Global Trade Analysis Project

Income and Factor taxes and Labor flows

Erwin Corong
Center for Global Trade Analysis, Purdue University

GTAP Data Base
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Outline

- Income and Factor Taxes
- Wage flows (Wage and Employment)
- Summary

Income and Factor Taxes

- **GTAP Data Base includes income and factor tax payments, which can be calculated from three headers: EVOS, EVFB and EVFP**
  - Income Taxes: INCTAX = EVFB(e,a,r) – EVOS(e,a,r)
  - Factor Taxes: ETAX(e,a,r) = EVFP(e,a,r) – EVFB(e,a,r)

- **Since GTAP DB version 6, income and factor tax data is based on International Monetary Fund's Government Finance Statistics**
  - Tax coverage:
    - Corporate taxes on income and profits (G111: G1111)
    - Individual taxes on income and profits (G111: G1112)
    - Social Security contributions (G12)
    - Payroll and manpower taxes (G112)
    - Property taxes (G113)

- **GTAP DB v11: All reference years**
  - IMF GFS data: 180 countries covered, though some with missing observations (1997-2020)
  - Supplement IMF data with OECD Global Revenue Statistic Database (1990-2020)
  - GTAP DB v10: (2014 rates based on 2011)

Income and Factor Tax processing

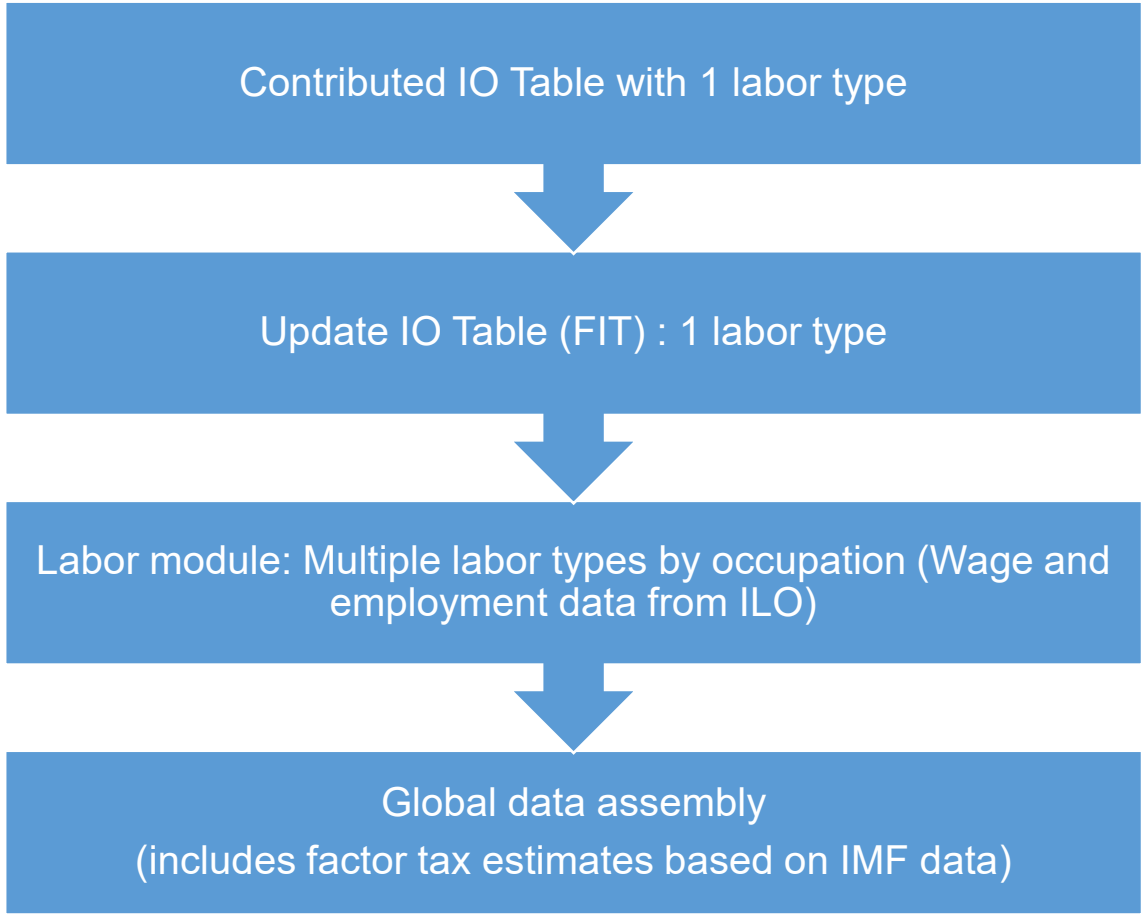
- **Update data extraction and processing (Years 2000-2020, by Wajiha Saeed)**
  - Extract all available data in GFS from 1997 onwards, then convert from money values to ratios to GDP, with GDP from the IMF's International Financial Statistics (180 countries)
  - Process OECD data for additional information (+3 countries)
  - Fill in data for the missing countries by calculating average tax-to-GDP ratios across 183 countries, and applying them to 251 standard GTAP countries in the data build.

