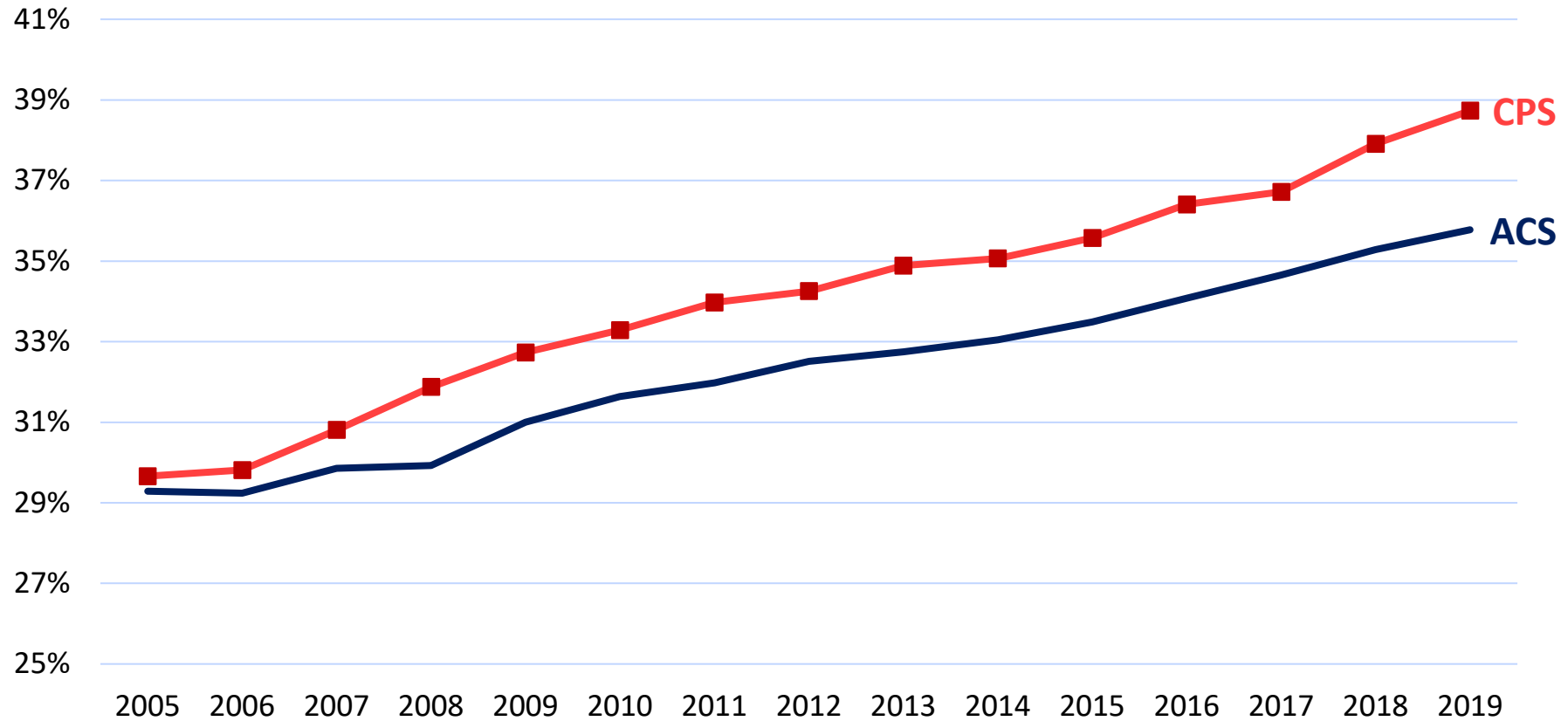
Topic	ACS	CPS
Main purpose	Population demographics	Unemployment rate
Reference period	Previous 12 months	Last week
Multiple job holders	No data	Second job data
Time-series	Starts in 2003	Starts in 1960s

ACS vs. CPS – Sample Size

- Current Population Survey (CPS)
 - ▶ March Supplement (ASEC) – 98,000 households per year
- American Community Survey (ACS)
 - ▶ 3.5 million housing units per year

