# Coastal Counties Workforce Board

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Mark McInerney
Director, Center for Workforce Research and Information

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# Section 1:
# AI Implication for Maine's workforce

# Preview

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There are two primary channels through which generative Artificial Intelligence (AI) could impact the labor market:

1) ***Productivity enhancement*** – AI used by workers or teams to increase output, automating/assisting with lower value tasks and enabling workers to spend more time on higher value tasks

2) ***Task displacement*** – AI used to automate tasks that previously had been labor intensive, therefore reducing demand for workers in specific occupations

Predicted impacts of AI on jobs and the economy (growth rates, net job impact, inequality) vary widely.

Compared to past waves of automation that:

- Largely affected manual production tasks
- Displaced middle income jobs (typically not requiring college education)
- Were concentrated in specific industries and geographic areas (plant/mill closure)

AI's impact could be much more diffuse:

- Across industries, areas and jobs of varying skill and educational requirements

# Labor Market Impact of Generative AI

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Several studies have considered the impact of AI on labor markets by assessing which tasks these models can perform, and:

- which occupations involve responsibilities including those tasks
- the demographic characteristics, geographic distribution and educational attainment of workers in those occupations

One of the most prominent studies, Eloundou et al. (2024), finds that:

- 19 percent of U.S. jobs might see 50 percent or more of their tasks performed/facilitated by AI
- 15 percent of all job tasks in the U.S. could be completed significantly more quickly using AI tools with no impact on quality of work

See: *GPTs are GPTs: An early look at the labor market impact potential of large language models*

*Generative AI, the American worker, and the future of work*

*Occupational Exposure to AI by Geography and Education*

# Measuring Occupational AI Potential

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Eloundou et al. (2024) use the O*Net database of occupational task composition and define exposure to/potential use of AI as follows:

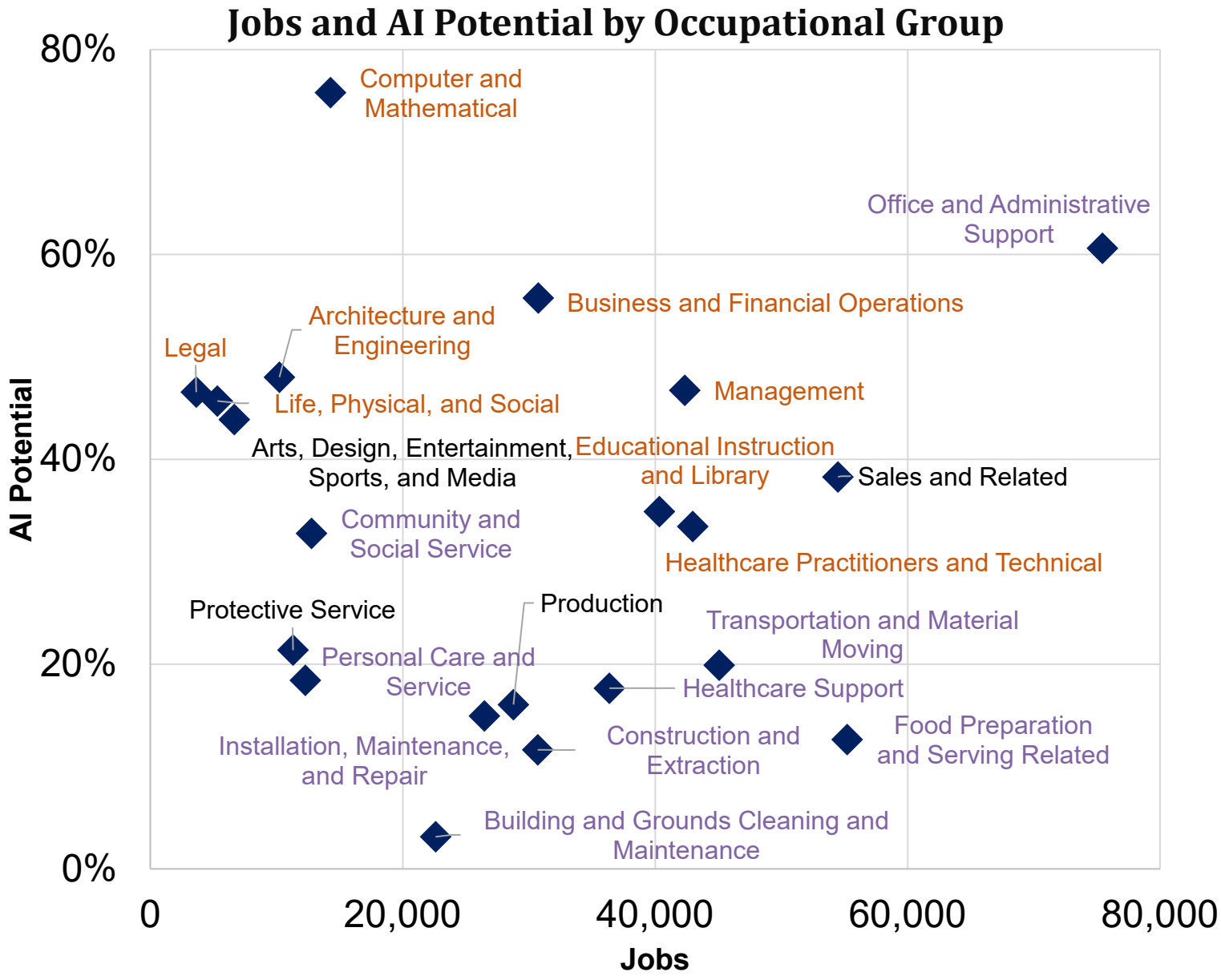
"…we define exposure as a measure of whether access to an LLM [Large Language Model] or LLM-powered system would ***reduce the time required for a human to perform a specific DWA*** [Detailed Worker Activity] or ***complete a task by at least 50 percent***….***while maintaining consistent quality***."

The first section of this report links Maine Occupational Employment and Wage Statistics (OEWS) to measures of occupational task composition and the potential for AI to facilitate and/or automate those tasks.

## The most job impact is expected in administrative support jobs

Jobs with the highest share of AI impacted tasks generally are professional and administrative support-related. Computer and mathematical jobs have highest share of tasks; the highest number of jobs are in administrative support occupations.

Jobs in manual labor-related occupations – production, construction, maintenance, and food preparation – have the lowest share of AI impacted tasks.




*Most jobs in these occupations require post-secondary education*

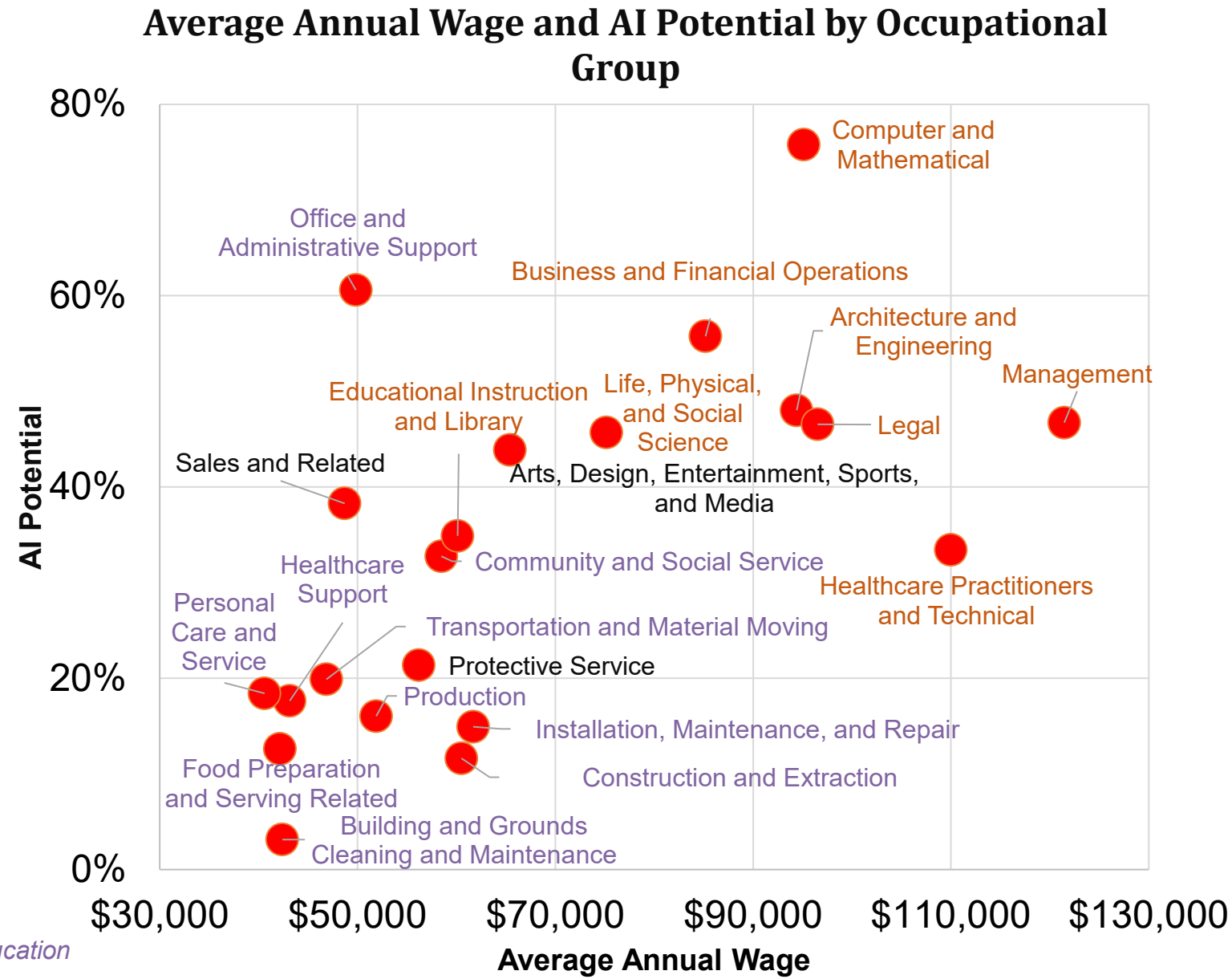
*Most jobs in these occupations do not require post-secondary educ*

*Educational requirements in these occupations vary*

## Generally, jobs with the highest potential AI impact have high average wages

Average annual wages in occupational groups with the lowest AI impact range from $40,000-$60,000.

Middle and high impacted groups are a mix of low, middle and high wage occupations. This is highlighted by the two most impacted groups: office and administrative support ($50,000 annually) and computer and mathematical ($95,000 annually).