- **Implementation**
  - Map GFS tax classifications to GTAP endowments
  - Factor Taxes
    - Social security contributions: Labor taxes
    - Other factor employment taxes: All GTAP endowments (i.e., labor, capital, land and natural resources)
    - Uniform across industries
  - Income Taxes
    - Personal income: Labor income taxes
    - Corporate income tax: Non-labor income taxes
  - Finally, we assume GFS does not account for Domestic Support, so final income taxes are GFS income tax plus land and capital-based Domestic Support (Domestic Support part is recorded in header FBEP)

GTAP DB Labor classification and procedure

- **Version 4-8:**
  - 2 labor types
    - Skilled (professional)
    - Unskilled (production and farm labor)
  - Procedure
    - Labor Force Surveys and Censuses from 13 (originally 15) countries
    - Regression to predict skilled labor shares for countries/regions with no data

- **Version 9-**
  - 5 Labor types by ILO occupation
    - 2 Skilled: Tech/Associate professionals and officials/managers/professionals
    - 3 Unskilled: Clerks, service/shop, agricultural and other workers
  - Details: Next slide



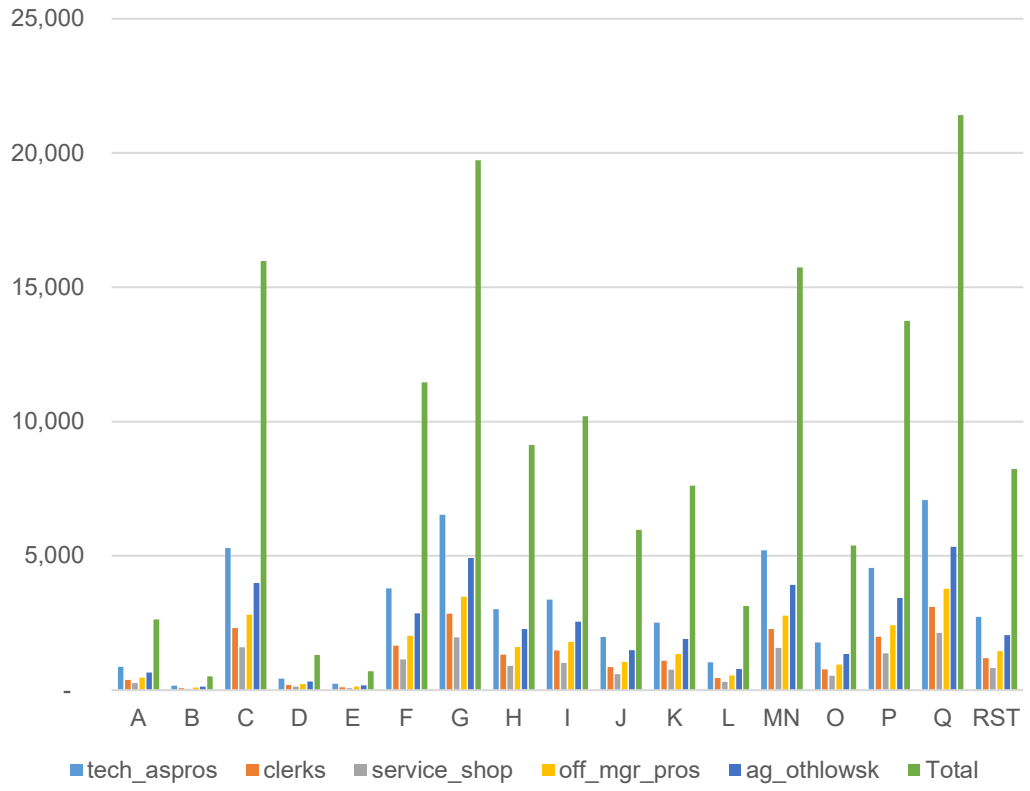
Wage and Employment inputs

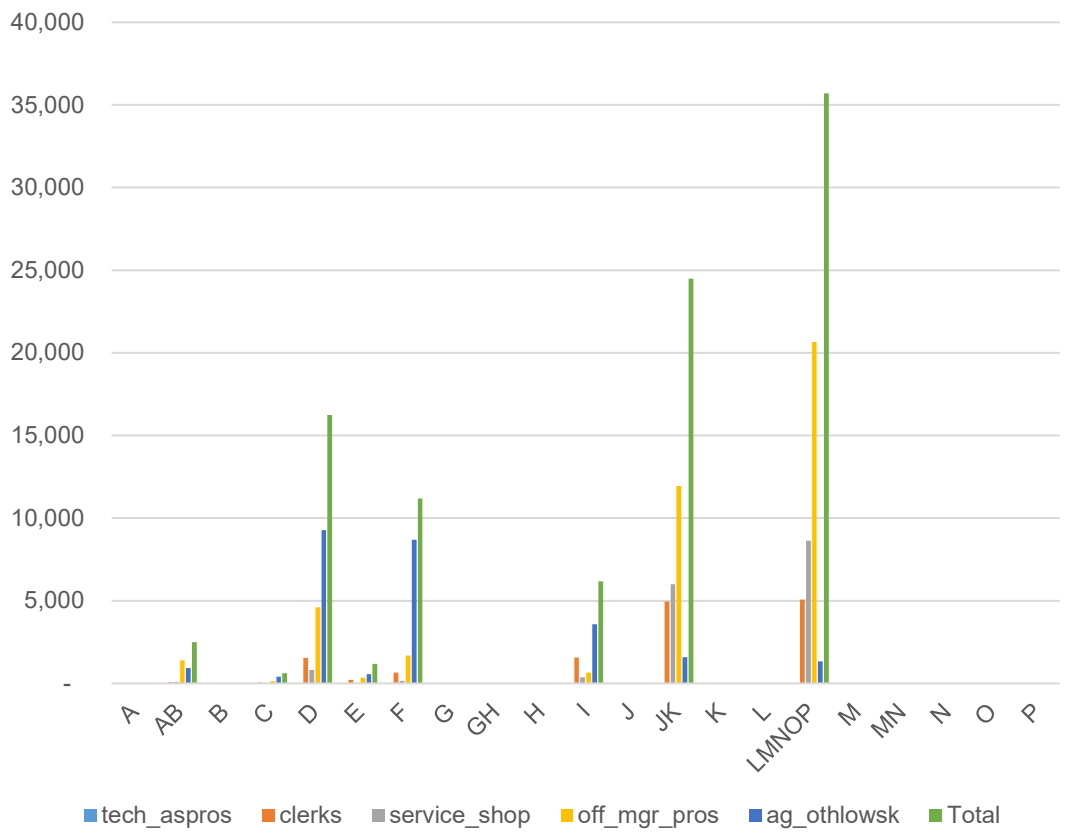
- **Wage and employment data by Weingarden and Tsigas (2010)**
  - Based on ILO Yearbook (2008), ILO wage by occupation by Oostendorp (2005) and national data for China and India
  - Imputed wages for 5 occupations for 48 countries
  - Employment data by ISIC Rev3 industries for 95 countries
  - 20 ISIC Rev3 industries—i.e., Industries A to P
- **Additional processing by Walmsley and Carrico (2013)**
  - Convert hourly wages to US$
  - Impute wages and employment volume across all GTAP sectors and regions
  - Aggregate from 20 to 12 industries, then map to GTAP sectors
- **Disaggregate wage bill for each sector into 5 occupational categories using wage bill shares**
- **Has not been updated since 2010 or version 8 cycle!**

