

The U.S. Experience with Employment Projections

Methods and Uses

Michael Wolf

U.S. Bureau of Labor Statistics (BLS)
Employment Projections Program

9 November, 2021



Overview

- BLS Projections Background
- Data Sources and Classifications
- Employment Projections Methods
- Projections Use and Dissemination



U.S. Projections History

- U.S. Secretary of Labor is charged with developing a national employment statistics system
 - ▶ Bureau of Labor Statistics (BLS) is the statistical agency of the Department of Labor
- First Occupational Outlooks produced in 1940s to aide in postwar readjustments
- Comprehensive numerical projections every 2 years since the 1960s



US Employment Projections

- 10-year projections of structural labor market changes
- 2020-30 projections cover 790 occupations and 329 industries
- BLS projections prepared at the national level only
 - ▶ National projections serve as an input for state and local employment projections, which are produced by state governments



Projections Uses

- Workforce planning and policy
 - ▶ Federal workforce development funds sub baccalaureate training, but devolves decisions to the state and local level
 - ▶ Baccalaureate training policy is developed primarily at the state level
- Career development
 - ▶ Students, counselors, and jobseekers making career choice decisions
- Labor market research



Projections Methods Concepts

- Projections are developed through the use of models
- Data availability often determines model selection
- Projections models require assumptions – qualitative research helps validate assumptions and model results



BLS Employment Data Sources

- ▶ Occupational Employment and Wage Statistics (OEWS)
 - Establishment survey for nonagricultural wage-and-salary staffing patterns
- ▶ Current Employment Statistics (CES)
 - Establishment survey for nonagricultural wage-and-salary industry employment
- ▶ Quarterly Census of Employment and Wages (QCEW)
 - Administrative data set for wage-and-salary industry employment
- ▶ Current Population Survey (CPS)
 - Household survey for agricultural industry employment and staffing patterns, self-employed workers