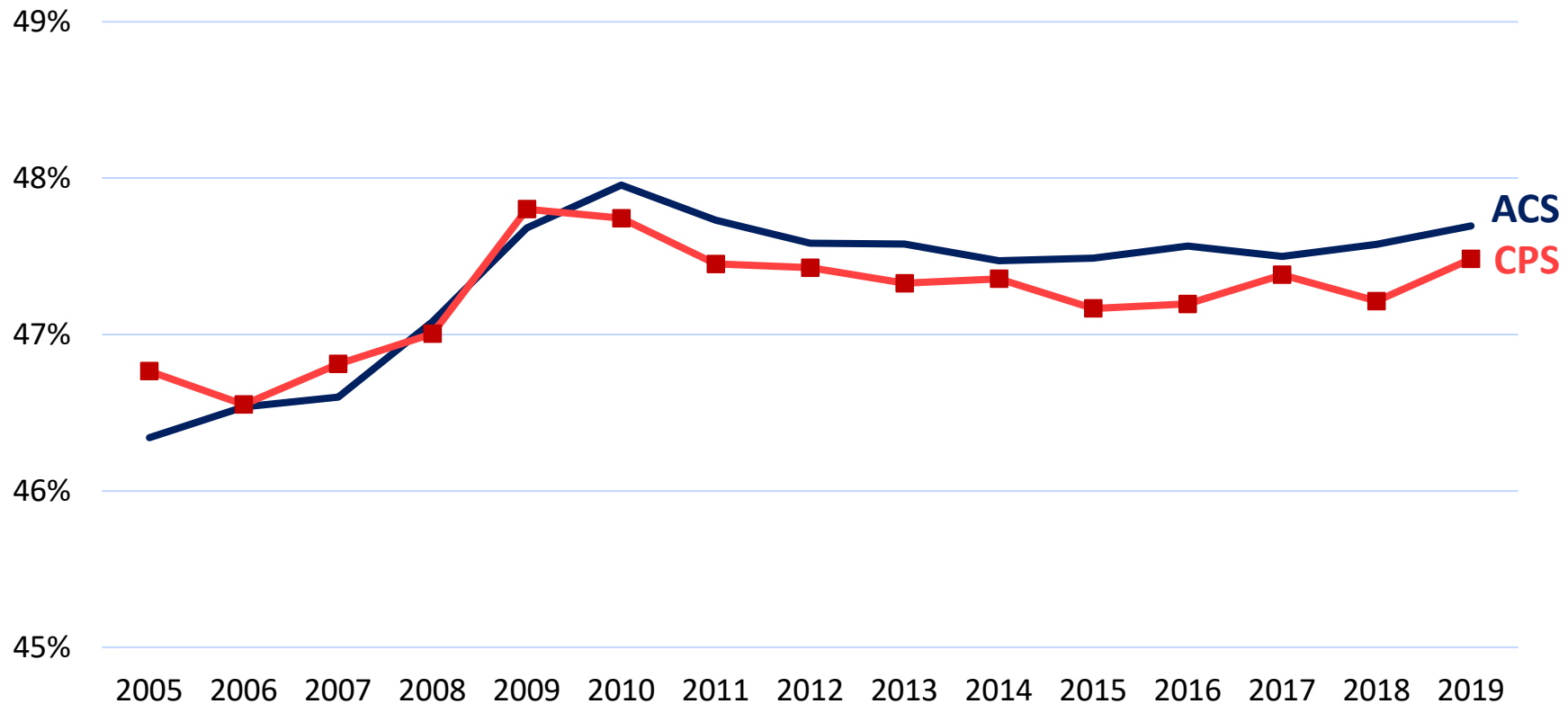
ACS vs. CPS

Percent of U.S. Workforce with at least a Bachelor's degree



ACS vs. CPS

Percent of Females in U.S. Workforce



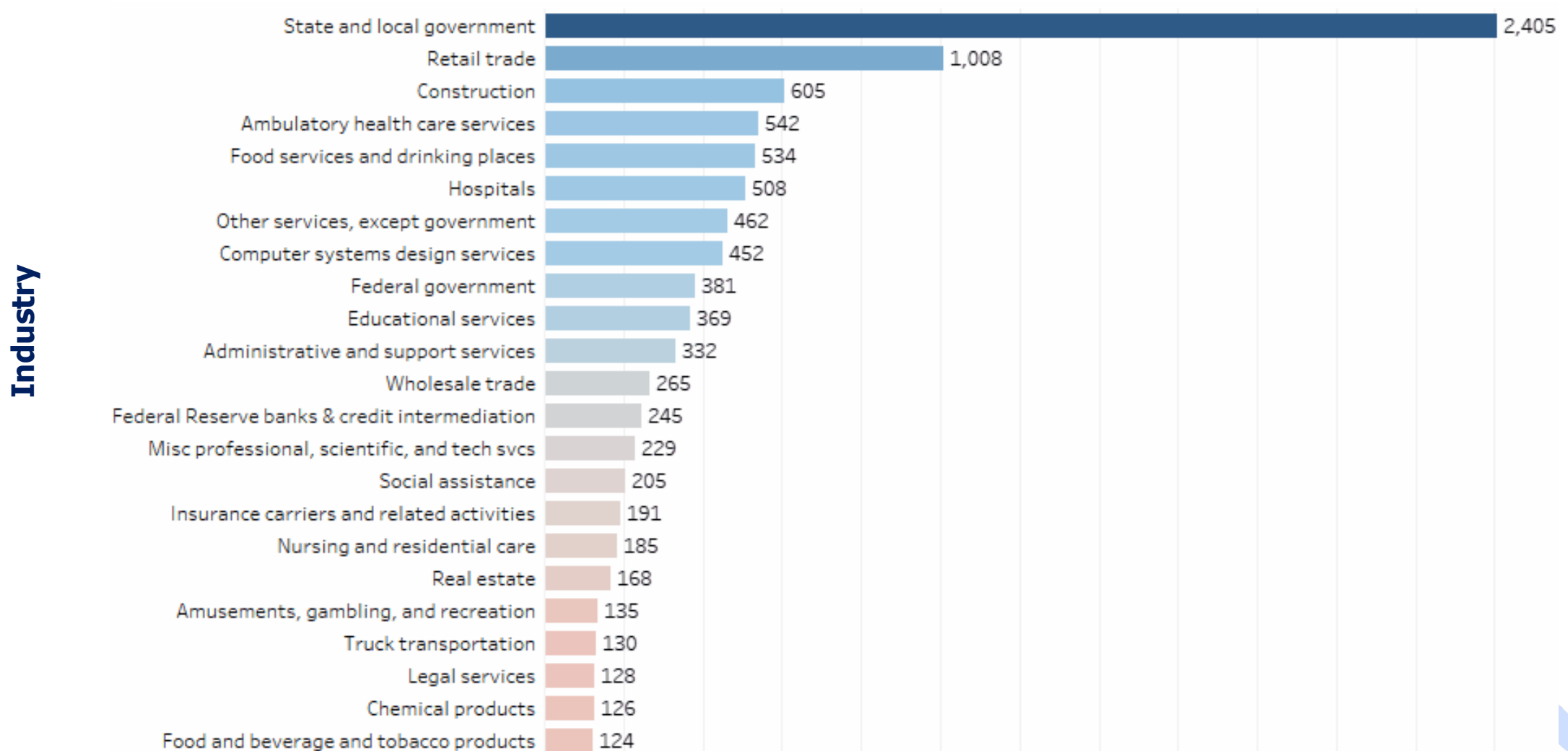
ACS vs. CPS - Takeaway

- CPS – labor force focused
 - ▶ Employment, hours and wages more aligned
- ACS – general population focused
 - ▶ Demographic composition
- Which one should we use?

Shared Methodology - RAS

- Use estimates from the ACS
- Scale ACS estimates to CPS-ASEC using RAS
 - ▶ Age by education by sex totals
 - ▶ For employment, hours, and wages
- Similar to ILPA approach with Decennial Census

Average Cell Size by Industry



Small Area Estimation (SAE)

- Fay-Herriot model
 - ▶ Mixed effects model, includes random and fixed effects
- Requires standard errors for each cohort
 - ▶ Replicate weights from ACS
- Weighted sum of the ACS and model estimate
- Borrow strength from other available information