Labor data processing

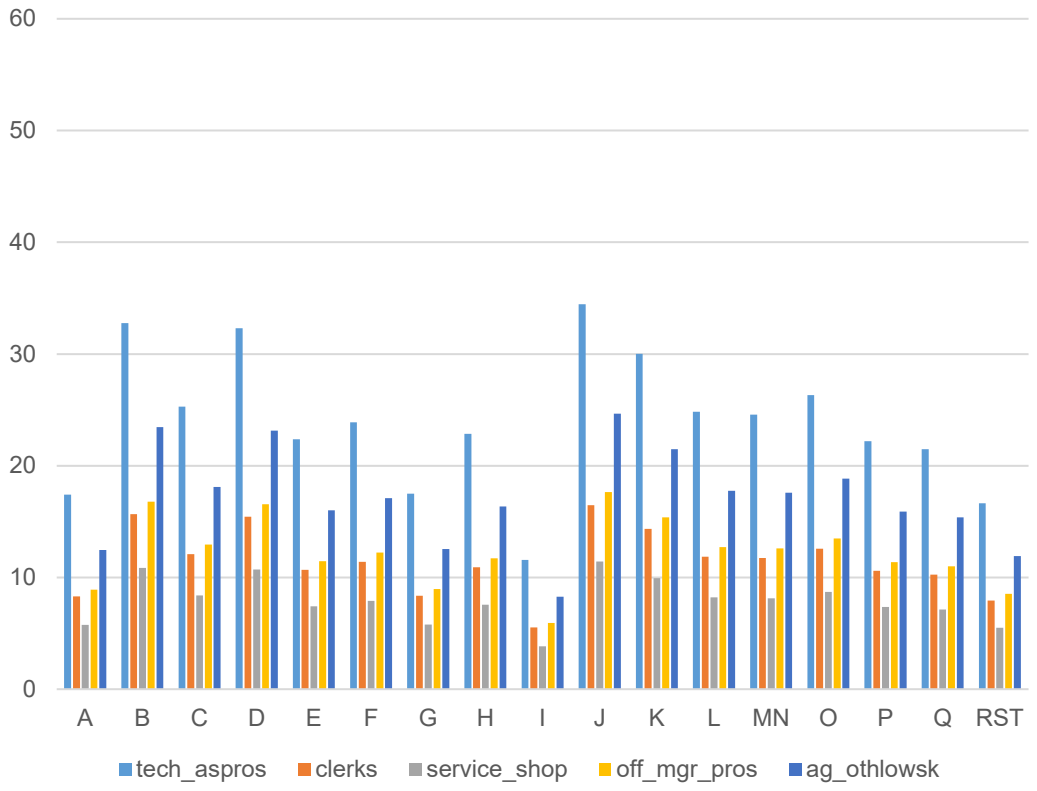
- **Updated ILO data extraction and processing (Years 2000-2019, by Puangchit Pattawee) using R software**
  - ilostat R package
  - Matched and merged wage and employment data: (a) wage by occupation (b) wage by industry; (c) employment by occupation and (d) employment by industry.
- **Updated wage and employment information for 70, mostly developing, countries.**
  - Wage optimization with degree of belief parameter (Tsigas and Weingarden, 2010) to impute wages for 5 occupations and 17 industries (ISIC Rev 4: A,B,C,D,E,F,G,H,I,J,K,L,MN,O,P,Q,RST)