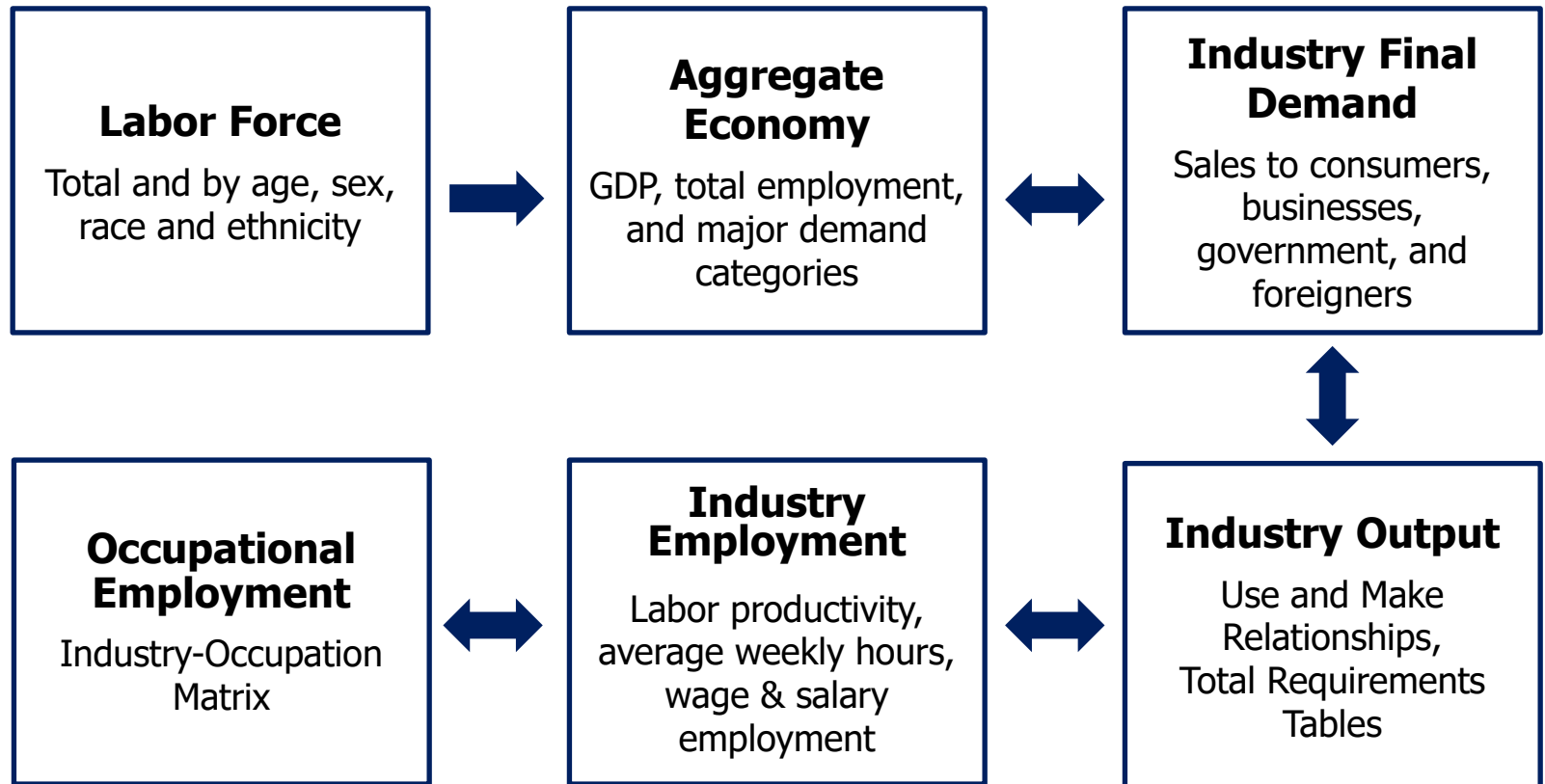


Classifications

- North American Industry Classification System (NAICS) for industries
 - ▶ Updated every 5 years
 - ▶ 1057 detailed industries
- Standard Occupational Classification (SOC) for occupations
 - ▶ Revised every 8-10 years
 - ▶ 820 detailed occupations
 - ▶ 24 occupations added in 2010, 37 added in 2018
 - ▶ 90% of occupations unchanged by revisions



BLS Employment Projections Process



Labor Force and Aggregate Economy

- Labor force projections serve as a supply constraint on overall projections of employment
- Labor force participation rates projected for 128 age-race-sex cohorts, based on historical patterns
- Aggregate economy projections provide key assumptions about the overall economy:
 - ▶ Demographics
 - ▶ Fiscal policy
 - ▶ Trade
 - ▶ Productivity



Final Demand

- The Aggregate Economy projections provide a projected level of Final Demand for:
 - ▶ Personal Consumption Expenditures (PCE)
 - ▶ Private Investment in Equipment (PEQ)
 - ▶ Private Investment in Intellectual Property (IPP)
 - ▶ Residential and Nonresidential Structures
 - ▶ Changes in Private Inventories (CIPI)
 - ▶ Exports and Imports of goods and services
 - ▶ Government Consumption and Investment
- These levels are not detailed enough to get industry-level output or employment, so models are needed to project final demand in more detail

Final Demand Methods

- PCE uses the Houthakker-Taylor model of consumer behavior to project consumption expenditures for 78 categories
 - ▶ Model based on historical relationships between consumption and disposable income, prices, and inventories
- PEQ and IPP are projected for 32 categories using the Modified Neoclassical model
 - ▶ Model based on historical relationships between investment and GDP, capital stock, and the rental cost of capital