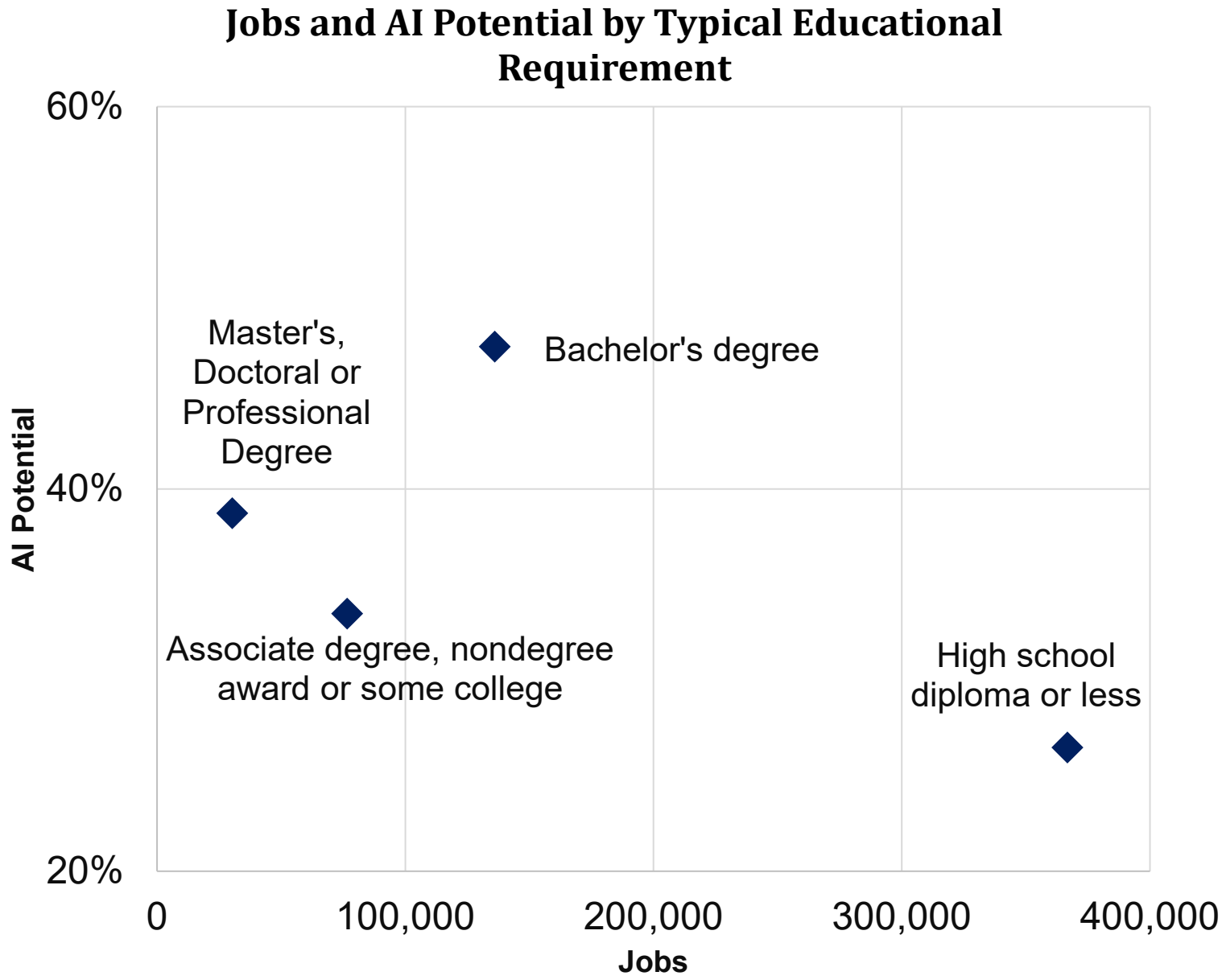

*Most jobs in these occupations require post-secondary education*

*Most jobs in these occupations do not require post-secondary education*

*Educational requirements in these occupations vary*

## Average AI Impact increases with typical educational requirements

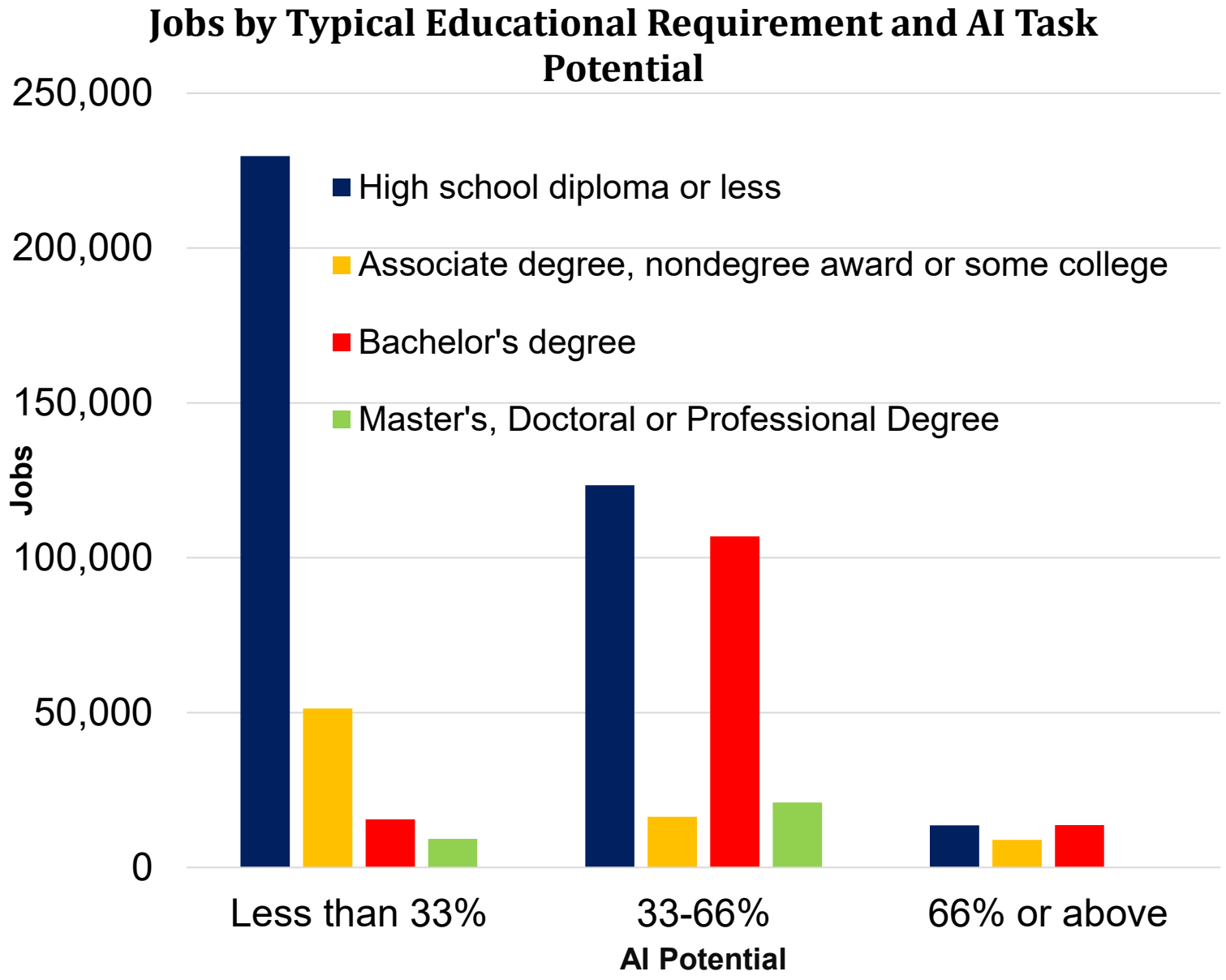
Educational requirements generally are higher as AI occupational potential increases.



## Jobs with low AI potential mostly do not require post-secondary education

36,000 jobs (6 percent of total employment) have AI potential impact affecting more than two thirds of typical job tasks. There is a split in terms of typical educational requirements (low, middle and high).

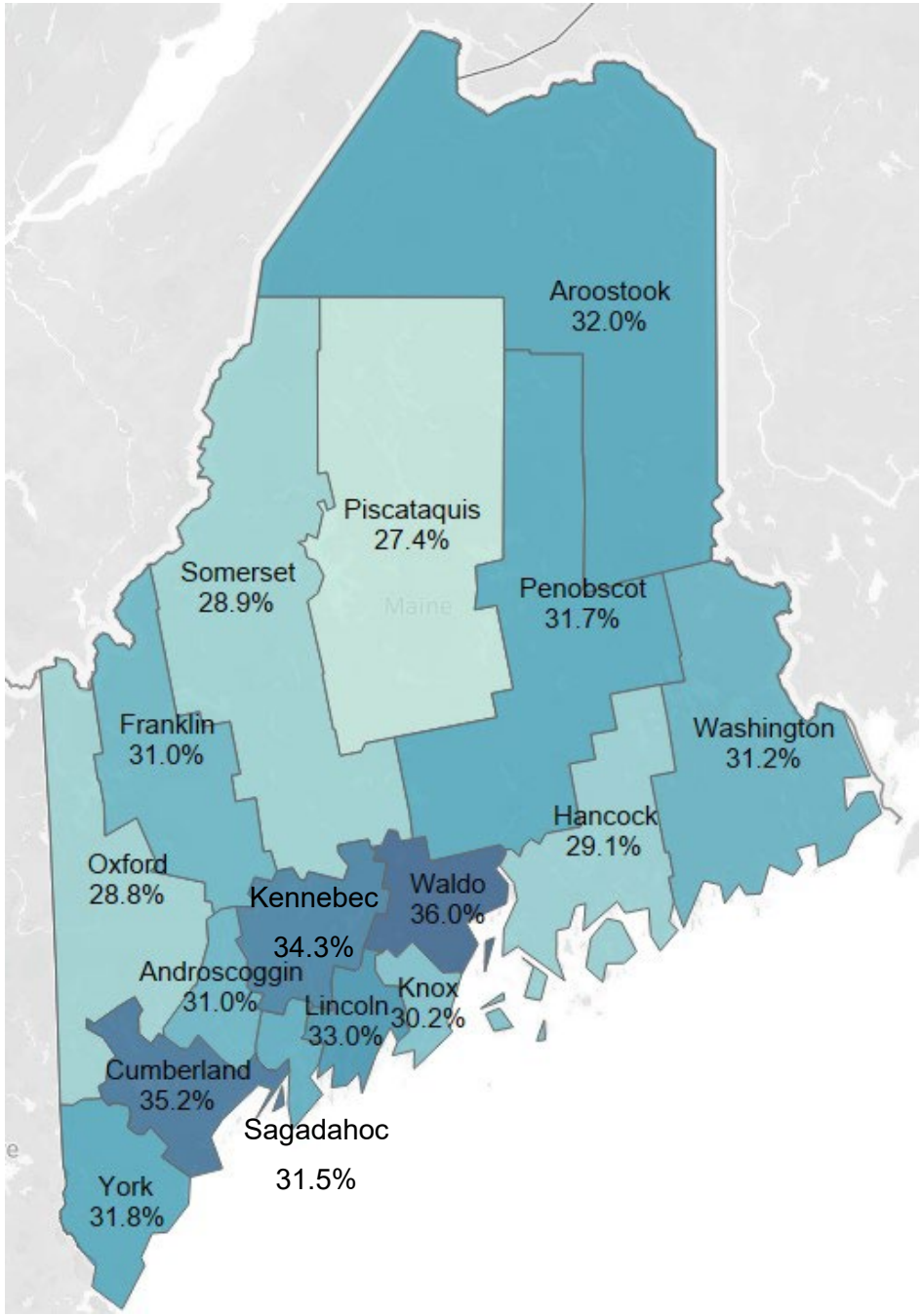
The middle-impacted group is split mostly between jobs requiring a bachelor's degree and those not requiring post-secondary education for entry.



## AI Impact is likely to be greatest in the southern coastal region

The potential impact varies from 27 to 36 percent of average job tasks among counties.

The overall variation in potential use of AI is quite small across counties.



# Skills and AI Potential

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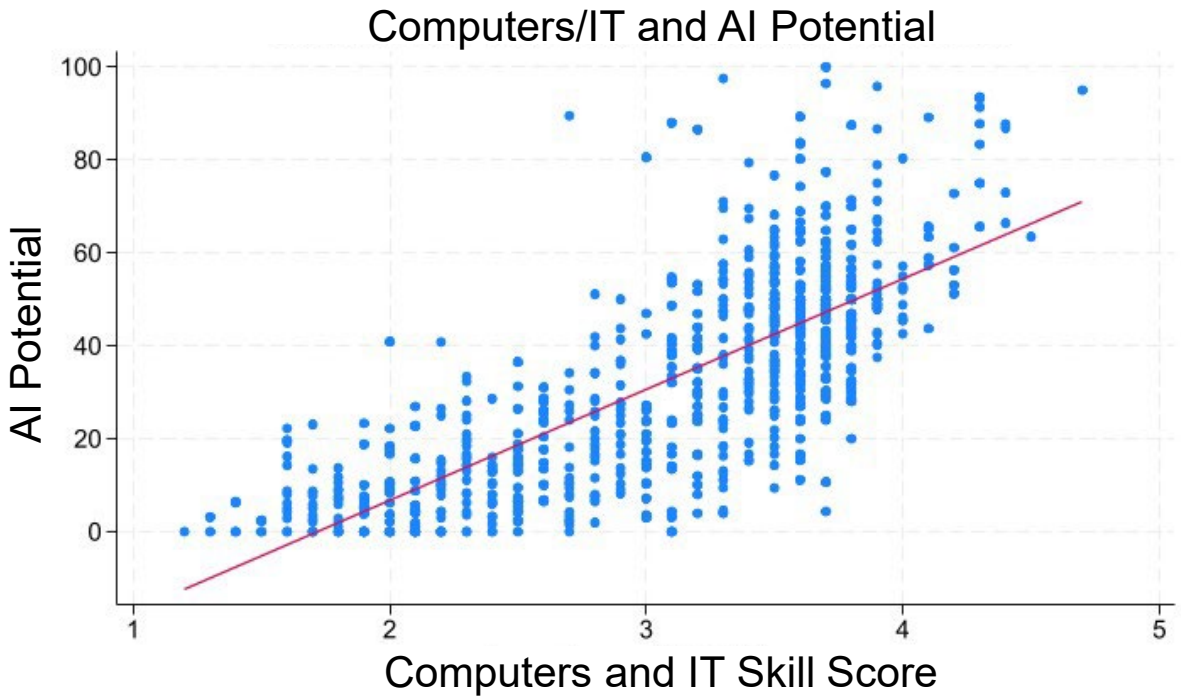
The U.S. Bureau of Labor Statistics defines skill as a capacity that is developed (through education, training, experience), general (applicable across many occupations), applied (action oriented), and work related (to performance at work)

The following three slides document the relationship between the relative importance of each skill category to each occupation and the potential use of AI in tasks typically performed in that occupation [Eloundou et. al (2023)]

Of the 17 skill categories:

- 4 are strongly positively correlated (Computer/IT, Analysis/Critical Thinking, Problem Solving/Decision Making, Writing/Reading)
- 3 are strongly negatively correlated (Mechanical, Fine Motor, Physical)
- the relationship is less clear for the rest