Small Area Estimation – Auxiliary Data

■ CPS

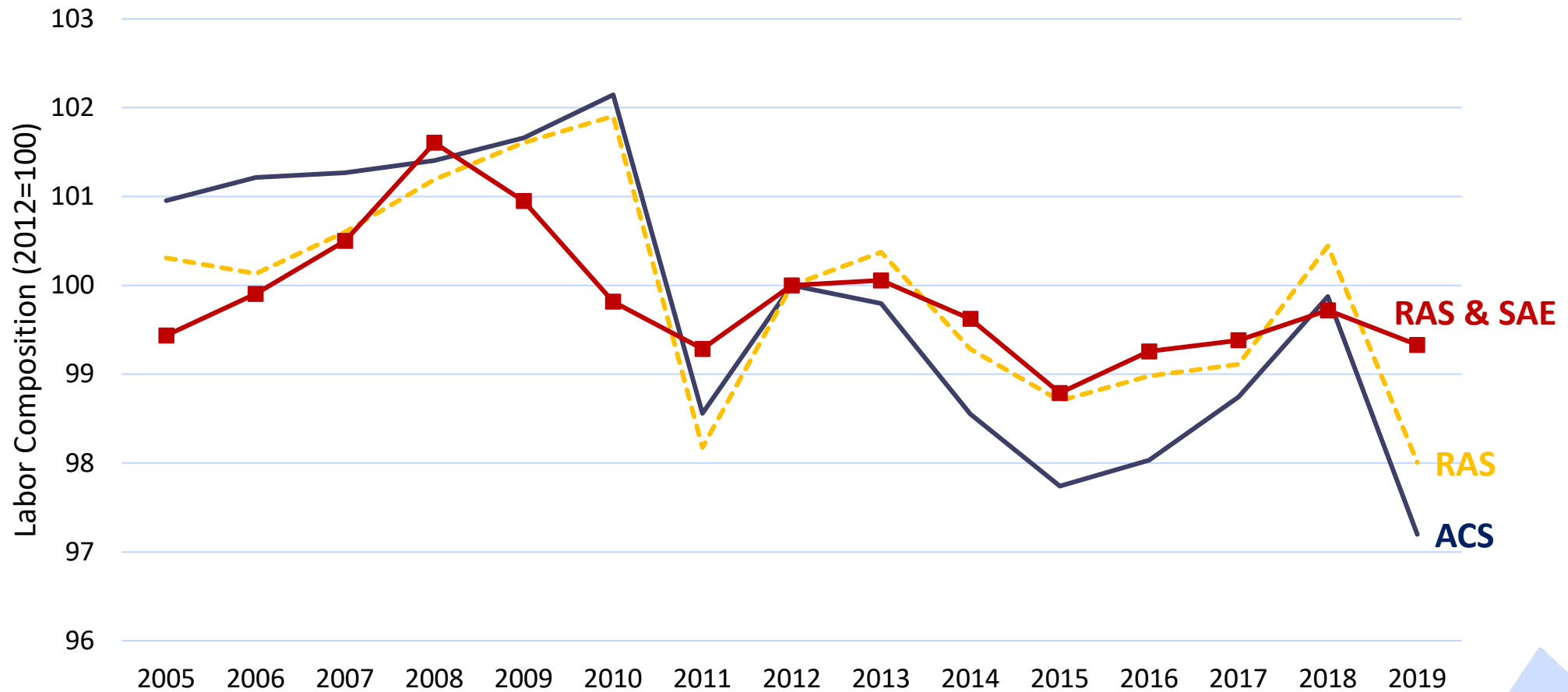
- ▶ Independent estimate
- ▶ Consistent with the aggregate

■ ACS 5-year (ex. 2015-2019)

- ▶ Larger sample size (60 vs. 12 months)
- ▶ Point estimate for a 5-year time period
- ▶ Data for areas with small populations
- ▶ More reliable but not as timely