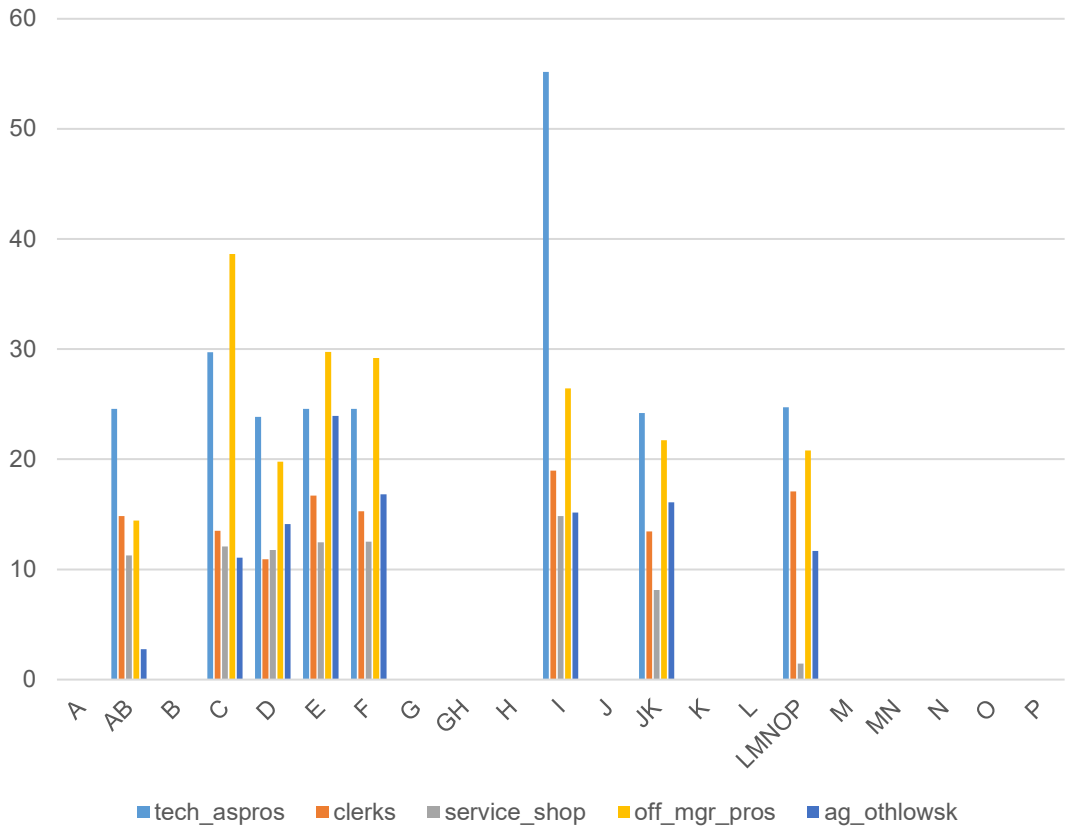
ILO employment data (USA, v11 vs v9-10)





