

The Impact of AI on Labor Markets

RSQE Annual Conference

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Outline

- Long-term demographics and implications for automation and AI
- Assessing which occupations are most exposed to labor market changes with the rise of AI
 - Approaches in the literature
 - Vasilauskas/Horrigan
- Next steps in our research

Long-term demographic changes and impacts on labor markets

Average monthly changes in employment will slow down significantly over the next ten years, especially in Michigan

Congressional Budget Office U.S. Employment Projections

Year	CBO Baseline Projections Civilian Employment Current Population Survey concept	Average Monthly Employment Change
2014	146,319,000	--
2024	161,469,000	126,249
2034	171,045,000	68,958

Published January 2025

Michigan Occupational Employment Projections, 2022-2032

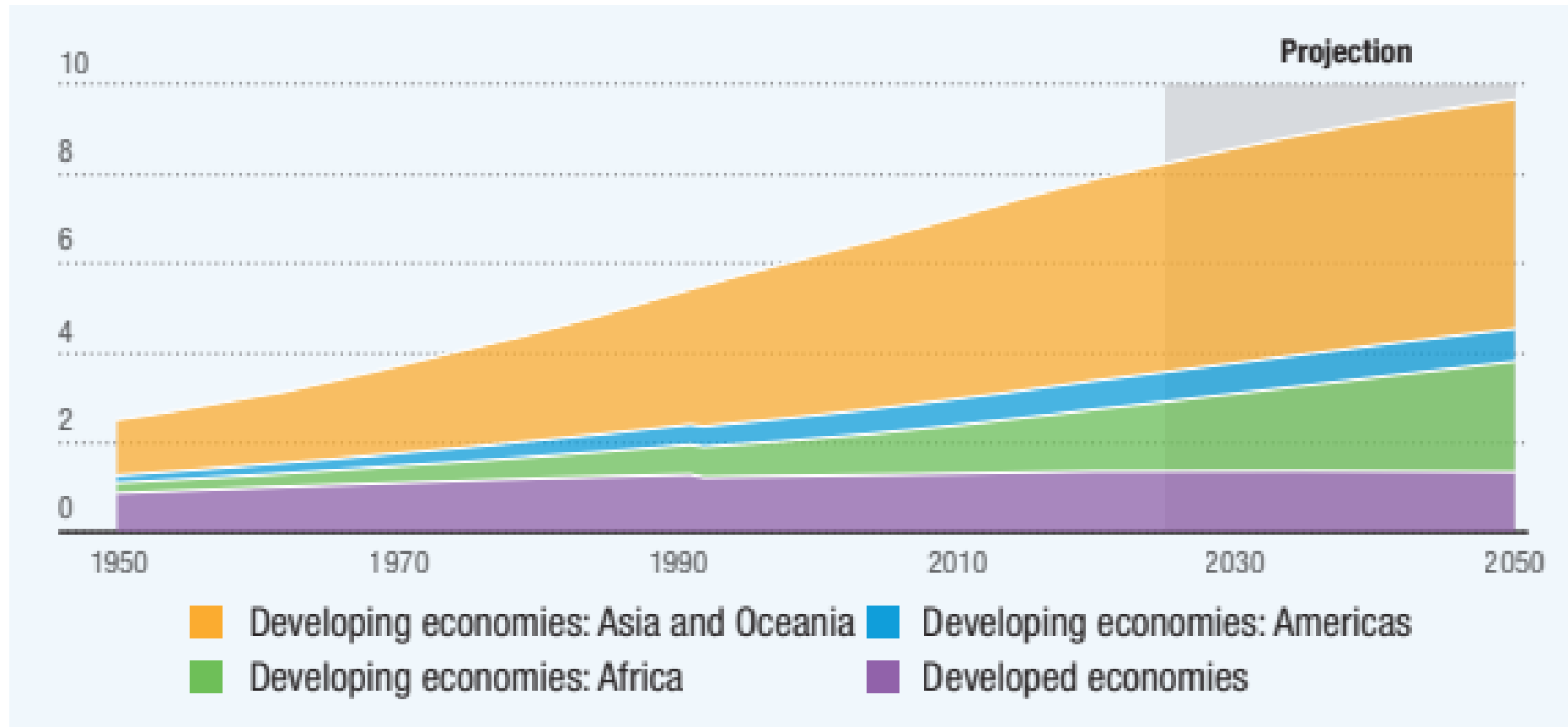
Year	Michigan Projections	Average Monthly Employment Change
2012	4,285,470	--
2022	4,524,550	1,992
2032	4,549,560	208