Computers/IT and AI Potential
AI Potential
Computers and IT Skill Score
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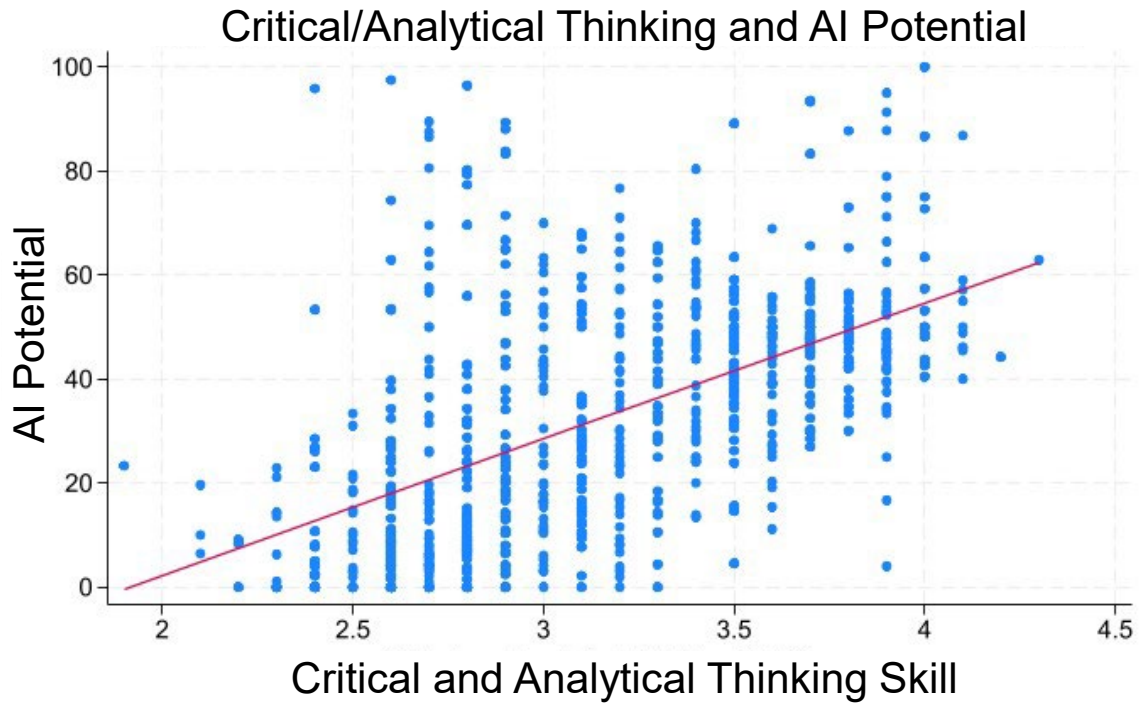
Critical/Analytical Thinking and AI Potential
AI Potential
Critical and Analytical Thinking Skill
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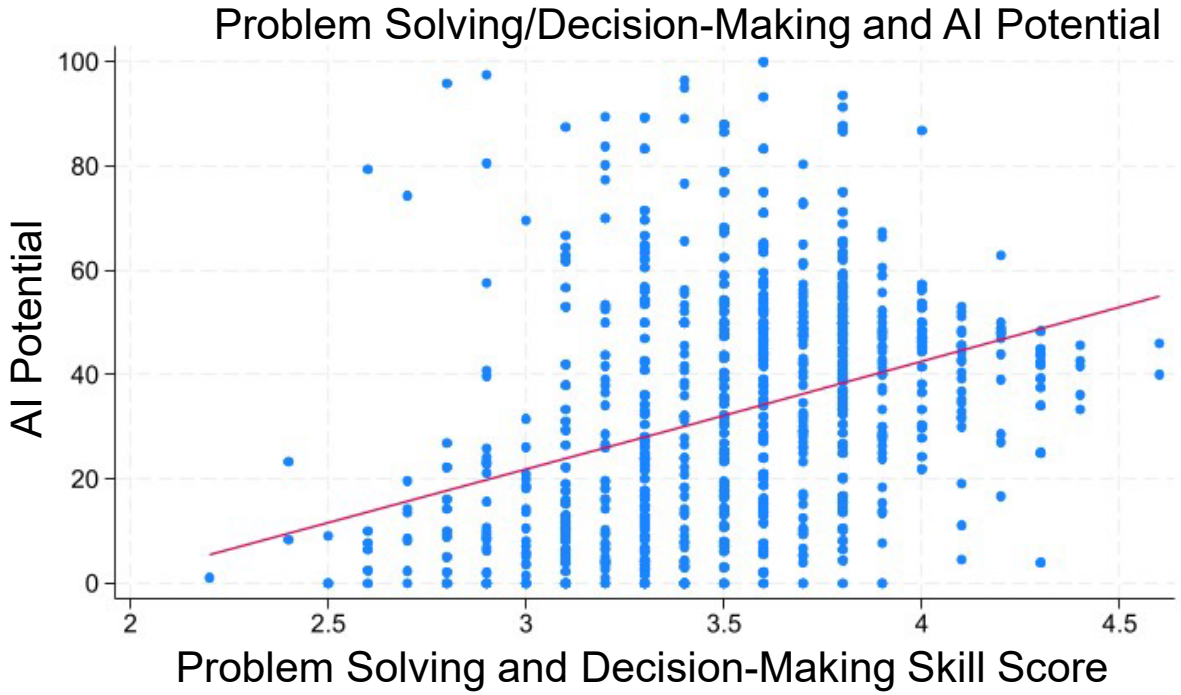
Problem Solving/Decision-Making and AI Potential
AI Potential
Problem Solving and Decision-Making Skill Score
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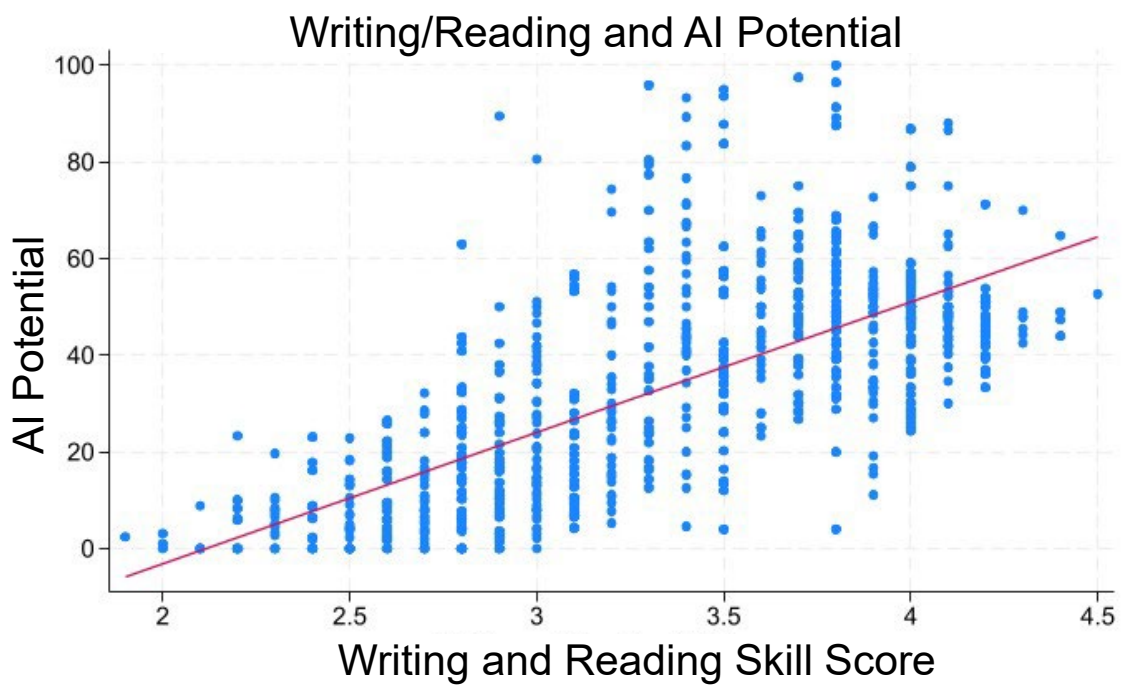
Writing/Reading and AI Potential
AI Potential
Writing and Reading Skill Score
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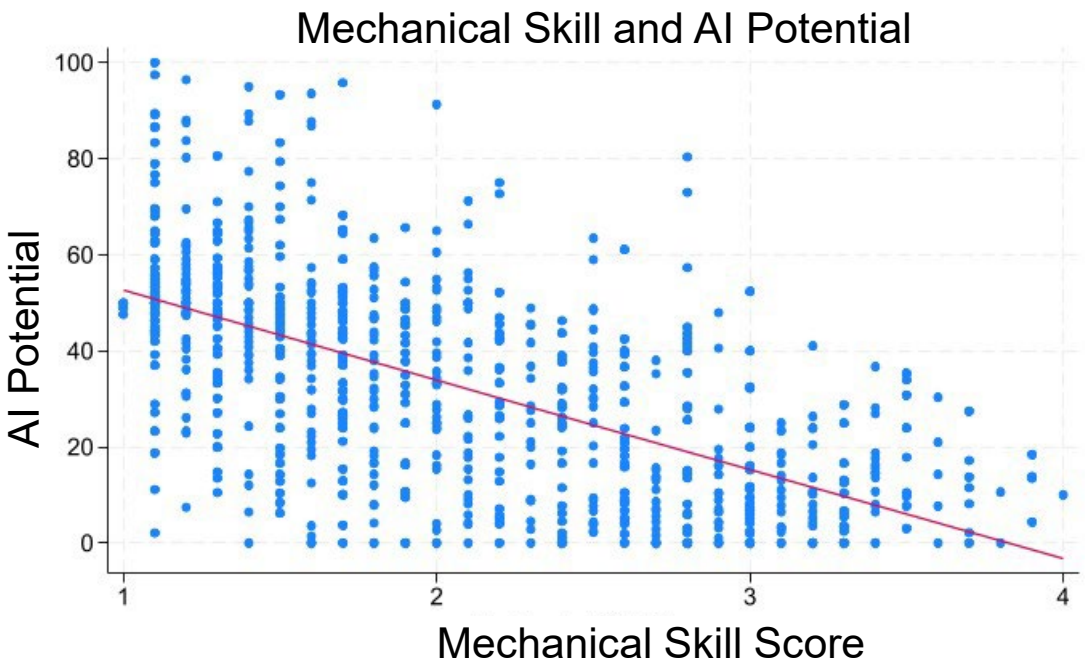
Mechanical Skill and AI Potential
AI Potential
Mechanical Skill Score
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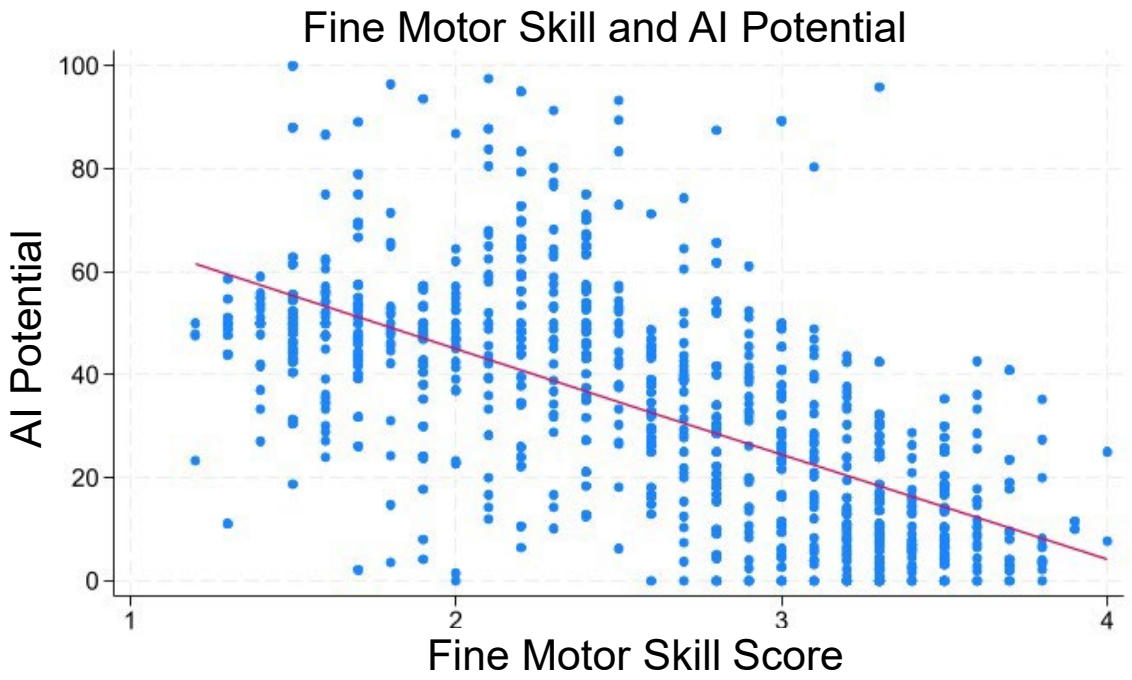
Fine Motor Skill and AI Potential
AI Potential
Fine Motor Skill Score
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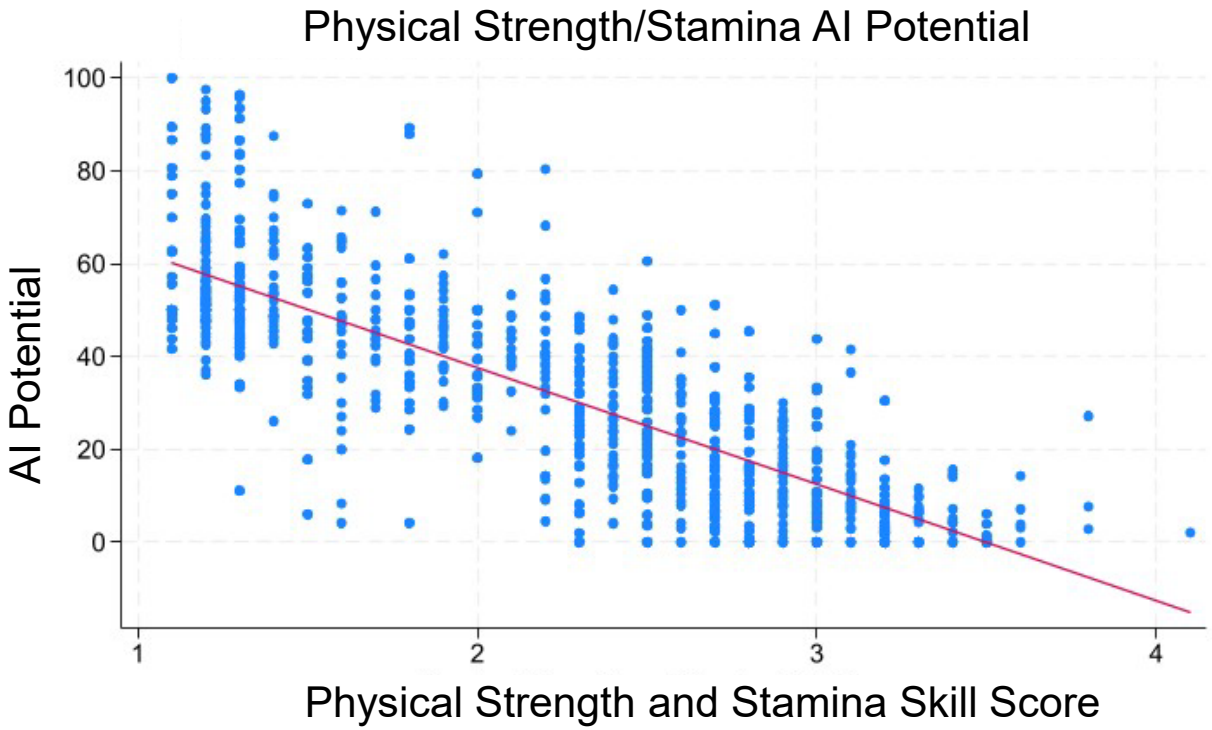
Physical Strength/Stamina AI Potential
AI Potential
Physical Strength and Stamina Skill Score
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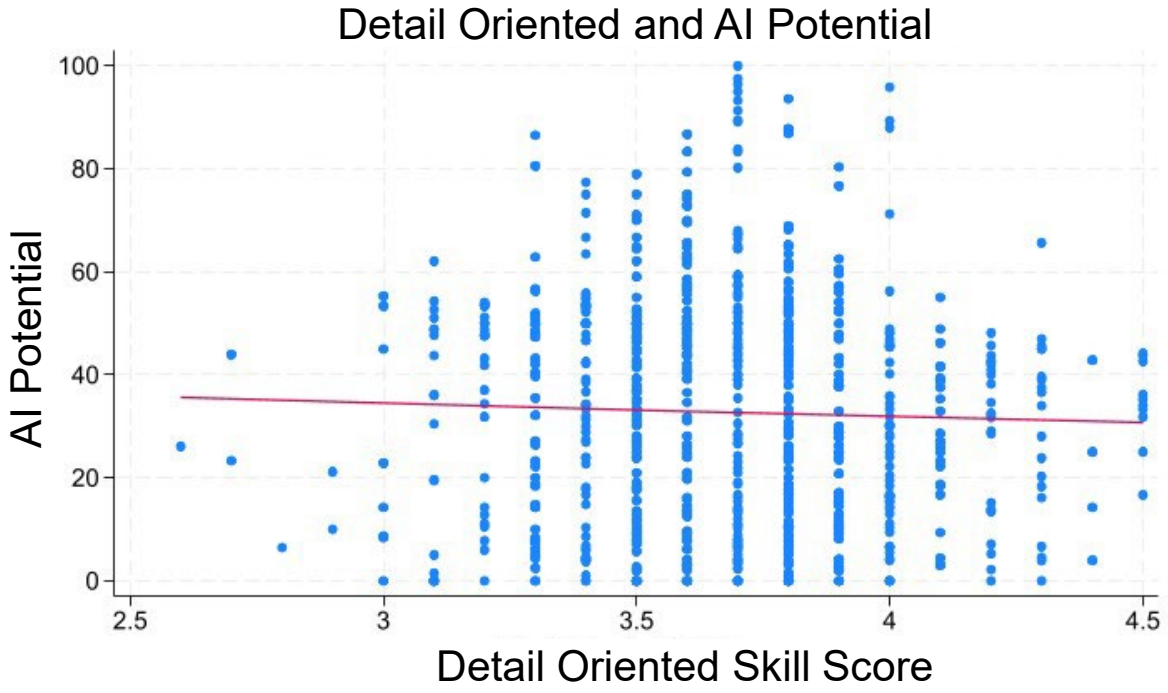
Detail Oriented and AI Potential
AI Potential
Detail Oriented Skill Score
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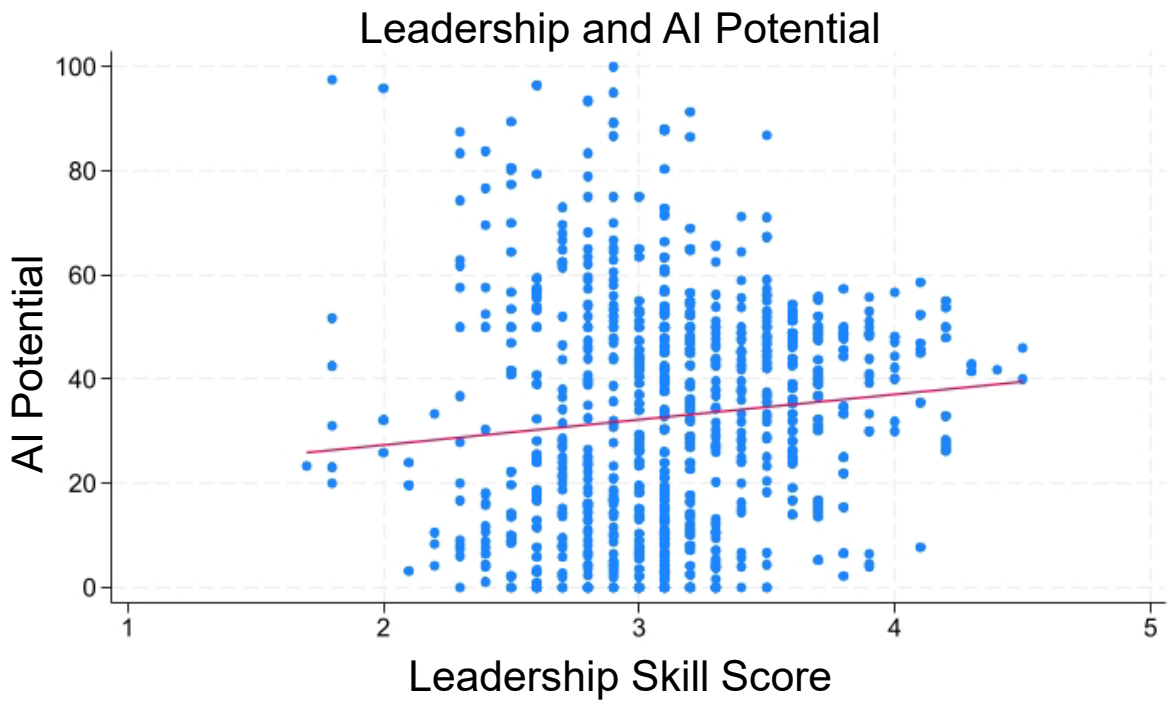
Leadership and AI Potential
AI Potential
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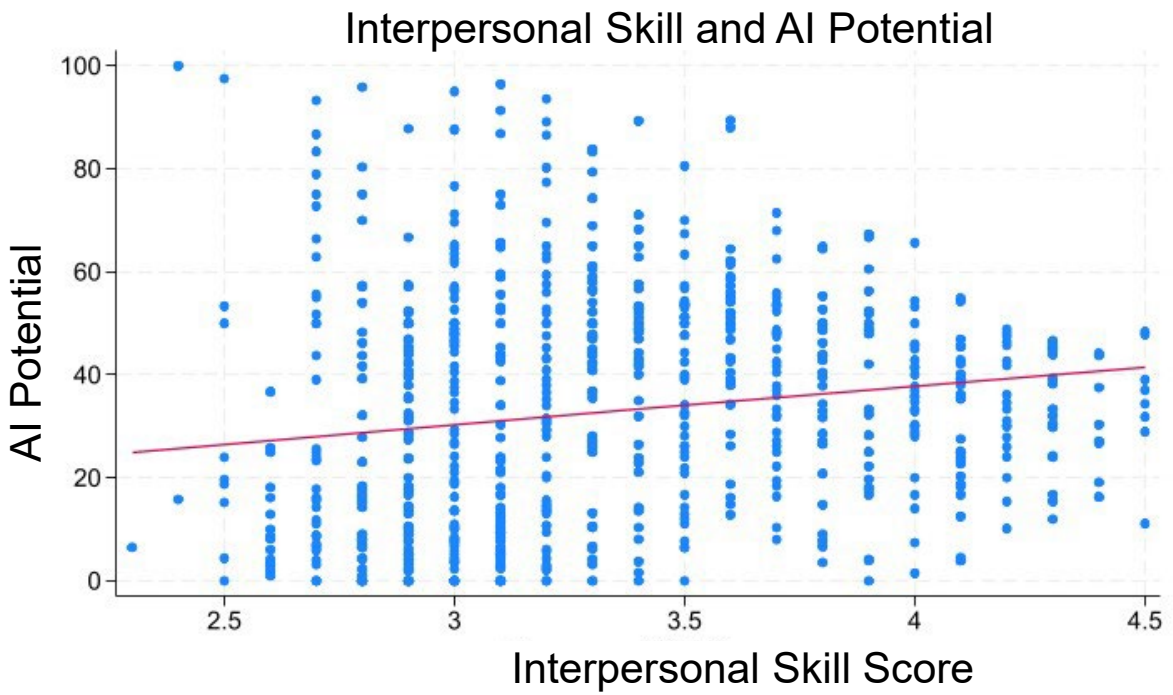
Leadership Skill Score