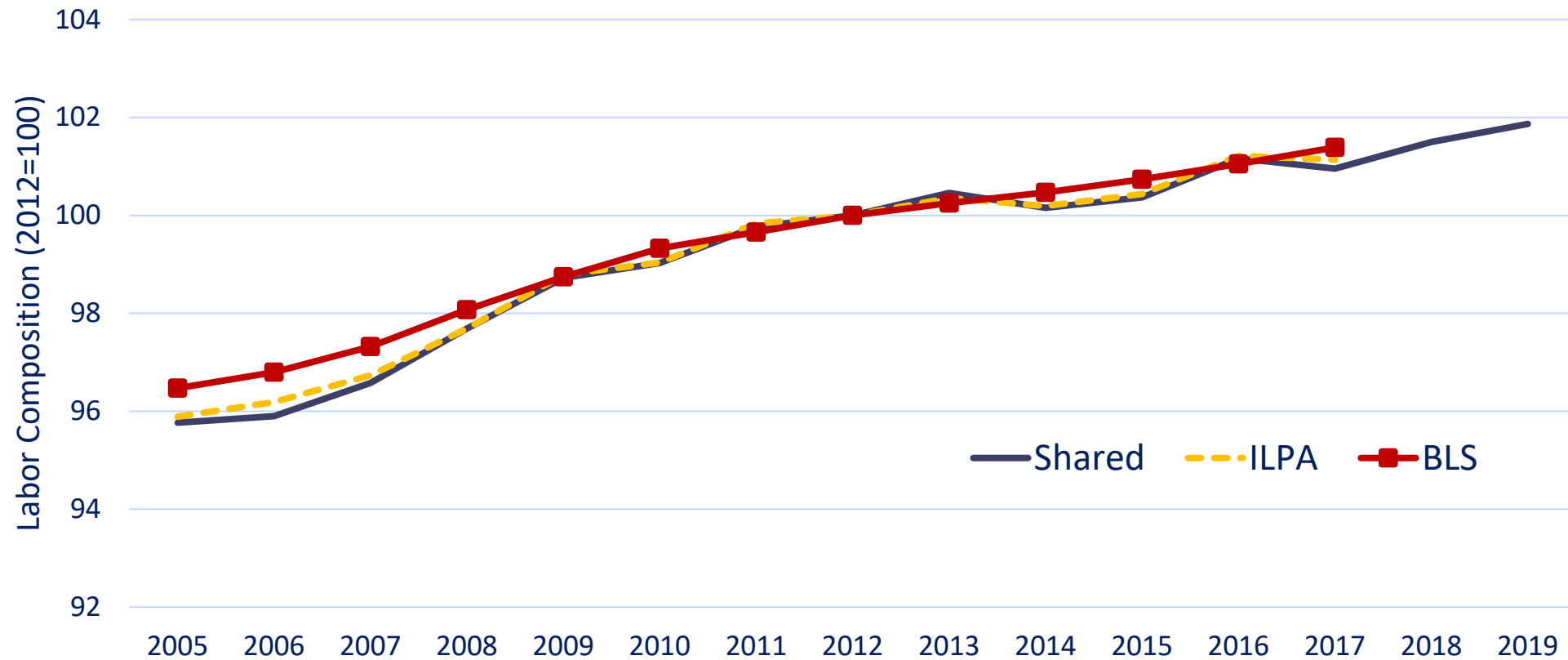
Impact of Adjustments

Warehousing and Storage



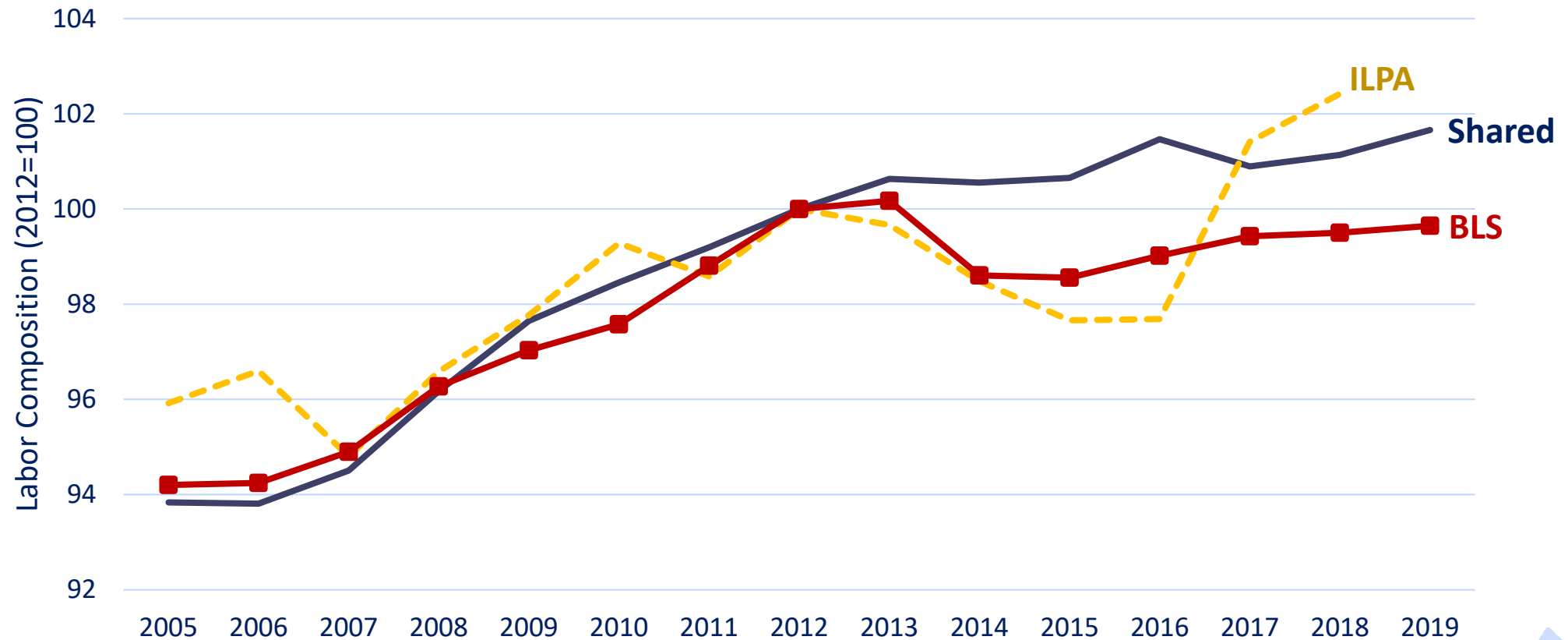
Labor Composition Index