Published 2014, 2024



Developing economies experience fastest population growth

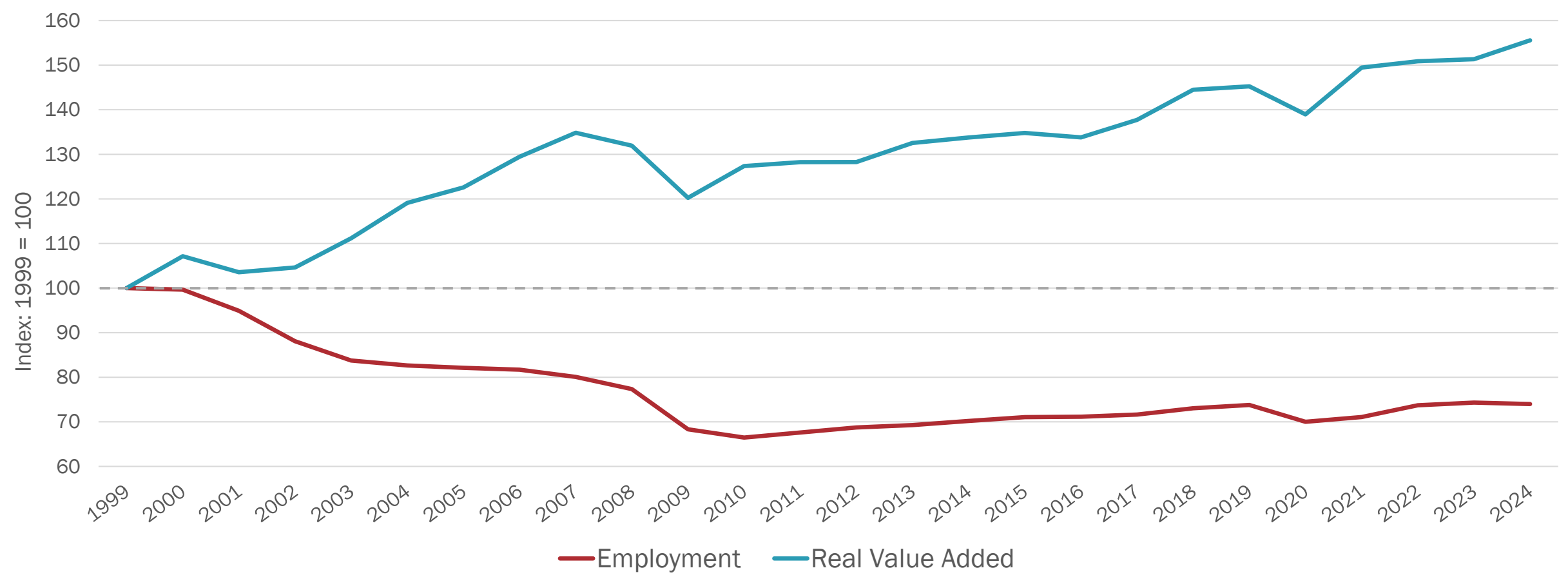
World population by group of economies, billions



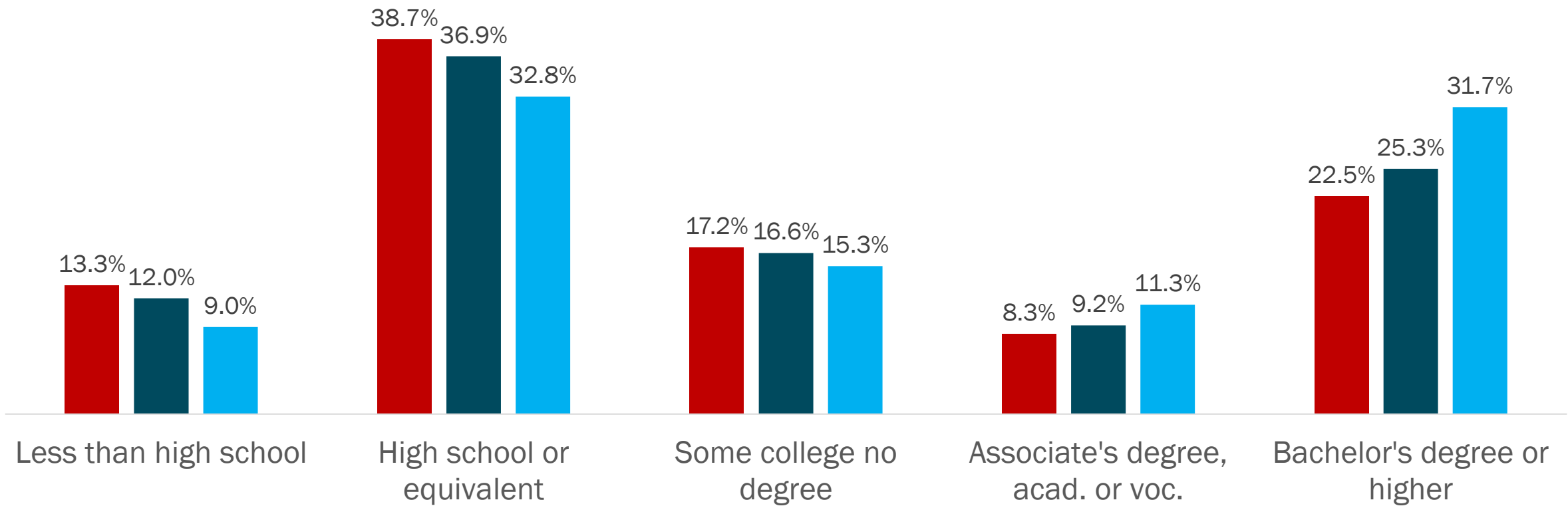
Source: UNCTAD, UNCTADstat.