Interpersonal Skill and AI Potential
AI Potential
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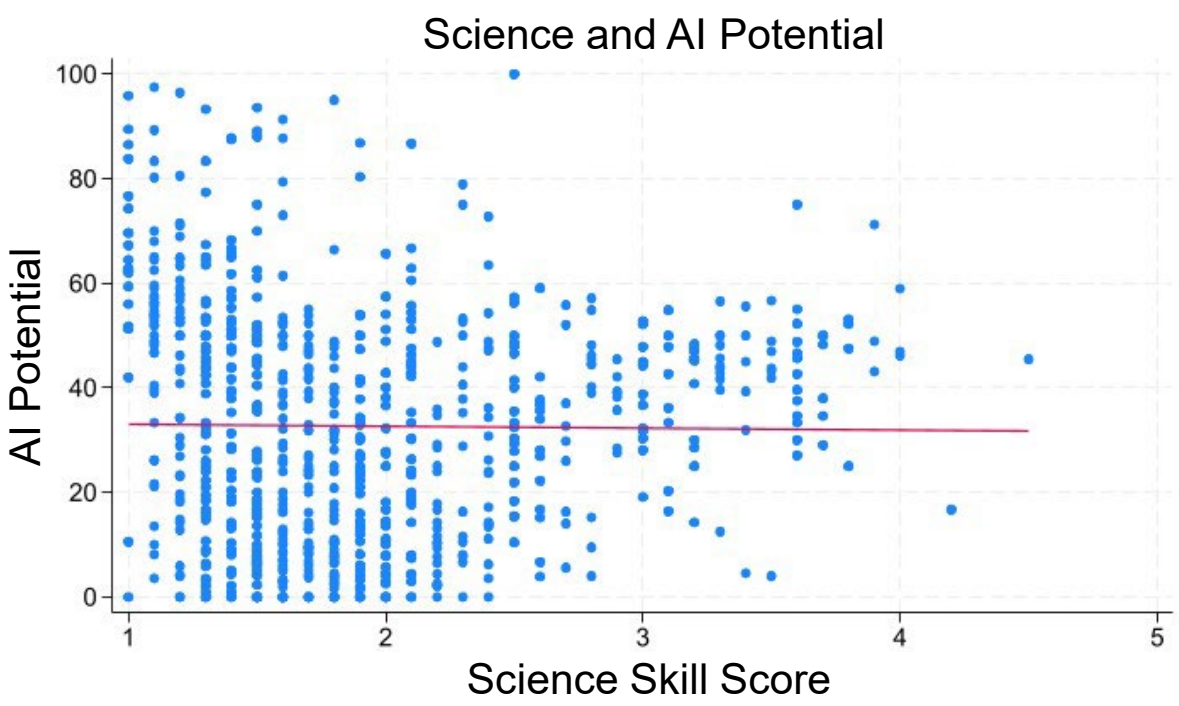
Interpersonal Skill Score


Science and AI Potential
AI Potential
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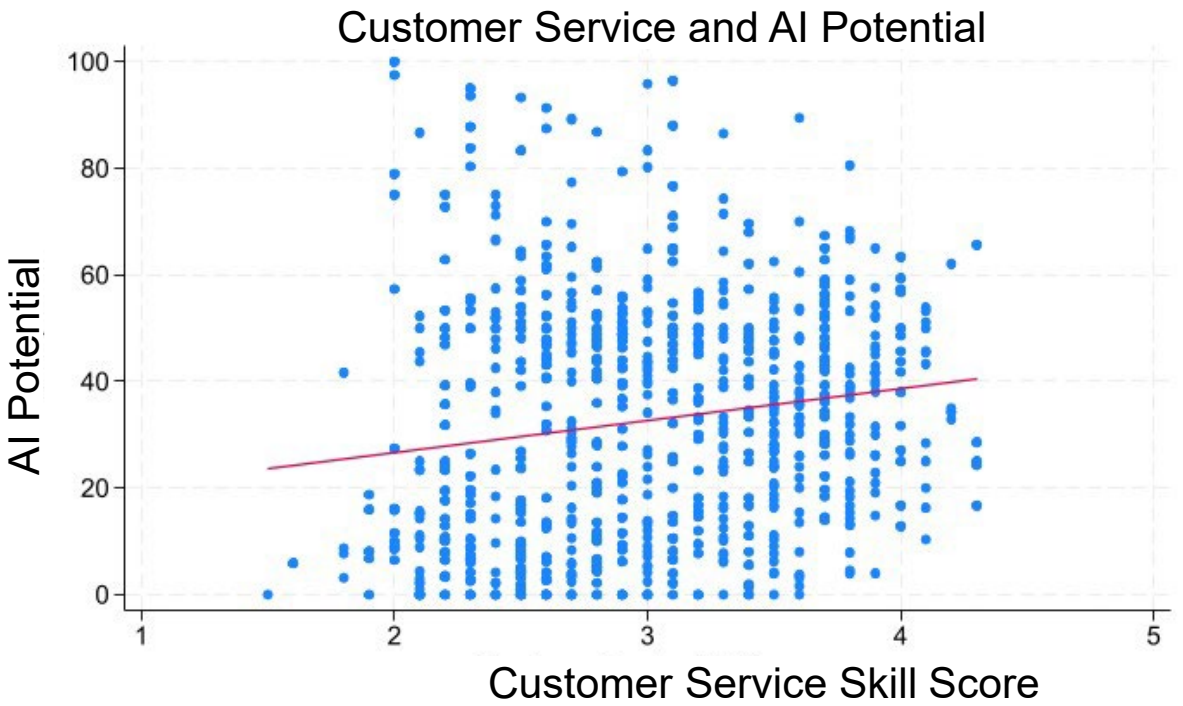
Science Skill Score


Customer Service and AI Potential
AI Potential
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100
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Customer Service Skill Score

## 15 occupations among highest AI potential and 500+ jobs

A selection of occupations with high AI potential illustrates the difference in compensation and typical educational requirements.