Total Economy



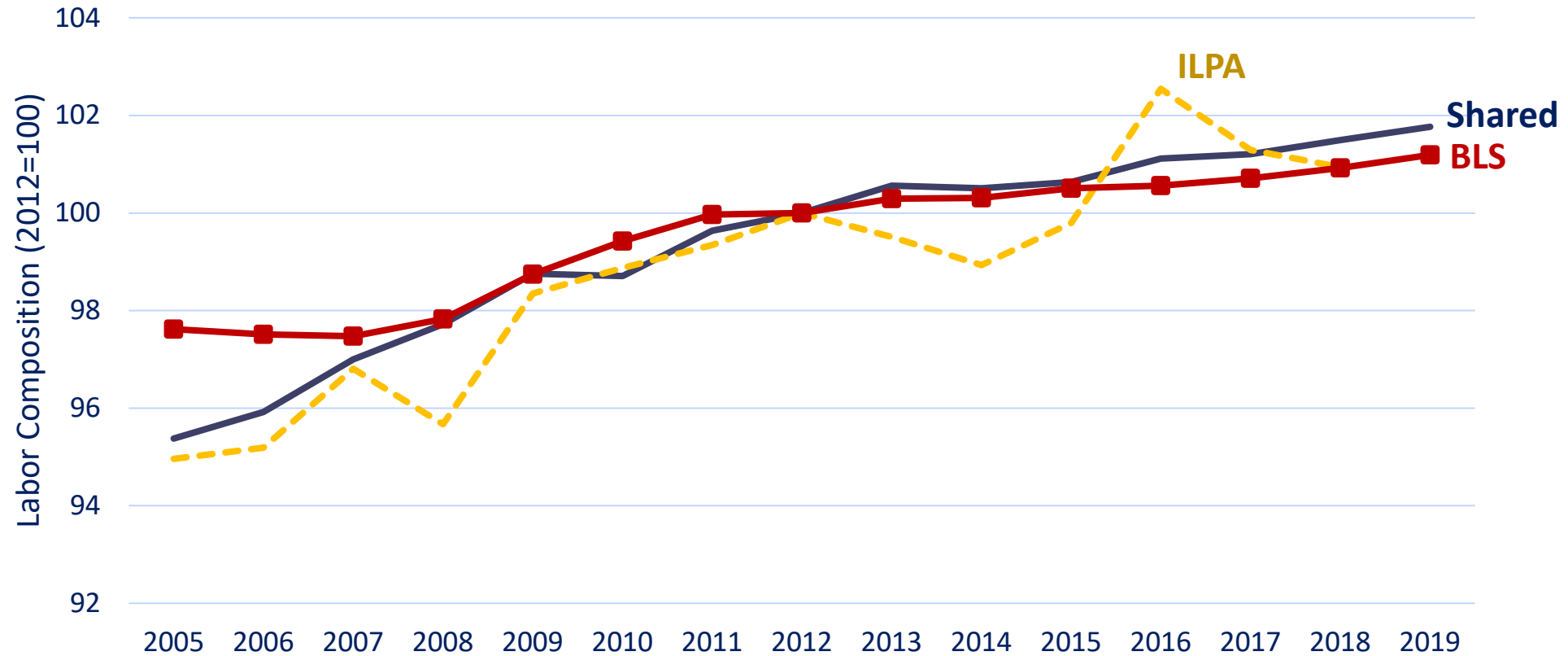
Labor Composition Index

Computer & Electronics Manufacturing (NAICS 334)



