

Workforce Data and its Many Uses

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July 16th

Workforce Data Sources

- Federal government
 - Census Bureau
 - American Community Survey
 - Bureau of Labor Statistics
 - Quarterly Census of Employment and Wages (QCEW)
 - Occupational Employment Statistics (OES)
 - Job Openings and Labor Turnover Survey (JOLTS)
 - Longitudinal Employer-Household Dynamics (LEHD)
 - National Center for Education Statistics
 - Bureau of Economic Analysis
- Data vendors like EMSI, Chmura Analytics, ESRI/ArcGIS
 - Much of what they offer is derived from government data sources
 - Often projections and built-in analytics are added
 - Occasionally there is freshly-collected data, e.g., job postings data scraped from jobs sites by web crawlers
- State government data assets
 - Higher education graduation records
 - Unemployment Insurance wage data

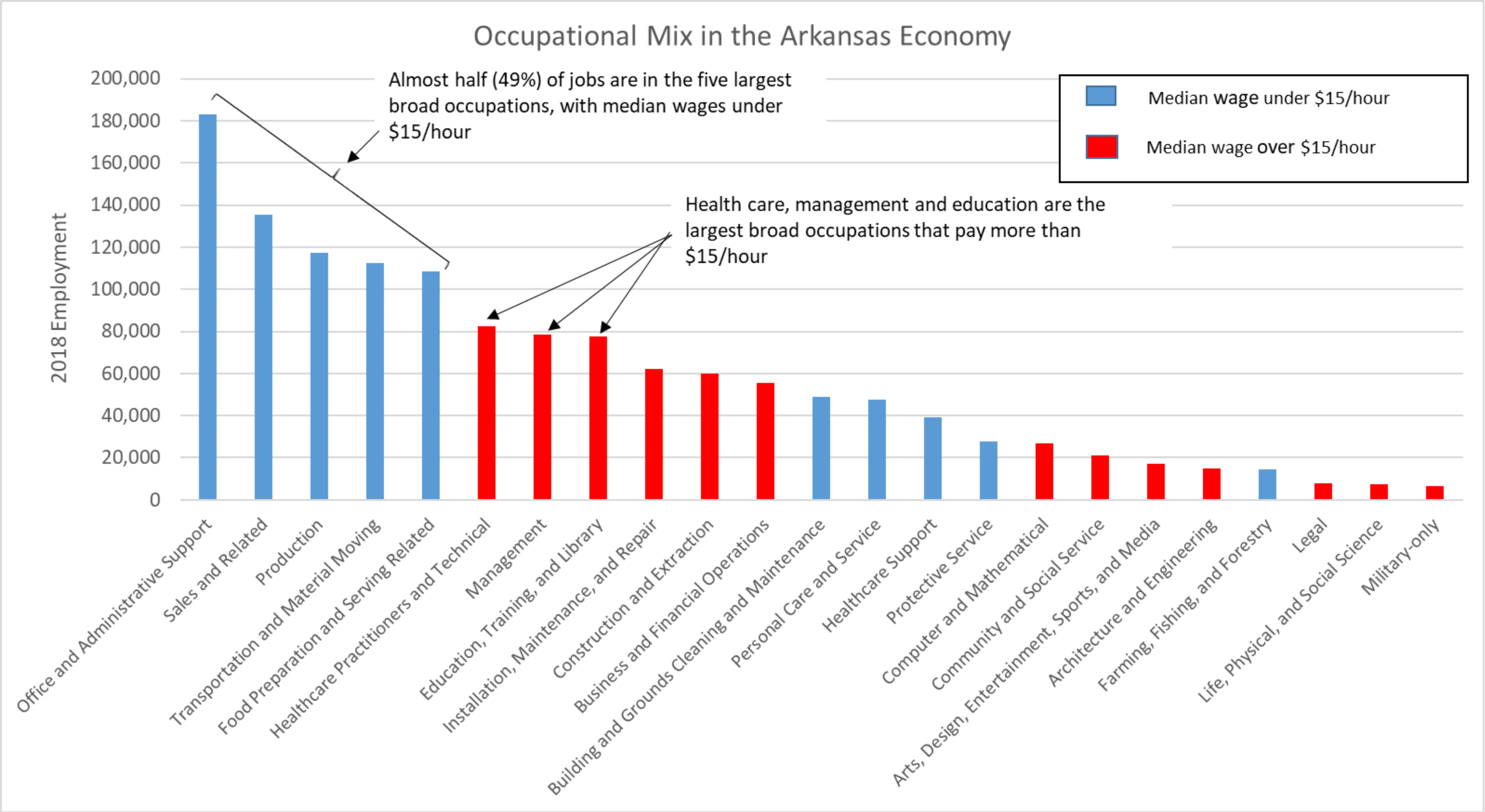
Workforce Data Use Cases

- Business recruitment, retention and expansion
 - Help businesses that are considering an Arkansas location to assess availability of a desired workforce
- Planning for academic and training programs
 - Assess likely labor market value of credentials from a proposed academic or training program
 - Data-driven decision-making about whether to continue or terminate an existing academic or training program
- Macroeconomic intelligence
 - Planning taxes and spending
 - Assessing adequacy and targeting of welfare programs

Stylized Facts about the Labor Market

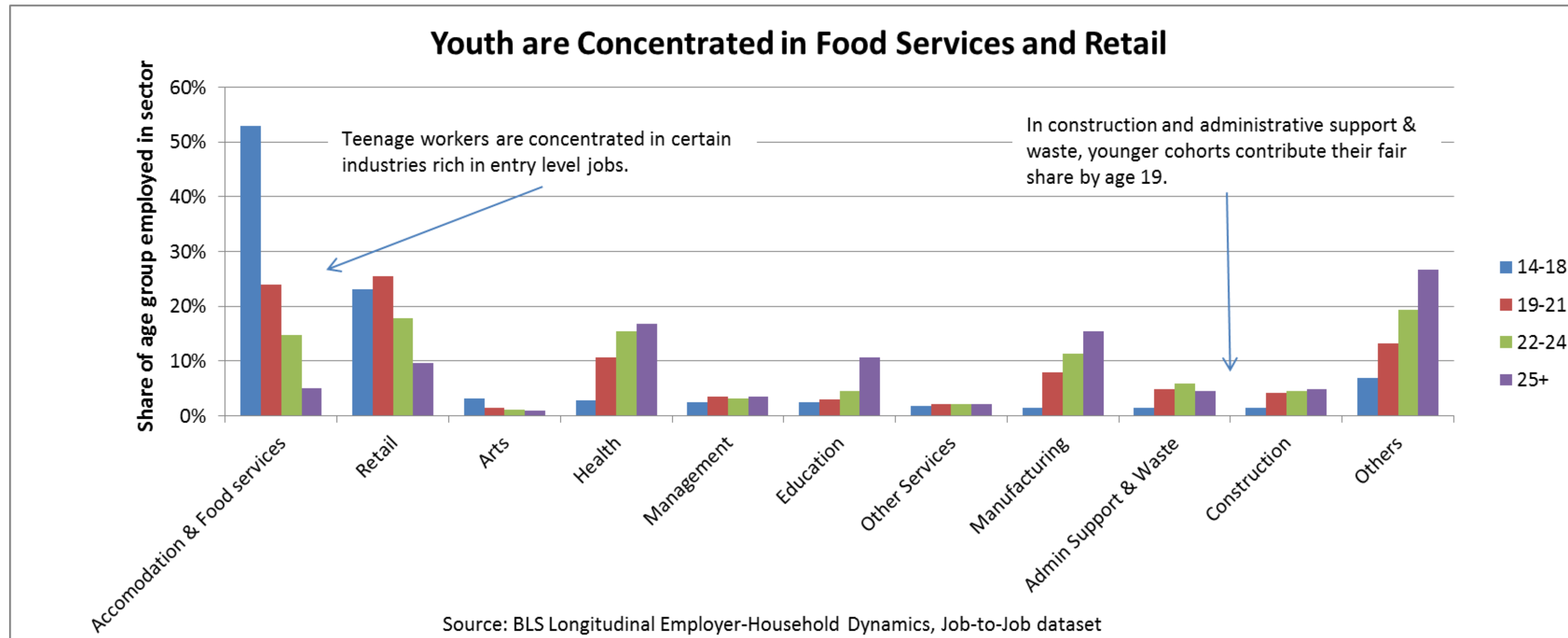
Arkansas Has a Lot of Jobs in Predominantly Low-Paid, Low-Skill Occupations, but Also Many Better-Paid and/or More Education-Demanding Jobs