Many occupations with high task potential are administrative support jobs. AI can automate many typical tasks such as organization, processing, entering or recording information. Others are higher paying, specialized computer and mathematical jobs in which AI can facilitate code generation and troubleshooting.

| Occupation Title | AI Task Potential | Jobs | Average Hourly Wage |
|---|---|---|---|
| Software Developers | 86.8% | 2,740 | $57 |
| Payroll and Timekeeping Clerks | 83.8% | 510 | $27 |
| Insurance Claims and Policy Processing Clerks | 83.3% | 1,520 | $28 |
| Bookkeeping, Accounting, and Auditing Clerks | 80.2% | 8,310 | $25 |
| Billing and Posting Clerks | 77.4% | 1,620 | $23 |
| Computer Systems Analysts | 75.0% | 2,600 | $50 |
| Data Scientists | 75.0% | 1,040 | $49 |
| Network and Computer Systems Administrators | 73.0% | 1,270 | $39 |
| Court, Municipal, and License Clerks | 70.0% | 1,190 | $24 |
| Legal Secretaries and Administrative Assistants | 69.6% | 610 | $25 |
| Compliance Officers | 68.2% | 1,890 | $42 |
| Eligibility Interviewers, Government Programs | 68.0% | 590 | $22 |
| Dispatchers, Except Police, Fire, and Ambulance | 67.4% | 720 | $27 |
| Interviewers, Except Eligibility and Loan | 67.2% | 1,050 | $20 |
| Medical Secretaries and Administrative Assistants | 66.7% | 4,550 | $22 |

## Legal Secretaries and Administrative Assistants task example

Some of the most important responsibilities of this occupation include:

- Documenting, recording information
- Processing, providing information
- Organizing, planning

Many of these tasks are already well suited to be performed more efficiently by or with the assistance of AI.

These types of job titles are captures in this occupation: Legal Secretary, Legal Admin Assistant, Legal Coordinator, Legal Management Assistant, Legal Office Support Assistant, Legal Practice Assistant

| Legal Secretaries and Administrative Assistants (43-6012) | | |
|---|---|---|
| **Importance** | **Work Activity** | **Work Activity Description** |
| 87 | Performing Administrative Activities | Performing day-to-day administrative tasks such as maintaining information files and processing paperwork. |
| 85 | Communicating with Supervisors, Peers, or Subordinates | Providing information to supervisors, co-workers, and subordinates by telephone, in written form, e-mail, or in person. |
| 83 | Working with Computers | Using computers and computer systems (including hardware and software) to program, write software, set up functions, enter data, or process information. |
| 82 | Processing Information | Compiling, coding, categorizing, calculating, tabulating, auditing, or verifying information or data. |
| 80 | Organizing, Planning, and Prioritizing Work | Developing specific goals and plans to prioritize, organize, and accomplish your work. |
| 77 | Establishing and Maintaining Interpersonal Relationships | Developing constructive and cooperative working relationships with others and maintaining them over time. |
| 75 | Documenting, Recording Information | Entering, transcribing, recording, storing, or maintaining information in written or electronic/magnetic form. |

## 15 occupations among lowest AI potential and 1,000+ jobs

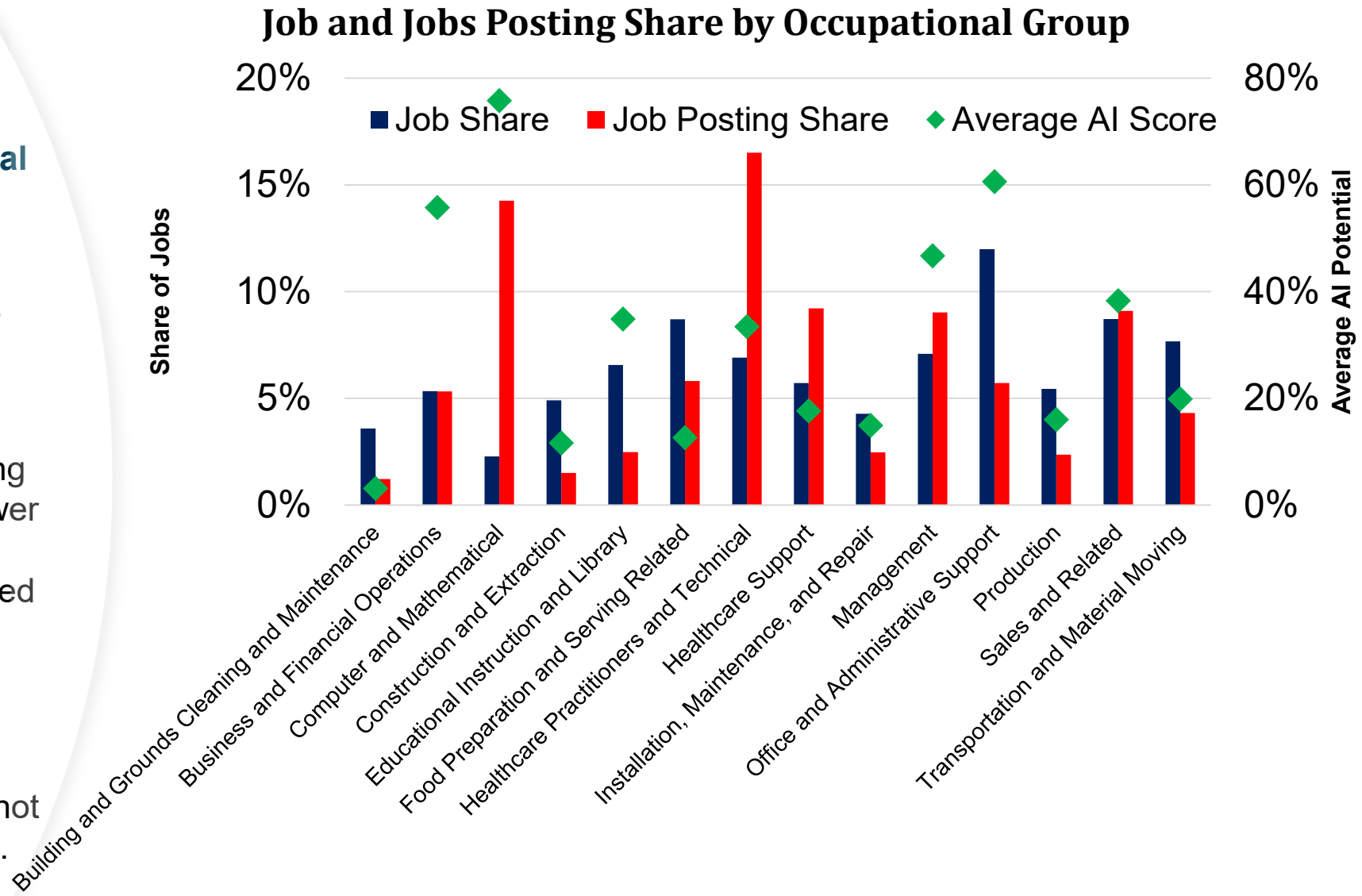
Occupations with the lowest AI potential and significant employment involve physical work activities, such as food preparation, cleaning, maintenance, construction, production, and transportation.

| Occupation Title | AI Task Potential | Jobs | Average Hourly Wage |
|---|---|---|---|
| Cooks | 0.0% | 3,020 | $17 |
| Dining Attendants and Bartender Helpers | 0.0% | 1,770 | $20 |
| Dishwashers | 0.0% | 2,230 | $17 |
| Janitors and Cleaners | 0.0% | 9,800 | $20 |
| Maids and Housekeeping Cleaners | 0.0% | 4,860 | $18 |
| Bus and Truck Mechanics and Diesel Engine Specialists | 0.0% | 1,590 | $29 |
| Packaging and Filling Machine Operators | 0.0% | 1,480 | $23 |
| Highway Maintenance Workers | 1.6% | 1,450 | $23 |
| Landscaping and Groundskeeping Workers | 2.4% | 6,020 | $21 |
| Helpers--Electricians | 2.4% | 1,100 | $24 |
| Industrial Truck and Tractor Operators | 3.1% | 2,950 | $24 |
| Food Preparation Workers | 3.7% | 5,540 | $17 |
| Laborers and Freight, Stock, and Material Movers | 4.0% | 5,940 | $20 |
| Construction Laborers | 5.0% | 3,180 | $23 |
| Operating Engineers and Construction Equipment Operators | 5.4% | 1,980 | $28 |

## Health care and clerical occupational groups stand out when comparing jobs to job postings

A higher share of job postings is for health care related occupations (registered nurses, home health and personal care aides and certified nursing assistants in particular) and a much lower share of job postings are for office & administrative support workers compared to occupational employment.

The larger share of postings in the computer and mathematical group is attributable partially to remote jobs posted on job boards in Maine that do not have an employment location specified.



# *Applying AI to Rebuild Middle Class Jobs*
# David Autor

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"Expertise is the primary source of labor's value in the US and other industrialized countries

…Expertise is in constant flux. Forms that once commanded a substantial market premium — farriery, typesetting, fur-trapping, spell-checking — are all now either antiquated or automated. Simultaneously, many of the most highly paid jobs in industrialized economies — oncologists, software engineers, patent lawyers, therapists, movie stars — did not exist until specific technological or social innovations created a need for them…

AI could potentially enable a larger set of workers to perform high-stakes expert tasks. It can do this by complementing their skills and supplementing their judgment."

Autor cites experimental evidence showing that using AI can lead to productivity improvement that could reduce the inequality in expertise (and therefore earnings):

"…ChatGPT did not eliminate the role of expertise. While the best writers remained at the top of the heap using either set of tools, ChatGPT enabled the most capable to write faster and the less capable to write both faster and better — so the productivity gap between adequate and excellent writers shrank."

# *The Simple Macroeconomics of AI*
# Daron Acemoglu

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In the U.S. over the last 75 years:

- Economic (real Gross Domestic Product) growth has averaged about 3 percent per year
- Productivity growth has averaged 2 percent per year

Some economists have predicted that AI could create a higher growth trajectory, even double these historic growth rates.

Acemoglu estimates that over the next decade, AI will produce a "modest increase" between 1.1 to 1.6 percent of additional economic growth over the next 10 years, with a marginally higher productivity growth rate.

"…AI advances are unlikely to increase inequality as much as previous automation technologies because their impact is more equally distributed across demographic groups, but there is also no evidence that AI will reduce labour income inequality."

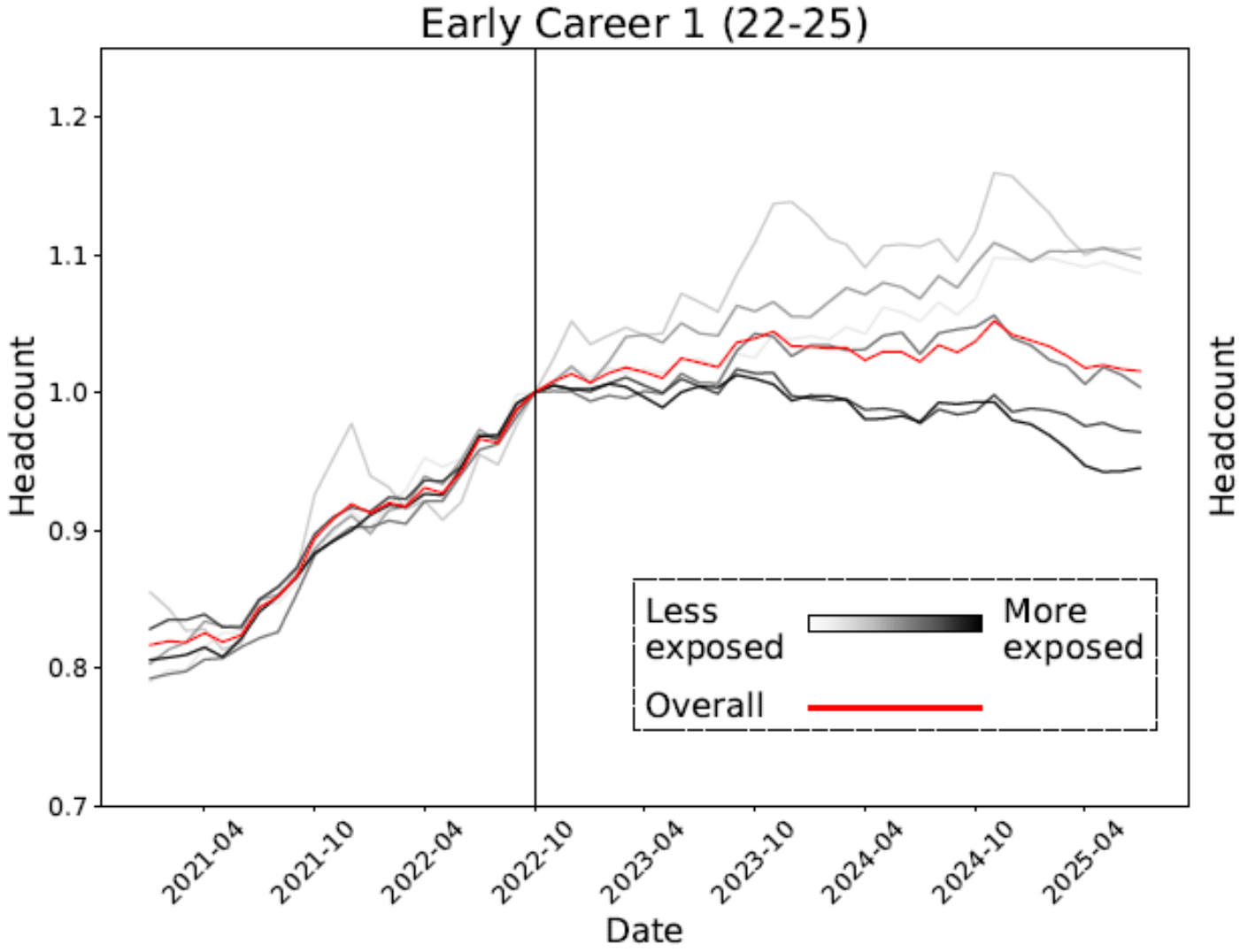
# *Canaries in the Coal Mine?*
# Brynjolfsson, Chandar and Chen

## Employment impact affecting younger workers where AI tends to automate tasks

The researchers find that employers appear to be hiring fewer younger workers in AI exposed occupations following the release of ChatGPT. The declines are concentrated in occupations where AI tends to *automate* tasks, versus those where it *augments*.