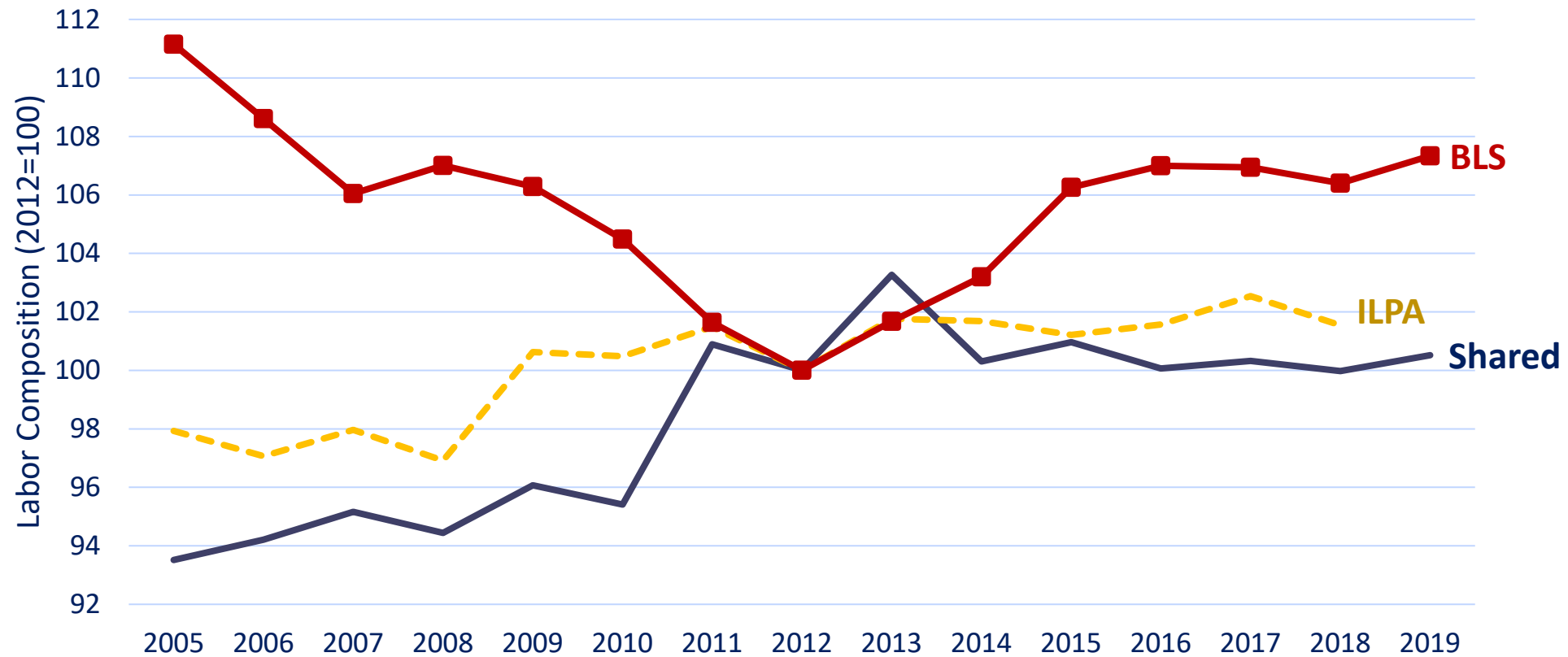
Labor Composition Index

Wholesale Trade (NAICS 42)



Labor Composition Index

Management of Companies (NAICS 55)



Conclusion

- Improved methodology for labor composition
 - ▶ Combines strengths of ACS and CPS
 - ▶ Small area estimation to address thin cells
- Shared methodology for both BEA and BLS
 - ▶ Will be introduced in near future
- Research into more industry detail underway

Contact Information

Jerin Varghese

Economist

Bureau of Labor Statistics

Office of Productivity and Technology

Division of Industry Productivity Studies

varghese.jerin@bls.gov