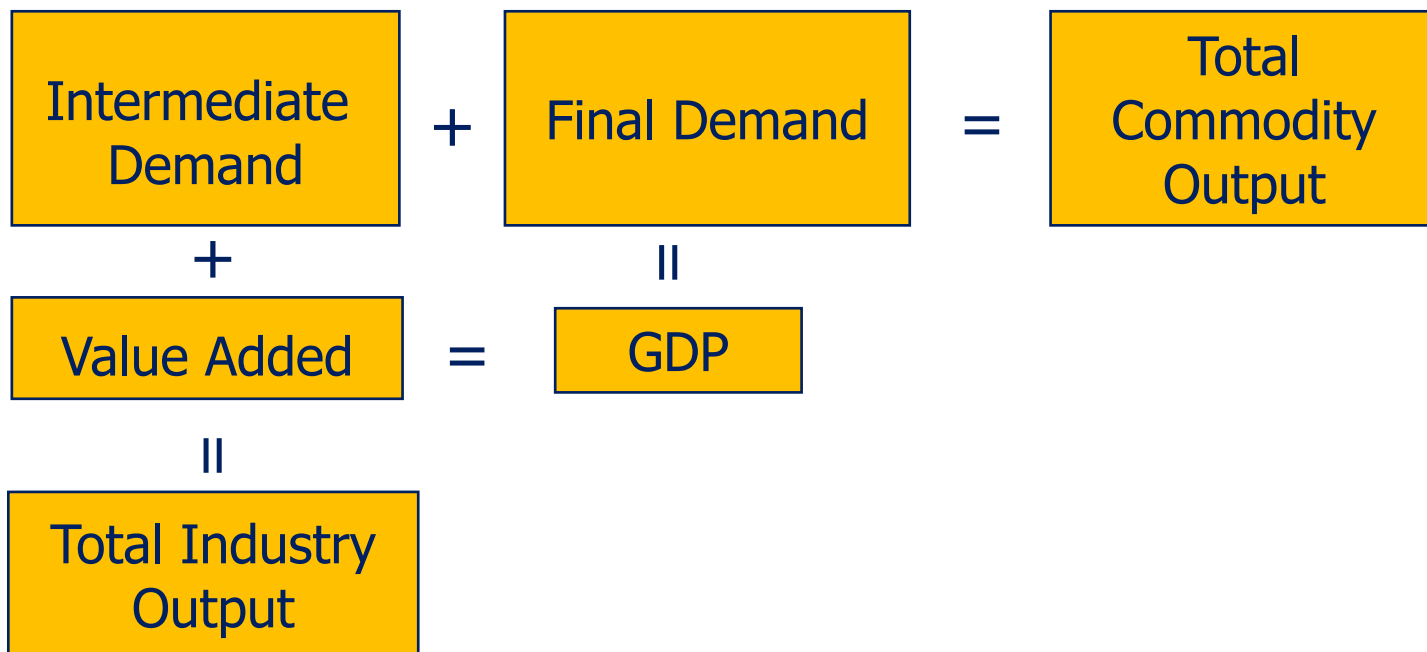


Final Demand and Industry Output

- Total Industry Output, not Final Demand, is the key determinant of employment needs by industry
- BLS uses an Input-Output system to model relationships between final demand and industry output
- The Input-Output system both connects the industry projections to the aggregate economy and ensures consistency in industry projections based on inter-industry relationships



Input-Output Analysis



- Intermediate demand: flows of goods and services which are not produced by the industry which produces the final product
- Input-Output (I-O) methods model relationships between final demand and total industry output

Example I-O Matrix

Use table: Commodities used by industries and final users

		INDUSTRIES									Total Interm. Use	FINAL DEMAND						GDP	TOTAL COMMODITY OUTPUT
		Agriculture	Mining	Construction	Manufacturing	Transportation	Trade	Financial	Services	Other		PCE	PFI	CBI	X	M	GOV		
COMMODITIES	Agriculture																		
	Minerals																		
	Construction																		
	Manufacturing																		
	Transportation																		
	Trade																		
	Finance																		
	Services																		
	Other																		
	Noncomparable Imports																		
	Total Interm. inputs																		
VALUE ADDED	Compensation																		
	Taxes																		
	GOS																		
	Total																		
TOTAL INDUSTRY OUTPUT																			



Projecting Industry Employment

- Total hours worked in each industry is a function of Industry Output and the Industry wage rate
- Average annual hours in each industry are a function of the unemployment rate
- Industry employment is determined by identity:
$$\text{Employment} = \text{Hours} / \text{Average Annual Hours}$$
- Employment across industries is controlled to aggregate employment from a macroeconomic model