This is not true for less exposed occupations. And, employment continues to grow, even for occupations that are exposed.

One potential explanation is younger workers have “codified knowledge” (book-learning) and fewer years of “tacit knowledge” (experience). AI is more adept at replacing codified tasks but less good at bringing tacit experience.



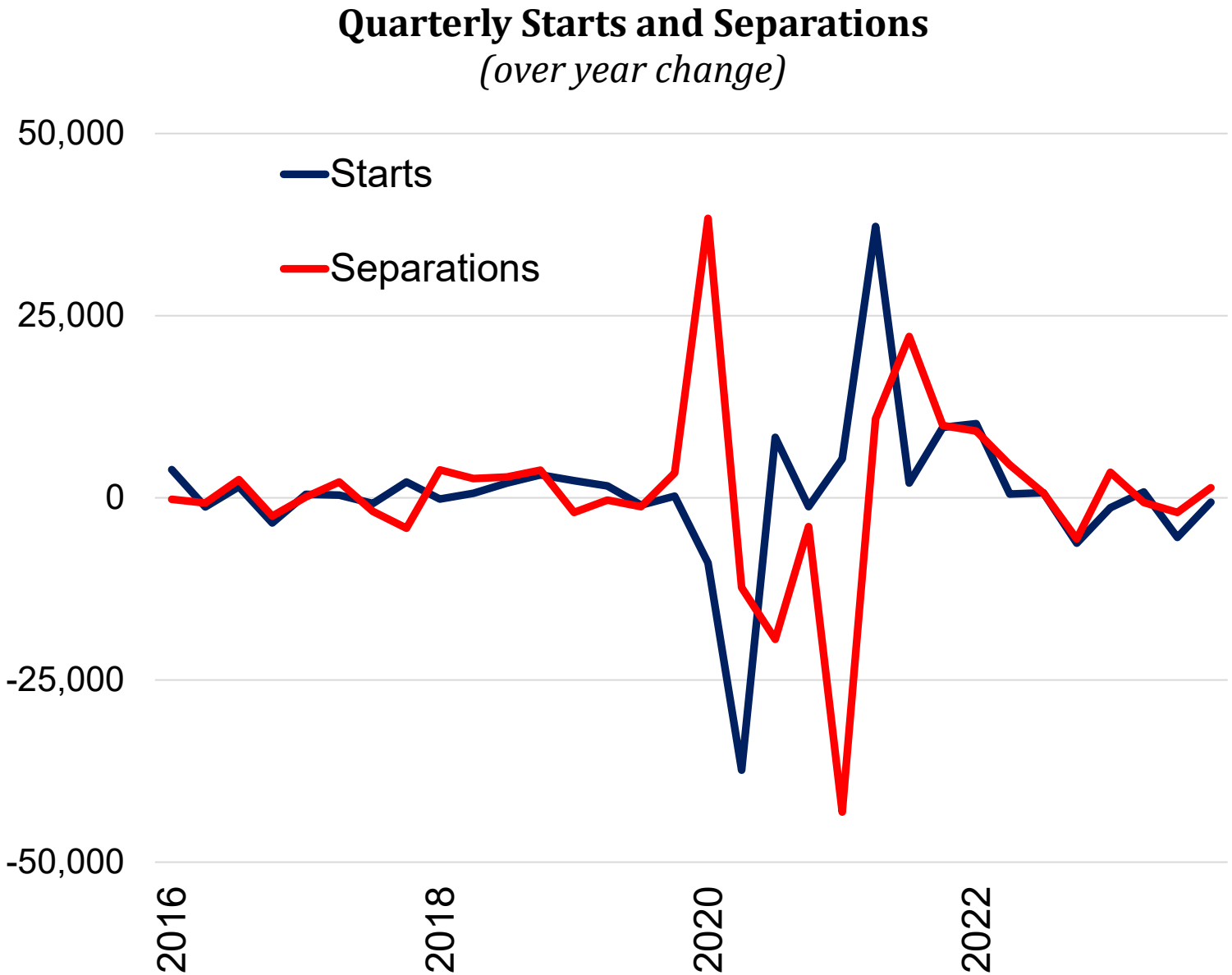
## The pace of hiring is an important factor in determining net job changes

The pandemic illustrates this point, a large share of the job impact occurred from a slowdown of hiring that would have occurred if not for the public health emergency.

Adoption of AI is likely to impact demand for labor and can lead to significant changes over time in ways other than sudden, large layoff events.

For example, employers may integrate AI into their organization and change their recruiting strategies and job responsibilities as a result: hiring fewer workers in some occupations and/or more in others.

Changes in skill demand can occur through both layoff of incumbent workers and through changes in the pace and types of recruiting.



# *Technological Disruption in the Labor Market*
# Deming, Ong and Summers

## The pace of labor market disruption has slowed

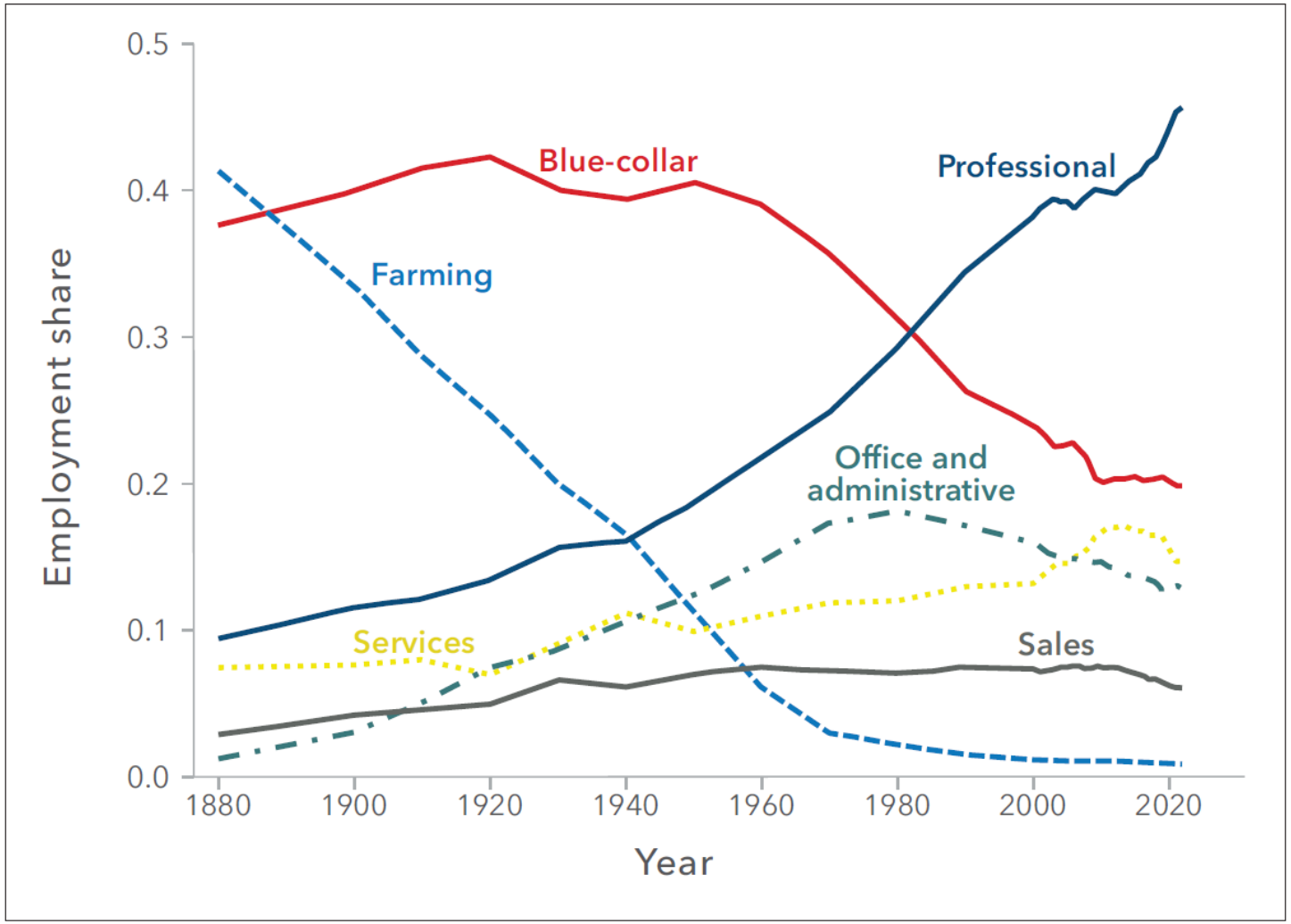
"…even though technological breakthroughs often occur rapidly, ***technology gets adopted gradually, and the disruption of labor markets takes decades***…."

"…The changes in the structure of US employment at the end of the nineteenth century were greater than in any decade…

Even more disruptive was the period between 1940 and 1970, when agricultural employment was still disappearing, manual labor was shifting into production and away from railroads, and clerical and administrative work were growing rapidly.

***The years spanning 1990 to 2017 were the most stable period in the history of the US labor market***, going back nearly 150 years."

**Figure 1: Changes in the occupation structure of the US labor market, 1880-2024**



# Takeaways

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Predictions from economists about the impact of AI vary widely. AI could have the effect of displacing workers in some occupations and increasing demand for workers in others.

- Long-term GDP forecasts range from a modest increase to a doubling of growth rates
- AI has potential to reduce labor market inequality (Autor) by increasing productivity of workers with lower earning potential, or widen inequality by displacing workers in jobs not typically requiring a college degree (Acemoglu)
- Past waves of technological breakthrough have played out over decades though some predict AI will result in sudden change

Compared to past waves of automation in which impacts were concentrated in specific industries and geographic areas, impacted workers in specific education and demographic groups, the impact of AI could be much more diffuse.

Occupations most likely to be impacted by AI include those in the computer and mathematical and the administrative support groups. These jobs often involve skills related to computer/IT, analysis/critical thinking, writing/reading, problem-solving and decision-making.

Jobs in these fields are somewhat divided between higher-paying roles that require advanced education/training for entry and lower-paying positions—many clerical or administrative in nature—that have already experienced declining labor demand in recent decades.

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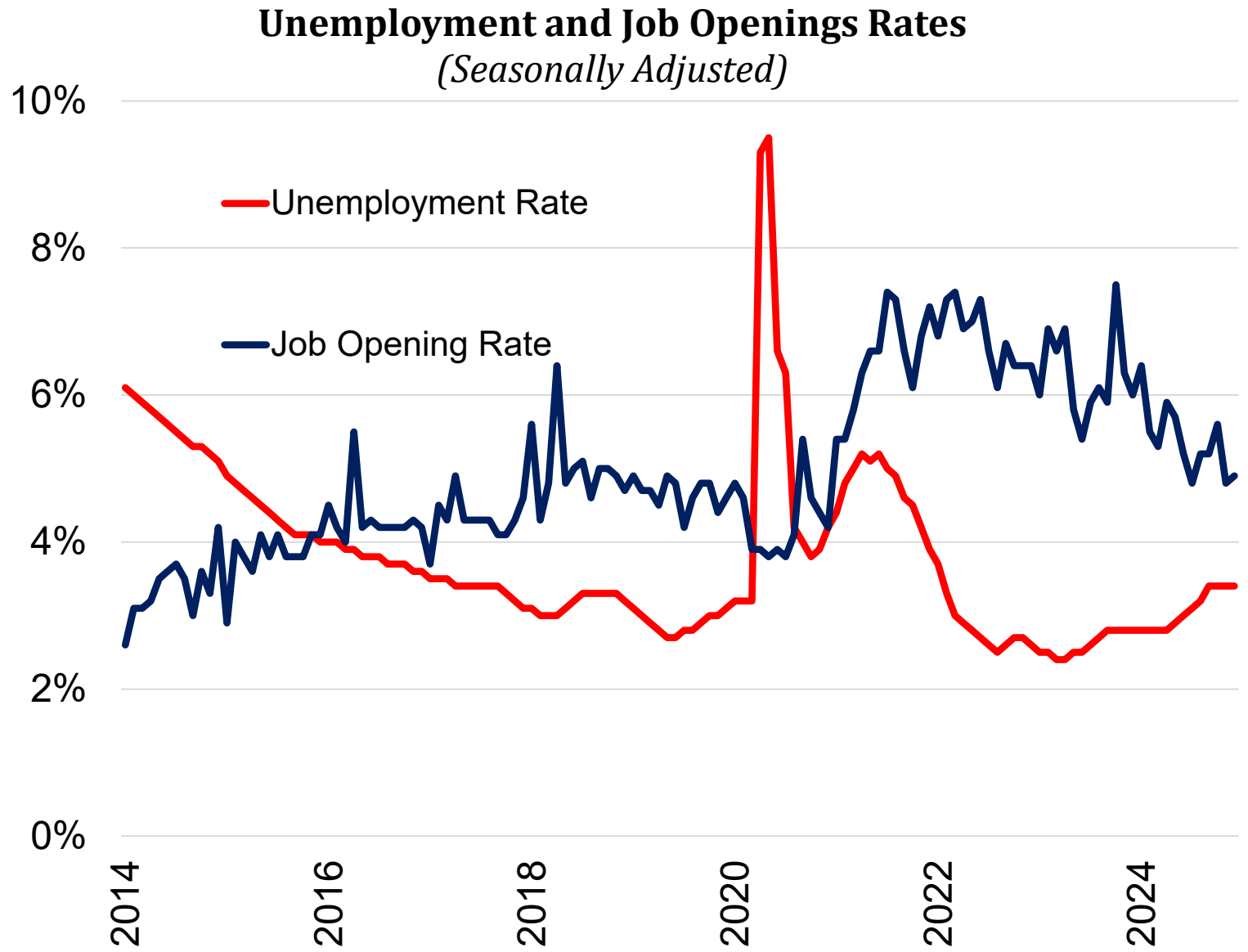
# Section 2:
# Statewide and regional labor market trends

## Labor demand and labor supply are becoming more balanced

Job openings remain elevated, but the gap with unemployment continued to move closer to what prevailed prior to the pandemic.