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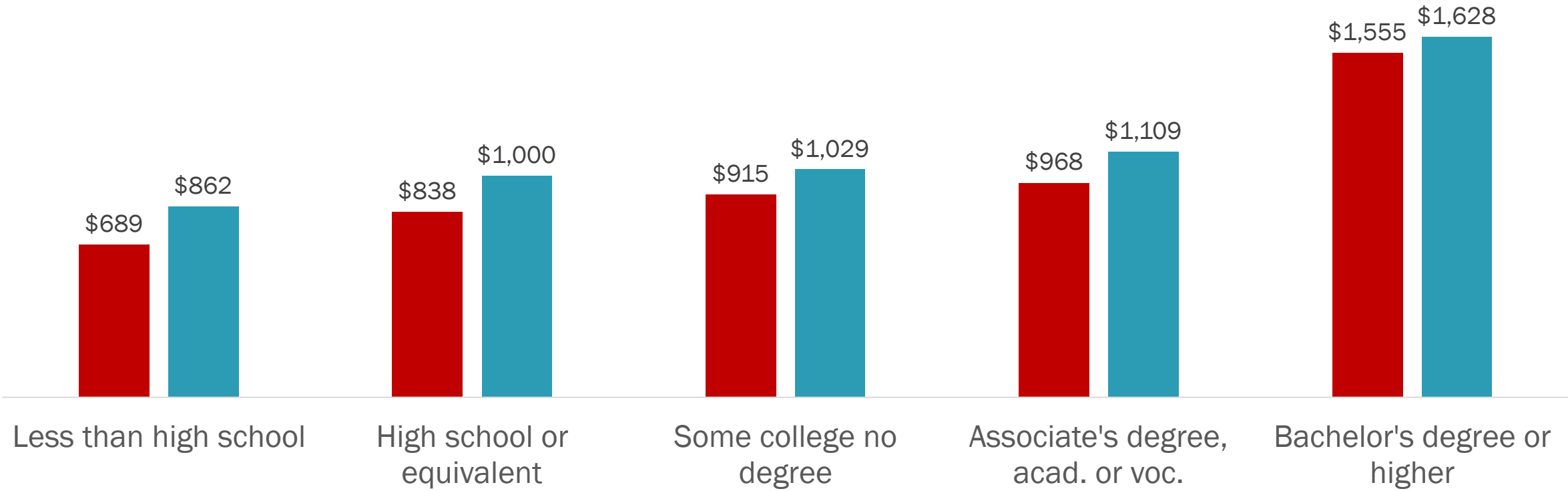
United States manufacturing industry employment and real value added, 1999-2024



Changes in the educational attainment distribution of employees in Manufacturing: 1999, 2007, and 2019



Median weekly earnings in 2024 by *education* for all wage and salary workers ages 25 and older – comparing groups **with** and **without** a license or certification



**Assessing which occupations are exposed to
labor market changes with the rise of AI**

Different approaches in the emerging literature

Existing Literature: Assessing theoretical exposure to AI and estimating effects on the labor market

O*NET Task-based Rubrics

Studies that use task-based rubrics to define what AI can theoretically perform or assist with, scoring occupations, industries, or regions by these measures.

e.g. Felten, Raj, Seamans (2021, 2023); Pew Research (2023); Eloundou (2023); Upjohn (2025)

Detecting Labor Market Impacts for Exposed Occupations

Given a framework for what constitutes an AI-exposed group of occupations, analysis of labor force characteristics for these occupations over time.

e.g. Canaries in the Coal Mine? - Brynjolfsson, Chandar, Chen (2025); Generative AI as Seniority-Biased Technological Change - Hosseini & Lichtinger (2025)

Chat and API Usage Data

*Studies that map LLM usage data to O*NET task **frameworks**, and subsequently to occupations.*

e.g. Microsoft Research (2025); Anthropic Economic Index (2025)

"AI Exposure and the Future of Work: Linking Task-Based Measures to U.S. Occupational Employment Projections"

Vasilauskas, Erik and Mike Horrigan, 2025
W.E. Upjohn Institute for Employment Research,
Kalamazoo, MI

<https://research.upjohn.org/reports/315/>

Sample of the O*NET Work Activities Survey

The Generalized Work Activities Survey contains questions about 41 Work Activities that are common across all occupations. For each work activity, participants are asked to rate the *importance* and *level, or intensity* of the activity in their current job.

Pew Research Center (2023), identified a subset of 16 cognitive and analytical work activities with high potential exposure to AI.

Work activities with high exposure to AI

Activity ID	Activity
4.A.1.a.1	Getting information
4.A.1.a.2	Monitoring processes, materials, or surroundings
4.A.2.a.2	Processing information
4.A.2.a.3	Evaluating information to determine compliance with standards
4.A.2.a.4	Analyzing data or information
4.A.2.b.1	Making decisions and solving problems
4.A.2.b.2	Thinking creatively
4.A.2.b.5	Scheduling work and activities
4.A.3.a.3	Controlling machines and processes
4.A.3.a.4	Operating vehicles, mechanized devices, or equipment
4.A.3.b.1	Working with computers
4.A.3.b.2	Drafting, laying out, and specifying technical devices, parts, and equipment
4.A.3.b.6	Documenting/recording information
4.A.4.a.8	Performing for or working directly with the public
4.A.4.c.1	Performing administrative activities
4.A.4.c.3	Monitoring and controlling resources

Note: The activity ID is the identifier for a work activity as listed in the O*NET data.

Source: Pew Research Center analysis of O*NET (Version 27.3).

"Which U.S. Workers Are More Exposed to AI on Their Jobs?"