Maybe in a second chart, include 25th and 75th percentile



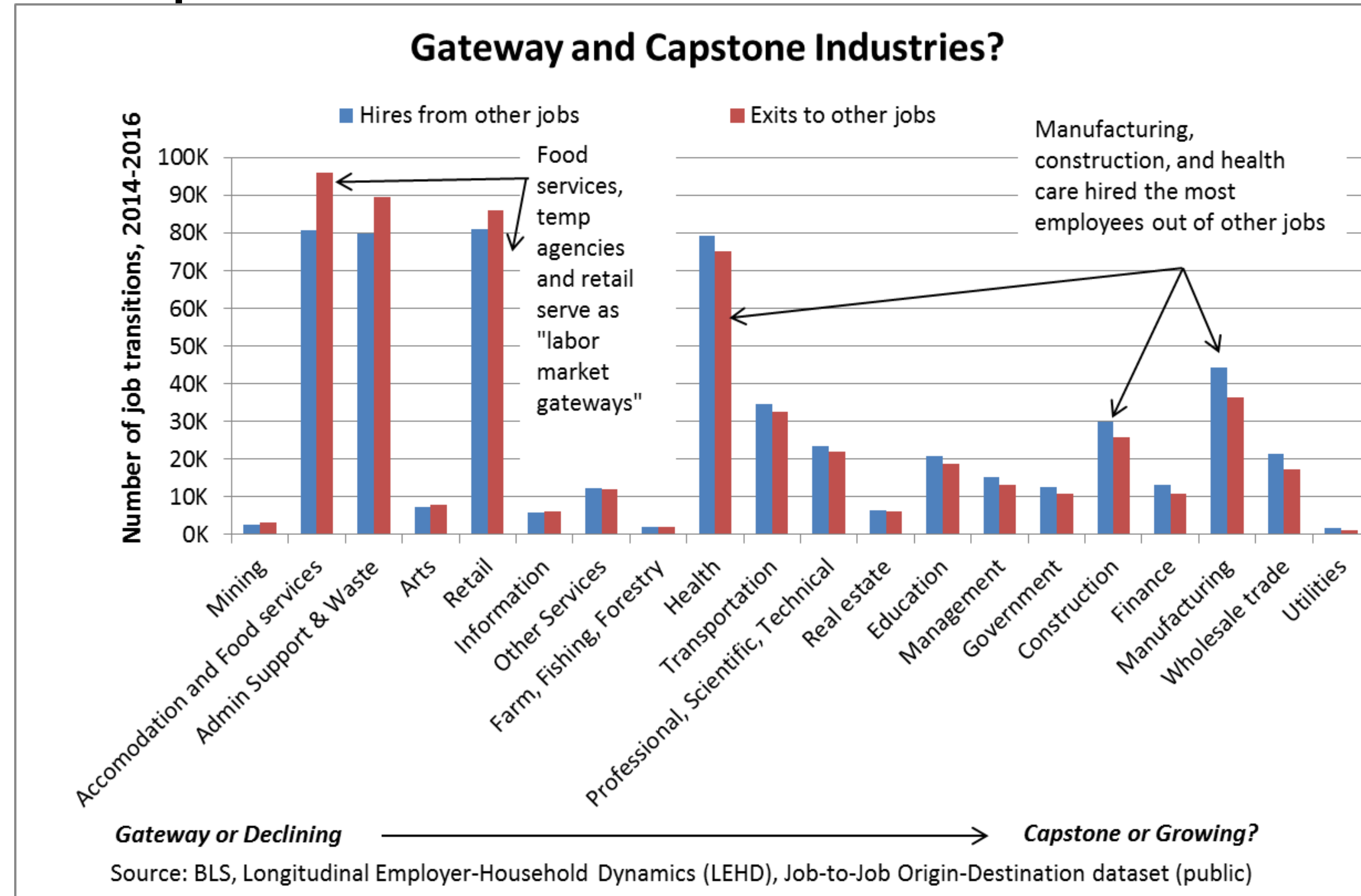
Youth Employment Patterns

It would be interesting to see salaries by age for this youth, at least in jobs that don't require education. My guess is that, with the same lack of skills, those jobs with lower frequency are also the ones with higher wages (but also, the ones that require more engagement and commitment in the workplace