Job openings rates have fallen to just under 5 percent.

There are an average of 1.5 job openings for each 1 unemployed job seeker in the state.

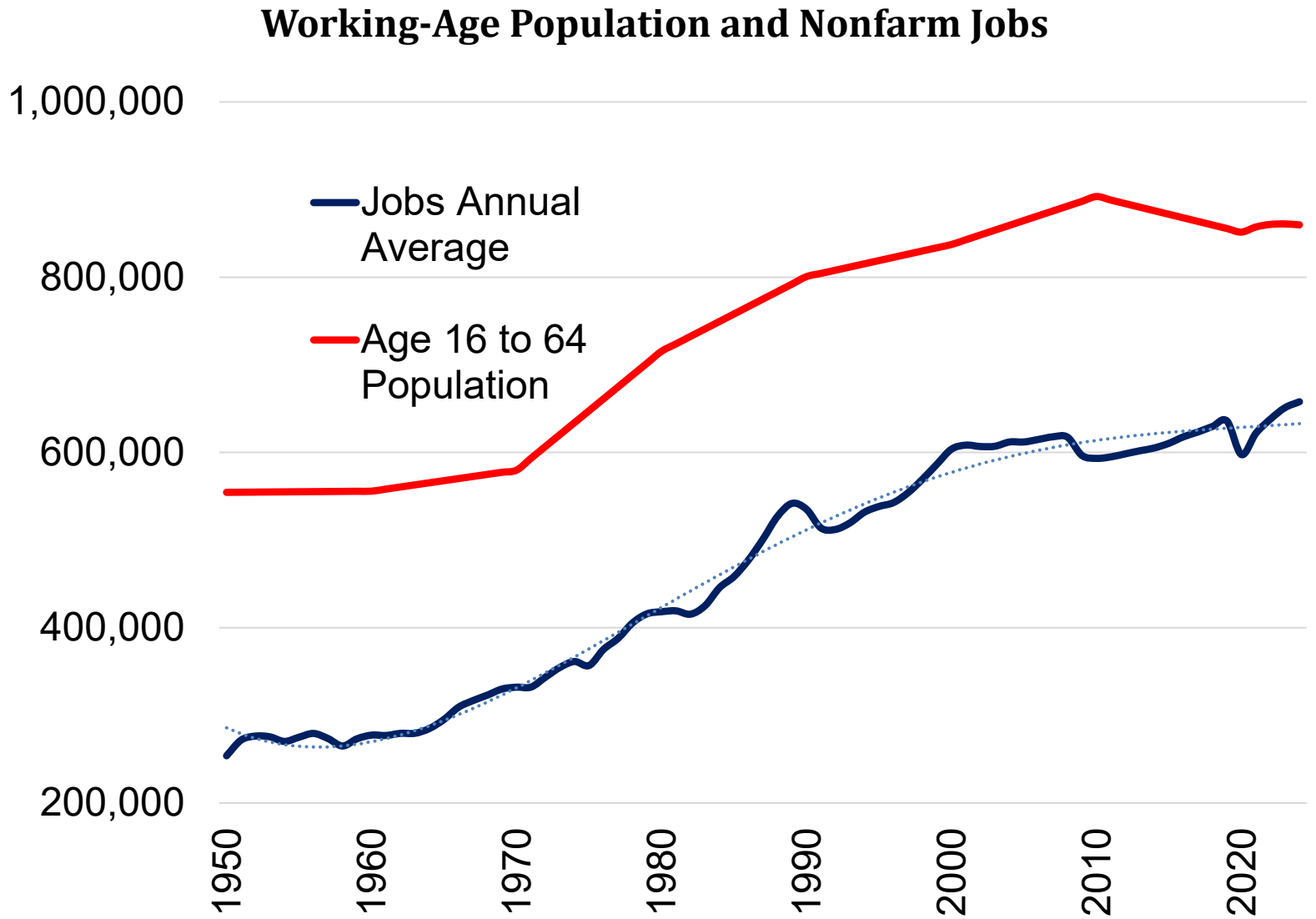


## Net job change has slowed

The population between age 16-64 is modestly smaller today than 15 years ago.

Job growth has progressively slowed, generally parallel to the working-age population.

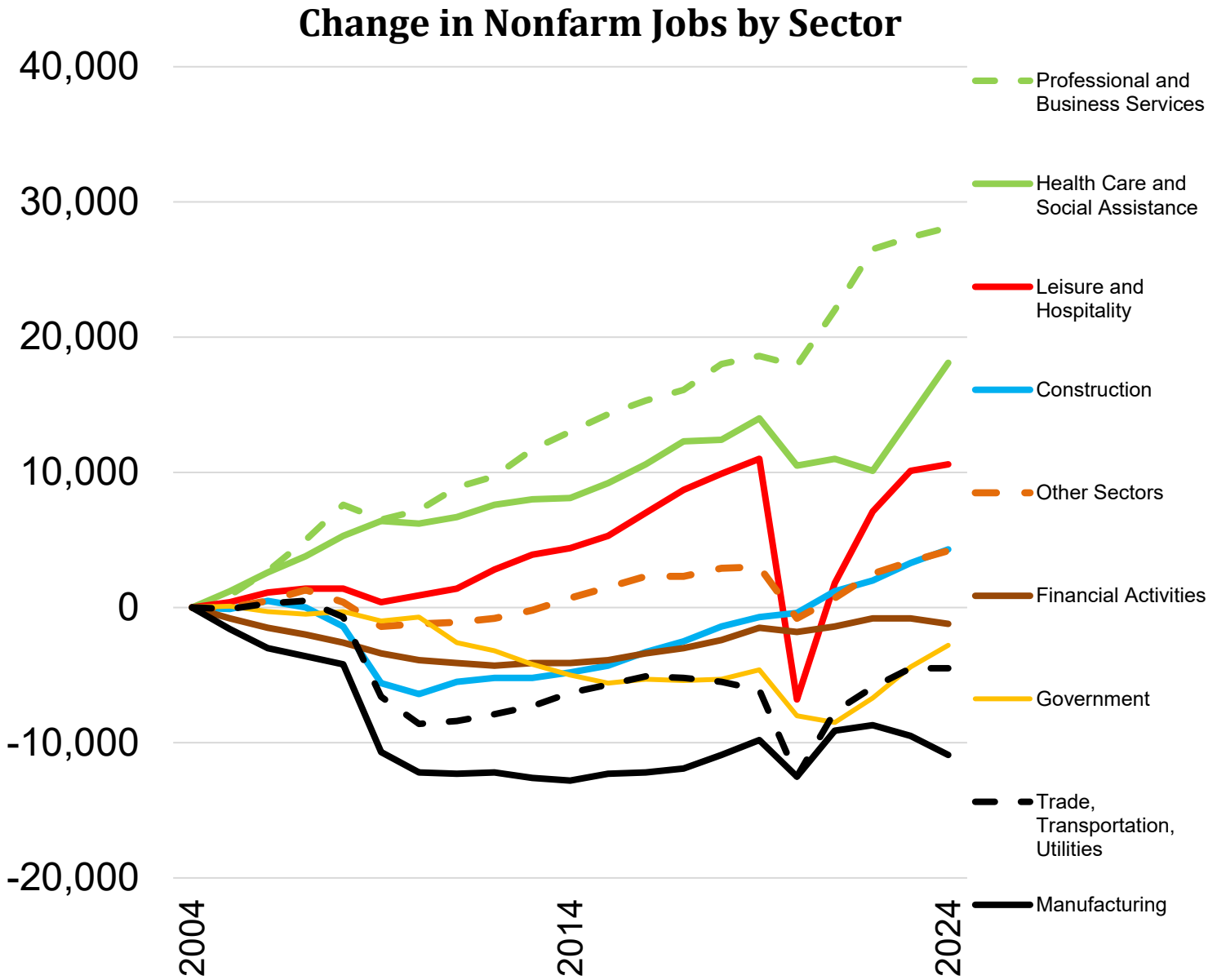
Except for recessions (beginning in 2008 and in 2020) and the following recoveries, net job growth (+54,000 jobs) in the 2000s has been quite modest.



## Statewide job change in the 2000s is concentrated in three sectors

In the last 20 years, the most significant job increases are in the health care and social assistance (+18,000 jobs) and the professional and business services (+28,000 jobs) sectors. Changes to the job structure occurred slowly in the more recent years.

Manufacturing jobs decreased significantly in the first decade of the 2000s but have since stabilized.

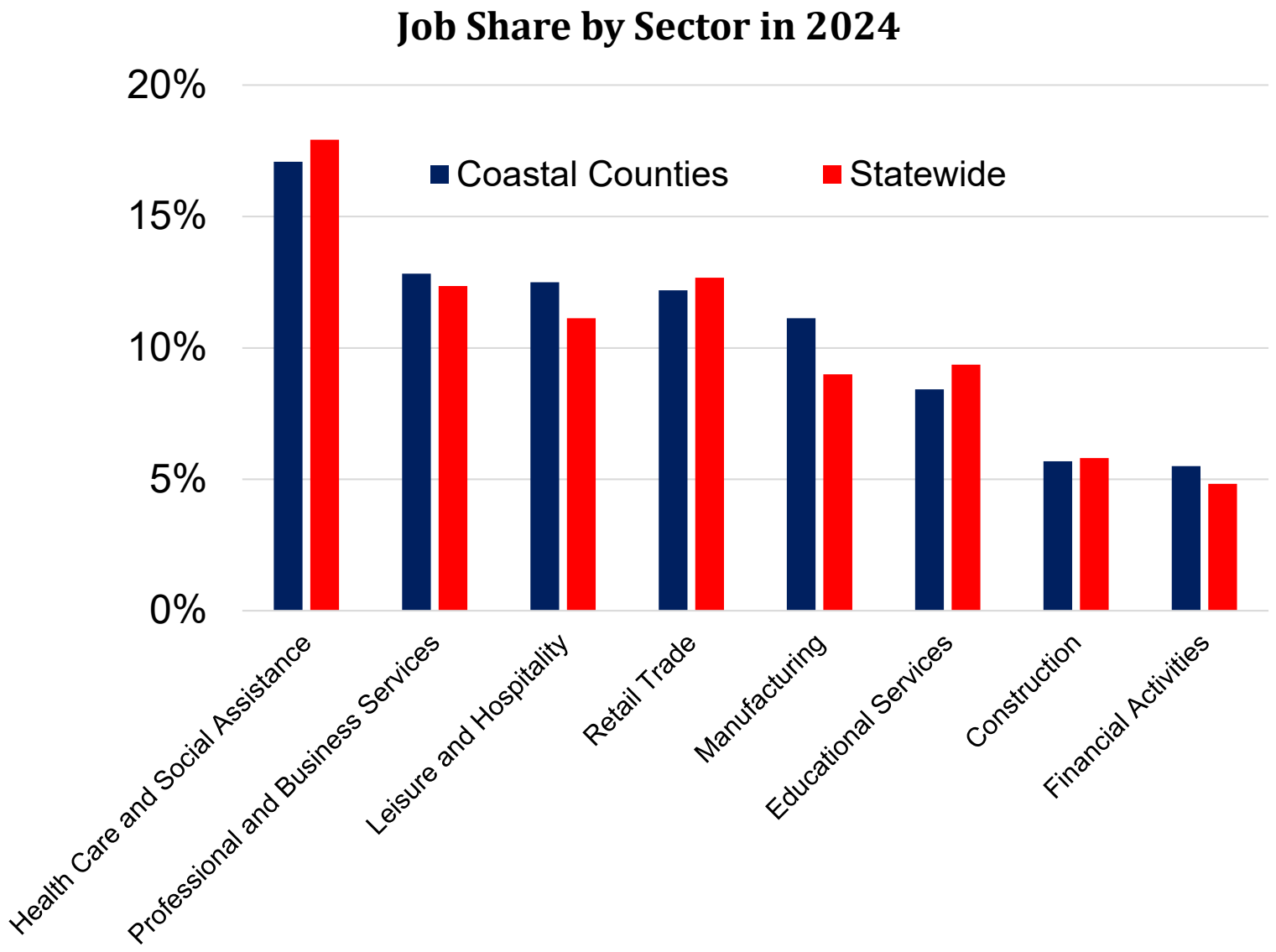


## Health care accounts for 17 percent of jobs in the Coastal Counties

Relative to the state, the Coastal Counties have:

- a higher share of jobs in the leisure and hospitality and manufacturing sectors.
- a lower share of jobs in the educational services sector.

Differences are small because the Coastal Counties account for half of statewide employment.