PEW RESEARCH CENTER

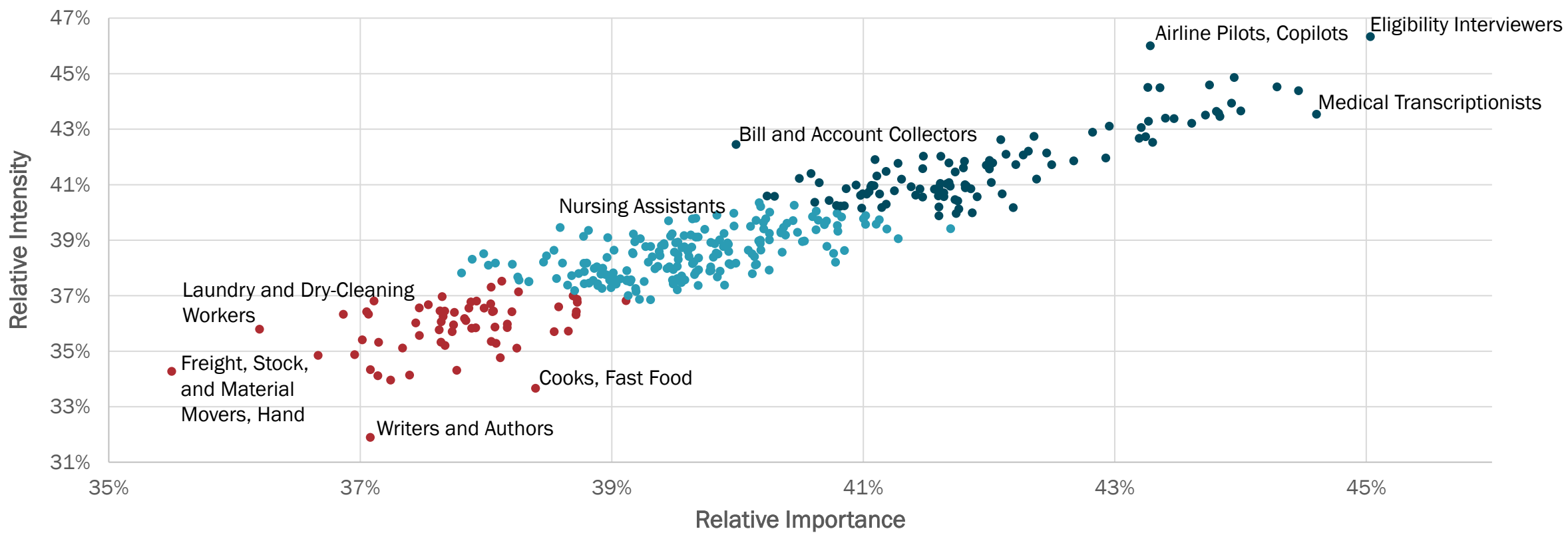
Adapting and extending Pew's task-based framework

- We calculate separate relative importance and relative intensity scores of high AI exposure tasks for each occupation.
 - For example, for each of the 41 tasks for a given occupation, incumbents are asked to rank the importance of the task on a Likert scale from 1 to 5
 - We add up these scores for high AI exposure tasks and express them as a share of total importance scores across all 41 tasks
 - We adopt a similar procedure to create a relative intensity score for high AI exposure tasks
- This yields two continuous measures per occupation: *the relative importance* of high-exposure tasks and *the relative intensity*.

Adapting and extending Pew's task-based framework

- Using these two dimensions, we apply a k-means clustering algorithm with Euclidean distance and $k = 3$ to group occupations into three tiers of AI exposure. The resulting Greatest Exposure cluster accounts for approximately 25 percent of total U.S. payroll employment, aligning closely with Pew's top quartile of exposed occupations.
- To improve the stability and interpretability of the clustering results, we restrict our analysis to occupations with at least 50,000 total employment in the 2023 BLS Occupational Employment and Wage Statistics data.
- We then merge these exposure classifications with occupational employment and wage data. Ten-year employment projections (2023–2033) are taken from the BLS Occupational Employment Projections program.

Cluster Assignments, Occupations sorted by relative importance and intensity of high AI-exposure work activities



Occupations with relatively: • Low Importance and Intensity • Medium Importance and Intensity • High Importance and Intensity

In the next ten years,
among
occupations
with the
greatest
exposure to AI

Those
requiring a BA
or higher will
grow by over
640,000
or 14%

Those
requiring high
school or less
will decline by
over 284,000
or 6%

In the next ten years,
among
occupations
with the
lowest
exposure to AI

Those
requiring a BA
or higher will
grow by over
183,000
or 4%

Those
requiring high
school or less
will grow by
grow by over
898,000
or 20%

Occupations within the Greatest Exposure cluster, typically requiring high school or less, include customer service representatives, and administrative support roles that are projected to decline.

Projected Declining Occupations in Greatest Exposure Cluster (HS or Less)					
SOC Code	Title	Annual Median Wage	Employment 2023	Projected Employment Change, 2023-33	Annual Growth Rate, 2023-33
43-4051	Customer Service Representatives	\$ 39,680	2,954,600	(148,800)	-0.5%
43-9061	Office Clerks, General	\$ 40,480	2,645,800	(147,500)	-0.6%
43-3071	Tellers	\$ 37,640	350,300	(51,400)	-1.6%
43-9021	Data Entry Keyers	\$ 37,790	163,900	(41,000)	-2.8%
43-3051	Payroll and Timekeeping Clerks	\$ 52,240	160,300	(24,200)	-1.6%
43-3011	Bill and Account Collectors	\$ 44,250	196,500	(18,600)	-1.0%
51-9061	Inspectors, Testers, Sorters, Samplers, and Weighers	\$ 45,850	595,500	(17,800)	-0.3%
43-4111	Interviewers, Except Eligibility and Loan	\$ 40,300	169,100	(16,700)	-1.0%
13-1031	Claims Adjusters, Examiners, and Investigators	\$ 75,050	345,200	(15,200)	-0.4%
43-4071	File Clerks	\$ 38,130	87,200	(13,300)	-1.6%
43-9041	Insurance Claims and Policy Processing Clerks	\$ 46,900	271,800	(10,500)	-0.4%
43-6012	Legal Secretaries and Administrative Assistants	\$ 50,680	154,200	(7,900)	-0.5%
51-8031	Water and Wastewater Treatment Plant and System Operators	\$ 54,890	124,700	(7,500)	-0.6%
41-3011	Advertising Sales Agents	\$ 61,270	111,600	(7,400)	-0.7%
43-6014	Secretaries and Administrative Assistants, Except Legal, Medical, and Executive	\$ 44,280	1,982,300	(6,100)	0.0%
43-4171	Receptionists and Information Clerks	\$ 35,840	1,054,500	(5,700)	-0.1%
27-1023	Floral Designers	\$ 34,690	53,700	(5,600)	-1.1%
43-4121	Library Assistants, Clerical	\$ 34,020	87,700	(5,000)	-0.6%
43-4131	Loan Interviewers and Clerks	\$ 47,380	206,100	(4,900)	-0.2%
43-3061	Procurement Clerks	\$ 46,670	63,300	(4,200)	-0.7%

Occupations within the Greatest Exposure cluster, typically requiring Bachelor's degree or higher. This cohort includes technical, financial, and analytical roles that are projected to expand.