Projecting Occupational Employment

- Allocate projected industry employment to occupations using a staffing-pattern matrix
- Occupational ratios (share of industry coefficients) change over time
- Could use quantitative methods to project ratios if sufficient historical data available
- BLS does not have comparable historical data, so use qualitative methods

Factors Affecting Occupational Utilization

- Automation technology
- Domestic outsourcing
- Offshoring (international outsourcing)
- Occupational substitution
- Change in the mix of industry sector outputs



Occupational Openings

- Openings to enter an occupation result from:
 - ▶ New jobs created
 - ▶ Occupational separations
 - Workers who leave the labor force entirely (e.g., retire)
 - Workers who find employment in a different occupation
- Openings caused by separating employees often outweigh new job creation as a source of opportunities

Projecting Separations

- Independent from main projections methods
- Use household survey data to estimate historical labor force exits and occupational transfers
- Run regression models to estimate probability of transfers and exits based on various worker characteristics
- Apply regression results to current worker demographics by occupation to obtain projected annual transfer and exit rates
- Apply these rates to the average of base and projected employment to get annual transfers and exits by occupation
- Separations is the sum of labor force exits and occupational transfers



Qualitative Research

- BLS conducts research to help develop and analyze the projections data
 - ▶ Data
 - Historical industry employment, staffing patterns, industry-specific data sources
 - ▶ Interviews and site visits
 - Professional organizations, schools, government agencies, employers
 - ▶ Published research and reports
 - Professional journals, newspapers, trade publications

Evaluation of Projections

- When the target year of projections is reached, BLS evaluates the results:
 - ▶ Where are the errors?
 - ▶ Could they have been avoided?
 - ▶ Should our methods be modified?
 - ▶ Are we misleading our users?



Occupational Outlook Handbook

- Premier career information resource since 1946
- Redesigned as a Web publication in 2012
- Provides detailed information on 560 occupations
 - ▶ What workers do, work environment, how to enter, pay, and job outlook
- Averages 1.5 million unique visitors per month on the BLS website