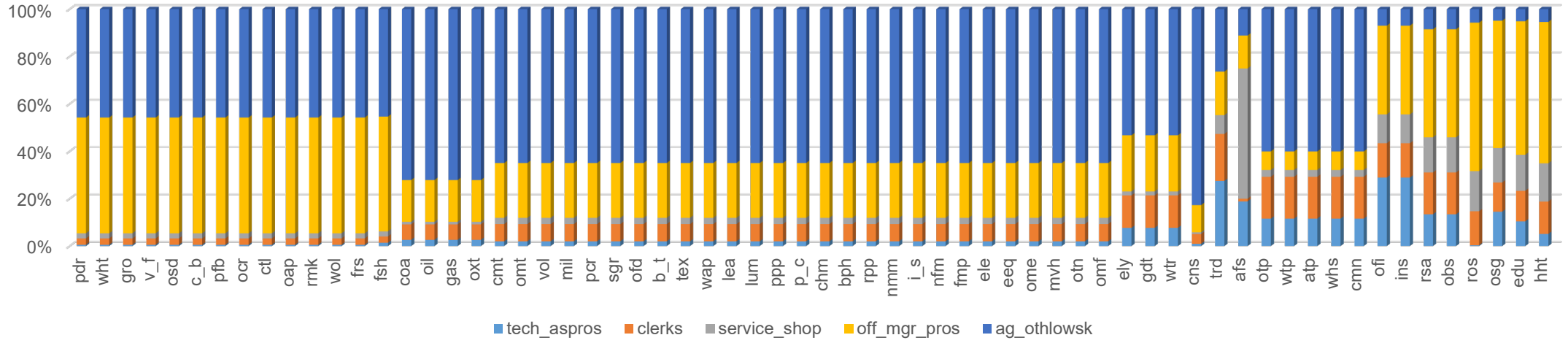
Wage data (USA, v11 vs v9-10)

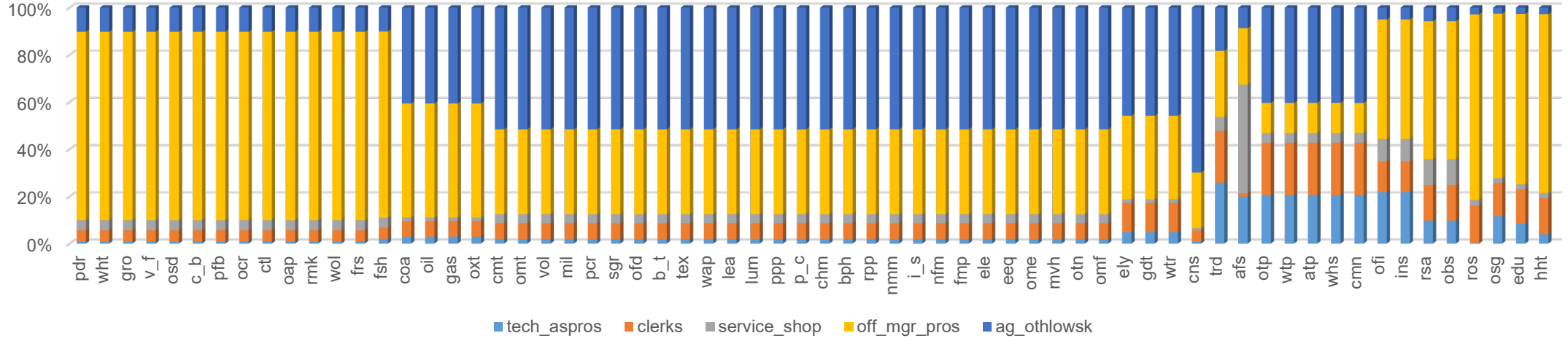




Sector I: Accommodation and Food Service (ISIC Rev 4); Transport and storage (ISIC Rev 3)

Wage bill shares (GTAP v11 vs v9-10, USA)





Looking ahead…

- **GTAP-Labor v11 satellite data**
  - Wage and Employment volume data
  - Combined ILO data with GDLD data to create a 5-dimension Wage and employment matrix:
    - Wage and employment by Occupation x Education x Gender x Activity x Region

- **GTAP DB v12**
  - Update income and factor shares data for 2019
  - Update wage and employment data estimates for all GTAP reference years (2004, 2007, 2011, 2014, 2017 and 2019)

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Comments / Questions

ecorong@purdue.edu