Projected Increasing Occupations in Greatest Exposure Cluster (Bachelor's degree or higher)					
SOC Code	Title	Annual Median Wage	Employment 2023	Projected Employment Change, 2023-33	Annual Growth Rate, 2023-33
13-2011	Accountants and Auditors	\$ 79,880	1,562,000	91,400	0.6%
15-1212	Information Security Analysts	\$ 120,360	180,700	59,100	2.9%
15-1211	Computer Systems Analysts	\$ 103,800	527,200	56,500	1.0%
13-2052	Personal Financial Advisors	\$ 99,580	321,000	55,000	1.6%
17-2112	Industrial Engineers	\$ 99,380	336,600	40,900	1.2%
41-3031	Securities, Commodities, and Financial Services Sales Agents	\$ 76,900	513,800	34,100	0.6%
29-1127	Speech-Language Pathologists	\$ 89,290	180,800	33,300	1.7%
17-2141	Mechanical Engineers	\$ 99,510	291,900	32,100	1.0%
15-2031	Operations Research Analysts	\$ 83,640	123,300	28,300	2.1%
15-1253	Software Quality Assurance Analysts and Testers	\$ 101,800	205,000	24,200	1.1%
15-1241	Computer Network Architects	\$ 129,840	177,800	23,900	1.3%
17-2051	Civil Engineers	\$ 95,890	341,800	22,100	0.6%
13-1041	Compliance Officers	\$ 75,670	403,900	21,900	0.5%
17-2071	Electrical Engineers	\$ 106,950	189,100	17,200	0.9%
19-1042	Medical Scientists, Except Epidemiologists	\$ 100,890	146,600	16,800	1.1%
21-1012	Educational, Guidance, and Career Counselors and Advisors	\$ 61,710	360,800	16,200	0.4%
11-9041	Architectural and Engineering Managers	\$ 165,370	210,200	11,600	0.5%
17-1011	Architects, Except Landscape and Naval	\$ 93,310	127,300	9,900	0.8%
17-2072	Electronics Engineers, Except Computer	\$ 119,200	98,700	8,900	0.9%
15-1254	Web Developers	\$ 84,960	94,100	8,500	0.9%
13-1141	Compensation, Benefits, and Job Analysis Specialists	\$ 74,530	103,700	7,200	0.7%
15-1242	Database Administrators	\$ 101,510	80,500	6,600	0.8%
15-1243	Database Architects	\$ 134,700	61,400	6,600	1.0%

Source: O*NET Work Activities Database (2023), Bureau of Labor Statistics Employment Projections (2023-2033), Rakesh Kochhar, "Which U.S. Workers Are More Exposed to AI on Their Jobs?" (2023), Author's Calculations

For occupations requiring some college, a certification, or an associate's degree, outcomes are mixed.