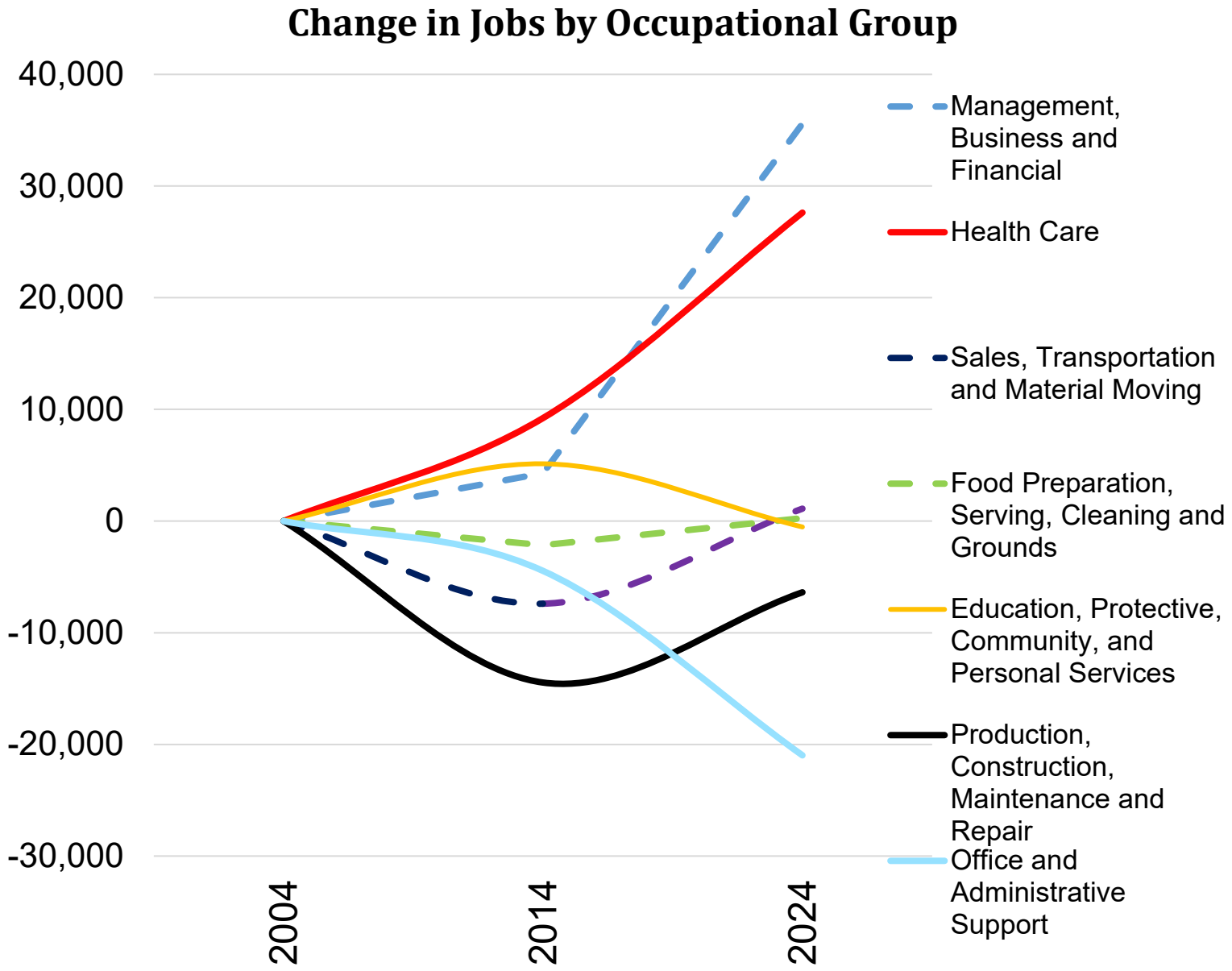


## Job change has been concentrated in three occupational groups

Areas of industry growth led to job increases in management, business and finance and health care occupational groups. The decline in manufacturing is reflected in fewer jobs in production, construction, maintenance, and repair occupations, though employment in this group has stabilized.

New technologies changing the work environment of many industries have resulted in 21,000 fewer jobs among office and administrative support workers. AI is likely to contribute to further decreases.

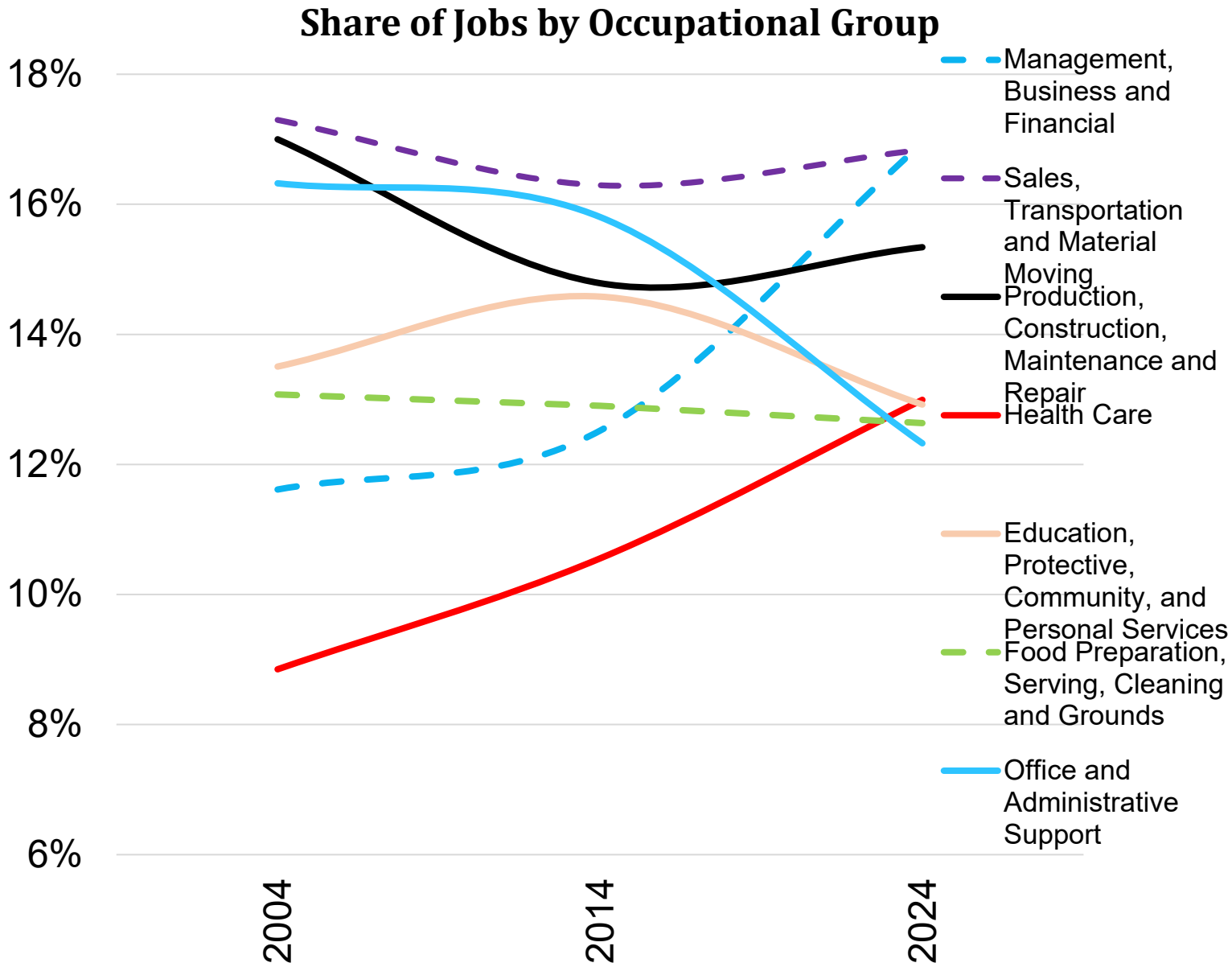
*(Jobs in Legal, Life, Physical, and Social Science and Arts, Design, Entertainment, and Media occupational groups increased by 1,700 each on average in the two decades. Combined these groups represent less than 3 percent of total jobs and are not included in this chart.)*

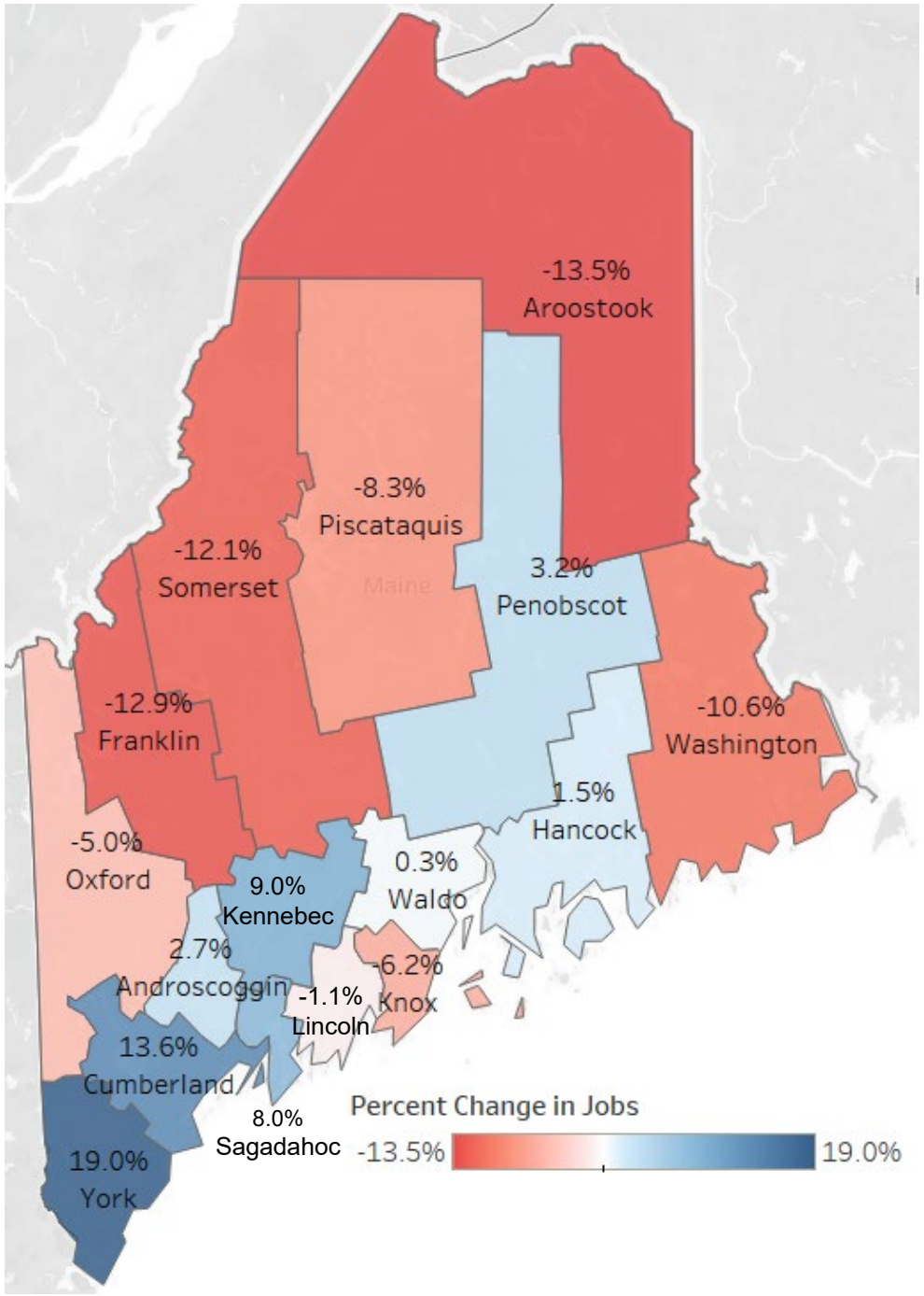


## Most occupational groups represent a similar share of jobs over two decades

Management, business and financial related occupations now are the largest group, the share of jobs in this group grew by five percentage points over the last two decades. The share of jobs in healthcare occupations increased by four percentage points in this time. Production, construction, maintenance and repair occupations represent a lower share but remain the third largest occupational group. The overall occupational composition has shifted away from office and administrative support occupations.

*(Legal, Life, Physical, and Social Science and Arts, Design, Entertainment, and Media occupational groups contain approximately one percent of occupational employment each and are not included in this chart)*






## Map: Percent Change in Jobs

*(from 2004 to 2024)*

## Table: Share of Jobs in 2024

| County | Share of Jobs in 2024 |
|---|---|
| Androscoggin | 7.8% |
| Aroostook | 4.2% |
| Cumberland | 31.0% |
| Franklin | 1.7% |
| Hancock | 3.8% |
| Kennebec | 10.1% |
| Knox | 2.7% |
| Lincoln | 1.8% |
| Oxford | 2.7% |
| Penobscot | 11.6% |
| Piscataquis | 0.8% |
| Sagadahoc | 2.8% |
| Somerset | 2.6% |
| Waldo | 1.8% |
| Washington | 1.6% |
| York | 12.8% |

# Takeaways

MAINE DEPARTMENT OF LABOR

Population between ages 16-64 is modestly smaller than 15 years ago contributing to a slower period of labor force and job growth.

Job openings remain elevated but moving closer to pre-pandemic levels.

The most significant job increases are in the health care and the professional and business services sectors. Demand for workforce in manufacturing has fallen, then stabilized.

Areas of industry growth led to increases in occupational demand for health care, management, business, finance, computer and mathematical groups.

Jobs and the economic base have shifted toward more densely populated areas of the state: the coastal counties account for half of jobs statewide.

A lesson from past waves of automation that is likely to apply in the years ahead:

- Workers whose skills are complementary to emerging technology and that can deploy those skills using or further developing that technology are likely to be in high demand.
- Workers whose skill can be substituted by emerging technology and are likely to experience decreasing demand, are more likely to experience job displacement and wage stagnation.