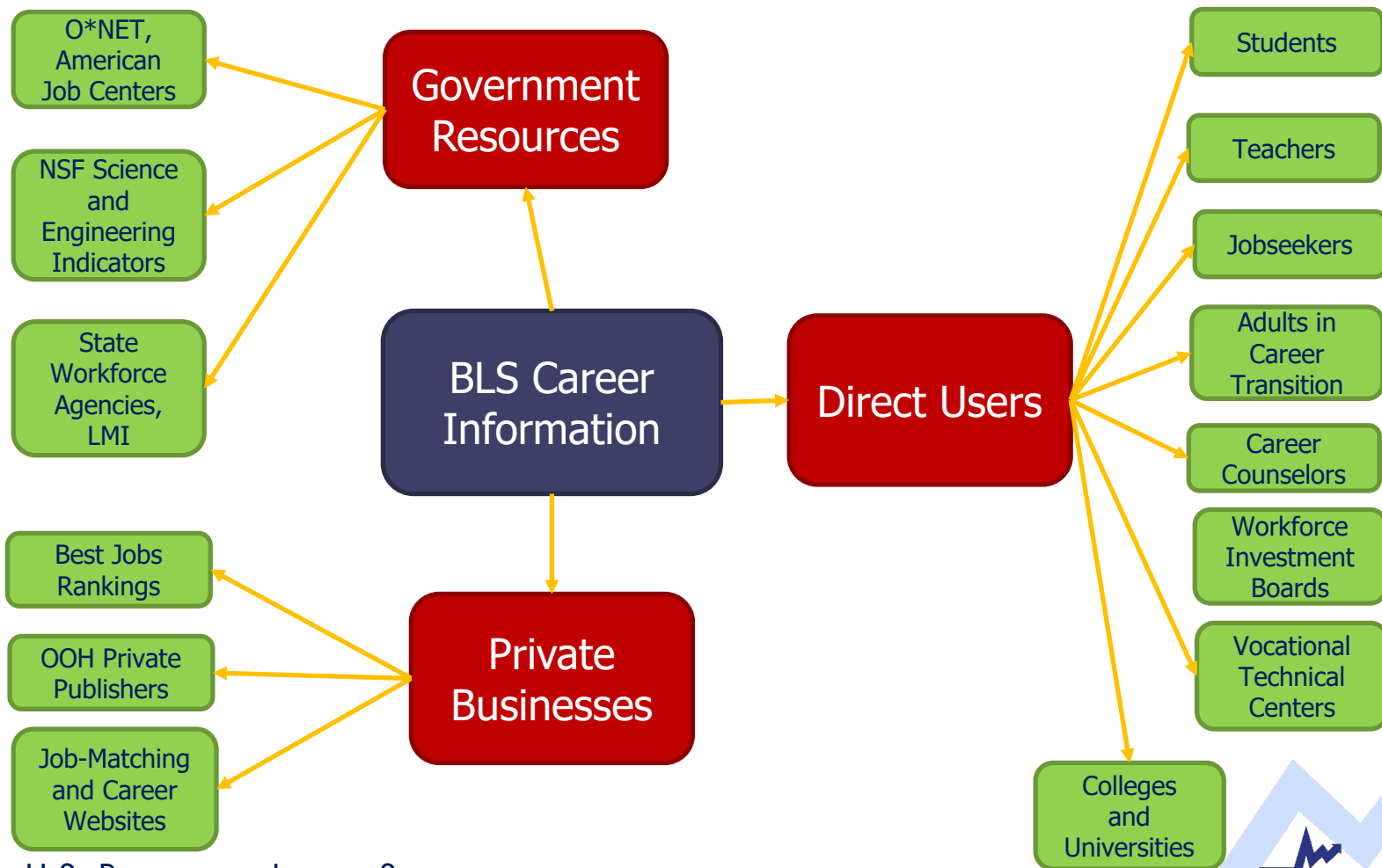


The screenshot shows the Occupational Outlook Handbook website. The browser address bar displays "https://www.bls.gov/oooh/". The page header includes the U.S. Bureau of Labor Statistics logo and navigation links for HOME, SUBJECTS, DATA TOOLS, PUBLICATIONS, ECONOMIC RELEASES, STUDENTS, and BETA. A search bar is located in the top right corner. The main content area features a dark blue banner with the text "OCCUPATIONAL OUTLOOK HANDBOOK" and a search box. Below the banner, there is a "Home" section with a "Search Handbook" button. The "Home" section includes a link to the "Occupational Outlook Handbook" and a note about the CareerInfo app. The "OCCUPATION GROUPS" section lists various categories such as Architecture and Engineering, Arts and Design, Building and Grounds Cleaning, Business and Financial, Community and Social Service, Computer and Information Technology, Construction and Extraction, Education, Training, and Library, Entertainment and Sports, Farming, Fishing, and Forestry, Food Preparation and Serving, and Healthcare. The "SELECT OCCUPATIONS BY" section includes dropdown menus for "2019 Median Pay", "Entry-Level Education", "On-the-job Training", "Number of New Jobs (Projected)", and "Growth Rate (Projected)", along with a "GO" button. The "FEATURED OCCUPATION" section highlights "Epidemiologists" with a photograph of two people and a brief description: "Epidemiologists are public health professionals who investigate patterns and causes of disease and injury in humans." A link to "view profile" is provided.



Use of BLS Employment Projections Data

■ Career information: Preparation and decision-making



Use of BLS Employment Projections Data

- Policymaking and funding: Program planning
 - ▶ State Labor Market Information offices to meet contract deliverables for Workforce Information grants
 - ▶ State and local Workforce Investment Boards for allocating funding for job training
 - ▶ Community colleges, universities, and other training providers to plan program offerings to show “need” (hiring needs of employers)
- Research and analysis for a changing workforce



Contact Information

Michael Wolf

Division Chief

Employment Projections Program

www.bls.gov/emp

202-691-5714

wolf.michael@bls.gov