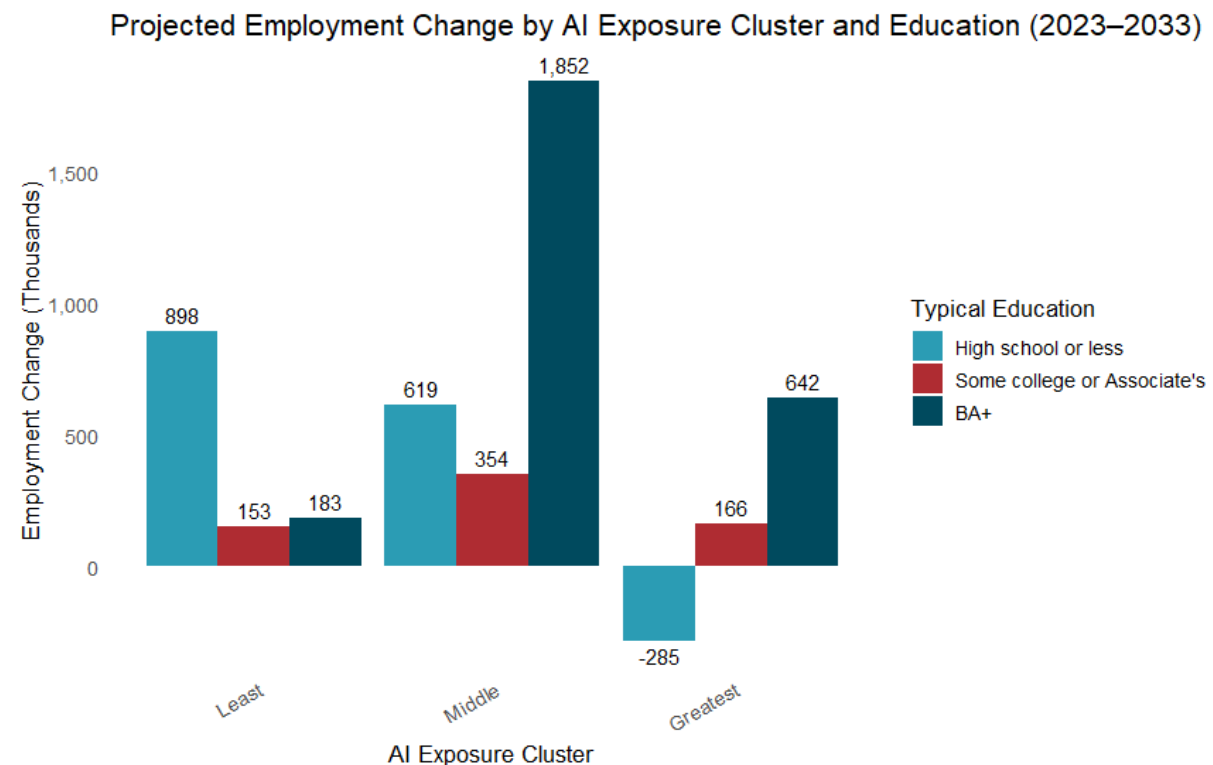
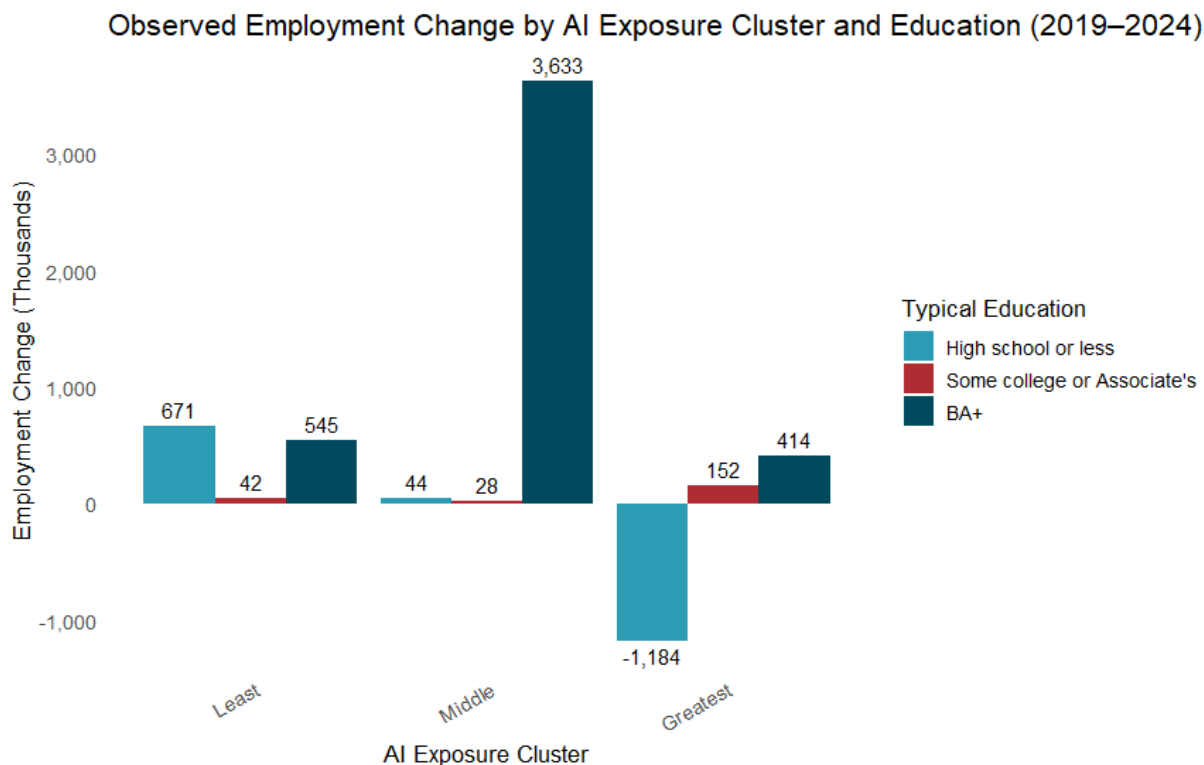
Within the Greatest Exposure cluster, this group includes a diverse array of technical and administrative roles.

Occupations in Greatest Exposure Cluster (Some college, postsecondary, or Associate's)					
SOC Code	Title	Annual Median Wage	Employment 2023	Projected Employment Change, 2023-33	Annual Growth Rate, 2023-33
31-9092	Medical Assistants	\$ 42,000	783,900	118,000	1.4%
53-3032	Heavy and Tractor-Trailer Truck Drivers	\$ 54,320	2,211,300	102,000	0.5%
15-1232	Computer User Support Specialists	\$ 59,240	725,300	37,200	0.5%
49-3011	Aircraft Mechanics and Service Technicians	\$ 75,020	141,400	7,300	0.5%
27-4011	Audio and Video Technicians	\$ 51,640	87,300	4,600	0.5%
23-2011	Paralegals and Legal Assistants	\$ 60,970	366,200	4,300	0.1%
53-2012	Commercial Pilots	\$ 113,080	56,500	3,200	0.6%
19-4031	Chemical Technicians	\$ 56,750	58,300	3,200	0.5%
17-3026	Industrial Engineering Technologists and Technicians	\$ 62,610	74,500	3,000	0.4%
17-3023	Electrical and Electronic Engineering Technologists and Technicians	\$ 72,800	99,600	3,000	0.3%
29-2031	Cardiovascular Technologists and Technicians	\$ 66,170	58,400	2,400	0.4%
17-3011	Architectural and Civil Drafters	\$ 61,820	112,300	1,300	0.1%
17-3022	Civil Engineering Technologists and Technicians	\$ 60,700	66,000	1,200	0.2%
49-2011	Computer, Automated Teller, and Office Machine Repairers	\$ 45,760	85,700	(1,700)	-0.2%
17-3013	Mechanical Drafters	\$ 64,060	50,400	(2,500)	-0.5%
31-9094	Medical Transcriptionists	\$ 37,060	54,500	(2,600)	-0.5%
25-4031	Library Technicians	\$ 39,310	81,500	(4,600)	-0.6%
43-4161	Human Resources Assistants, Except Payroll and Timekeeping	\$ 47,710	104,200	(5,000)	-0.5%
51-4111	Tool and Die Makers	\$ 61,490	59,100	(5,800)	-1.0%
43-4151	Order Clerks	\$ 41,600	106,300	(19,000)	-1.9%
43-3031	Bookkeeping, Accounting, and Auditing Clerks	\$ 47,440	1,663,800	(83,900)	-0.5%

Within groups of occupations that are relatively more-exposed to AI, an outsized share of employment growth is centered on occupations requiring higher levels of education

U.S. Employment Projections by Occupational Cluster and Typical Education					
Relative Intensity and Importance of High AI-Exposure Work Activities	Typical Educational Attainment Required to Enter Occupation	Total Employment, 2023	Projected Employment Change, 2023-33	Percent Share of Employment, 2023	Percent Share of Employment Change, 2023-33
Greatest	BA+	8,685,200	642,100	6.3%	14.0%
	Some college or Associate's	7,046,500	165,800	5.1%	3.6%
	High school or less	19,123,800	(284,700)	13.9%	-6.2%
Middle	BA+	23,598,800	1,851,600	17.2%	40.4%
	Some college or Associate's	5,964,900	353,600	4.3%	7.7%
	High school or less	39,611,400	618,600	28.8%	13.5%
Lowest	BA+	4,434,000	183,200	3.2%	4.0%
	Some college or Associate's	1,833,200	152,600	1.3%	3.3%
	High school or less	27,080,300	898,200	19.7%	19.6%
All Occupations	All Educational Requirements	137,378,100	4,581,000	100%	100%

Many of the patterns projected for 2023–2033 were already underway during the five-year period of pandemic-era employment decline and recovery. Growth remained concentrated in higher-wage, higher-education occupations, while employment declined in many clerical, administrative, and other lower-skill occupations with higher exposure to AI and digital technologies.

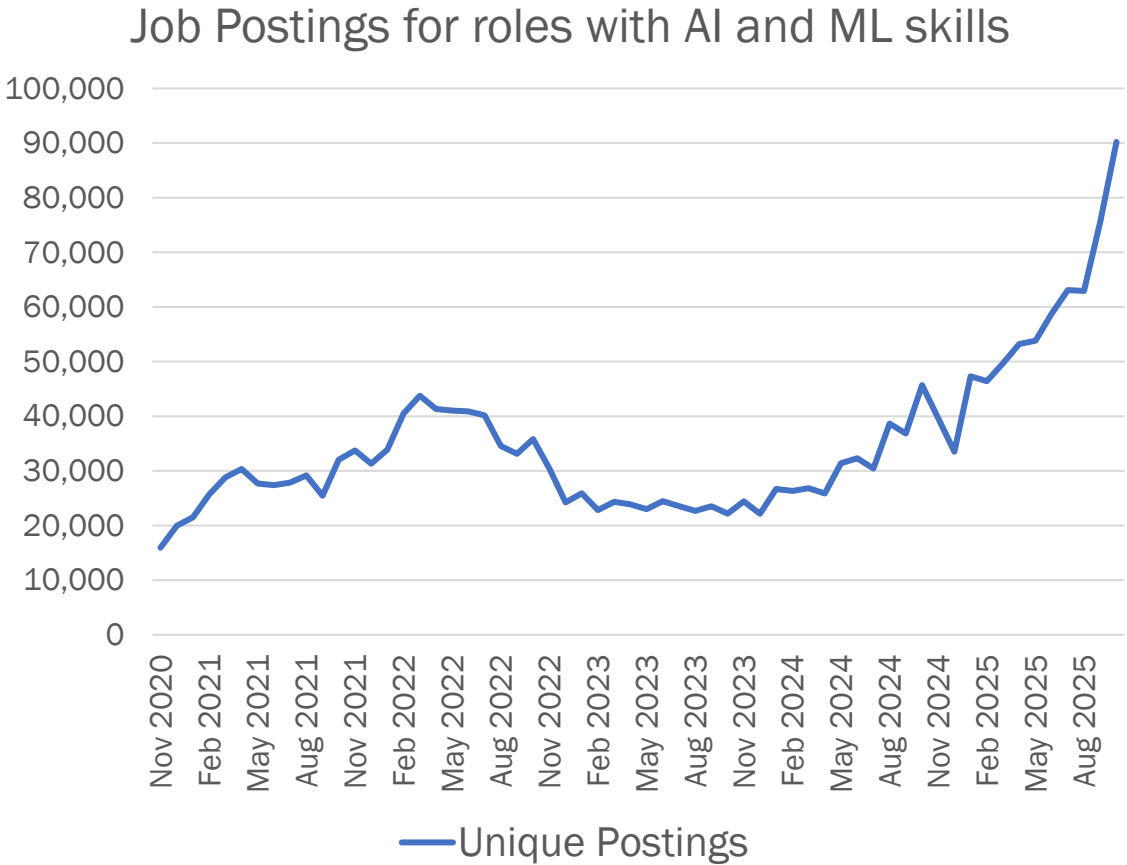
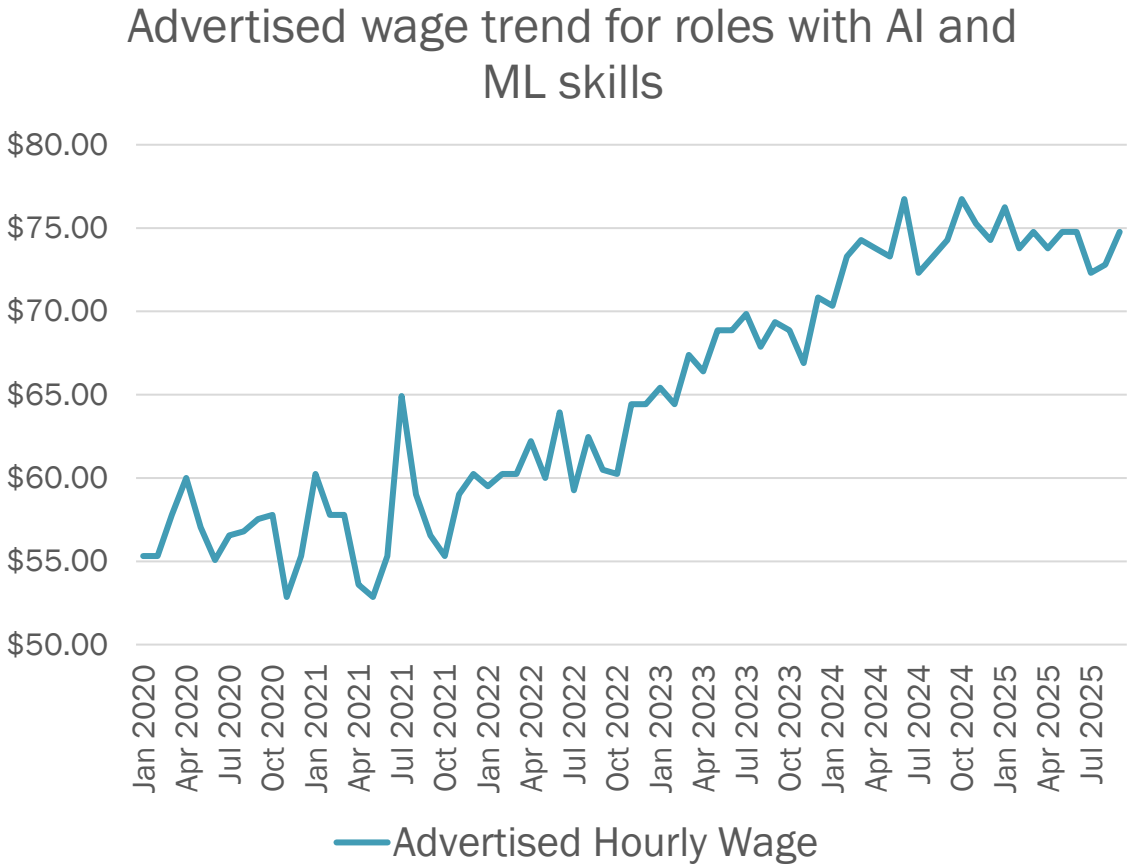


Next steps in our research

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- Use text analysis to assign task requirements listed in job postings to a framework of relative exposure to AI
- Qualitative in-depth research on both industry and occupation use cases, especially occupations that are in the ‘middle’ AI exposure group

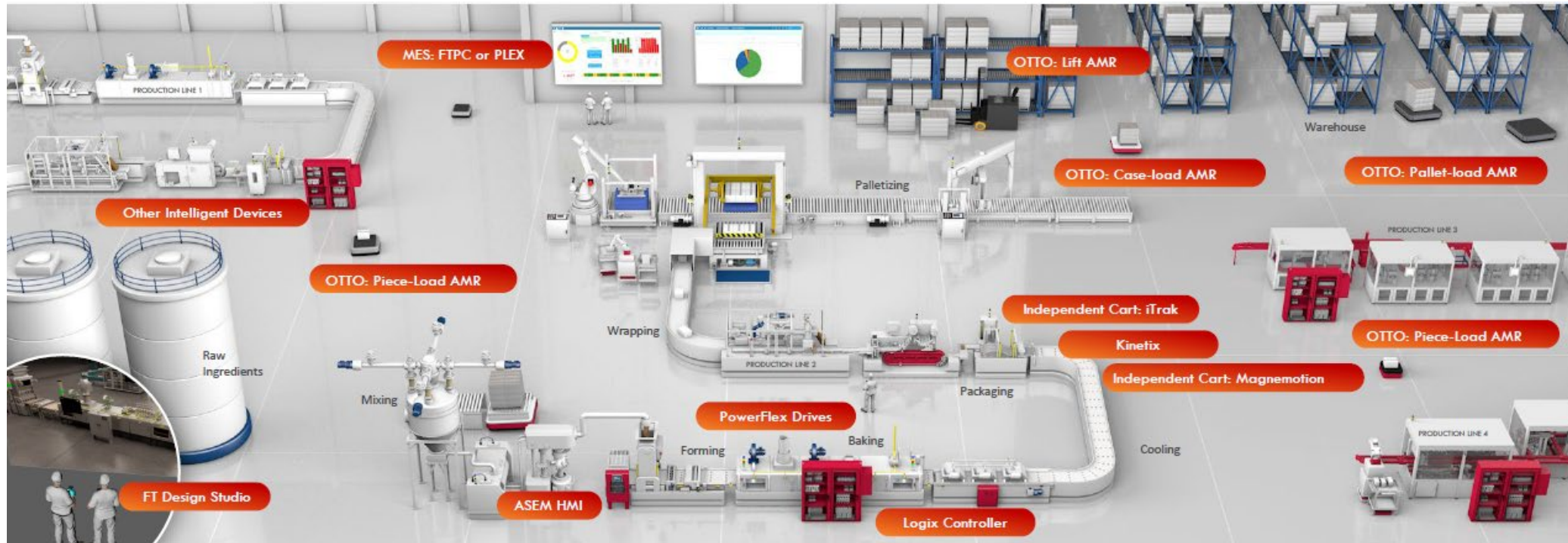
Advertised wages and job postings that explicitly list Artificial Intelligence and Machine Learning skills have risen sharply over the last four years



Industry examples

- Manufacturing
 - Predictive maintenance
 - Visual detection for quality control
- Health
 - Medical Imaging
 - Drug research
- Retail forecasting and inventory management
- Finance, Algorithmic trading, Fraud detection
- Legal and tax services
- Education

Manufacturing, Factory Floor Design



Digital twins offered in a suite of tools from **Rockwell Automation**, provides cost-savings in the construction of new manufacturing facilities by allowing users to evaluate thousands of potential floor plans

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