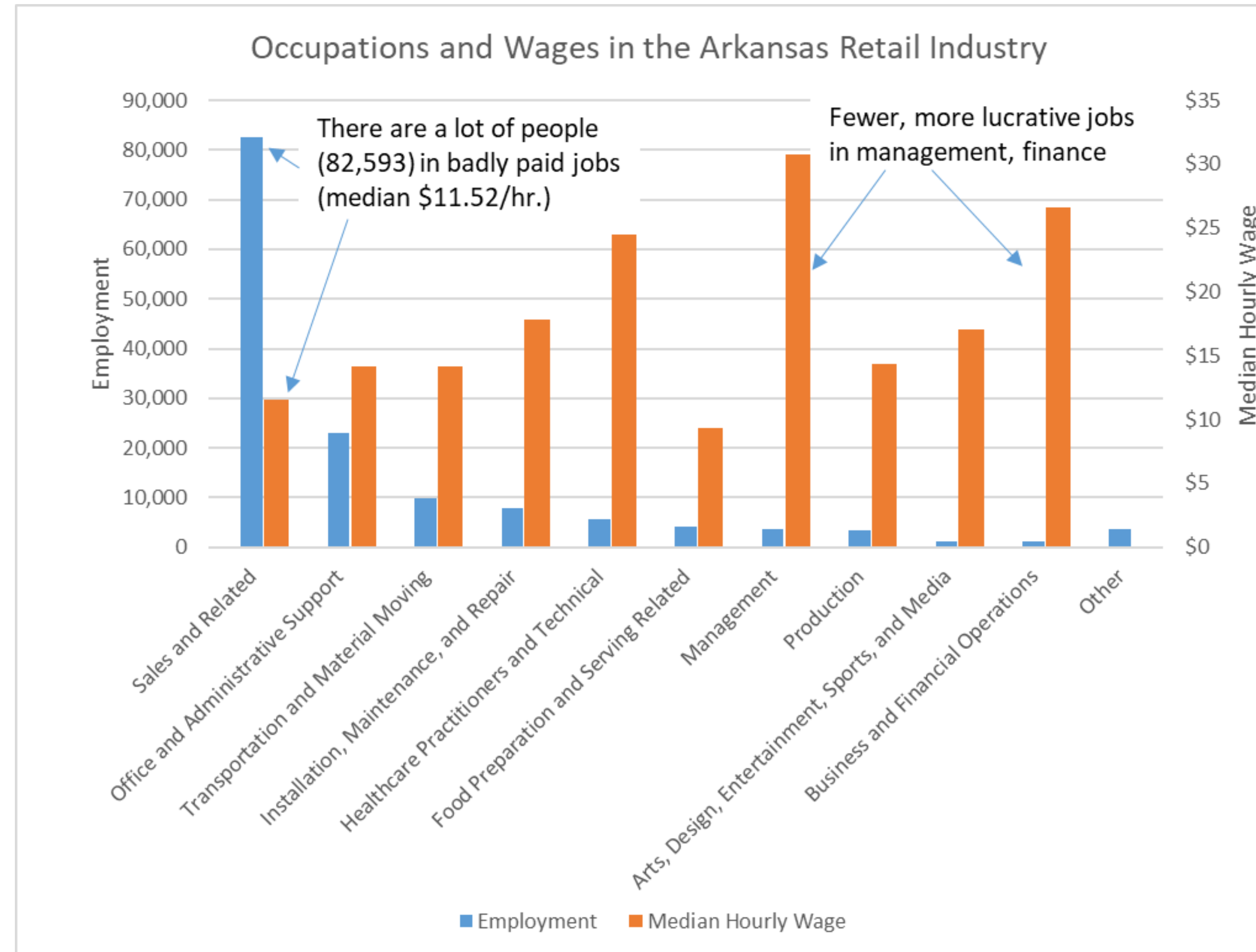


Classifying Industries along a Gateway-to-Capstone Spectrum

The legend for the different colors is not clear as there's a ton of text. Maybe more space between the chart and the legend



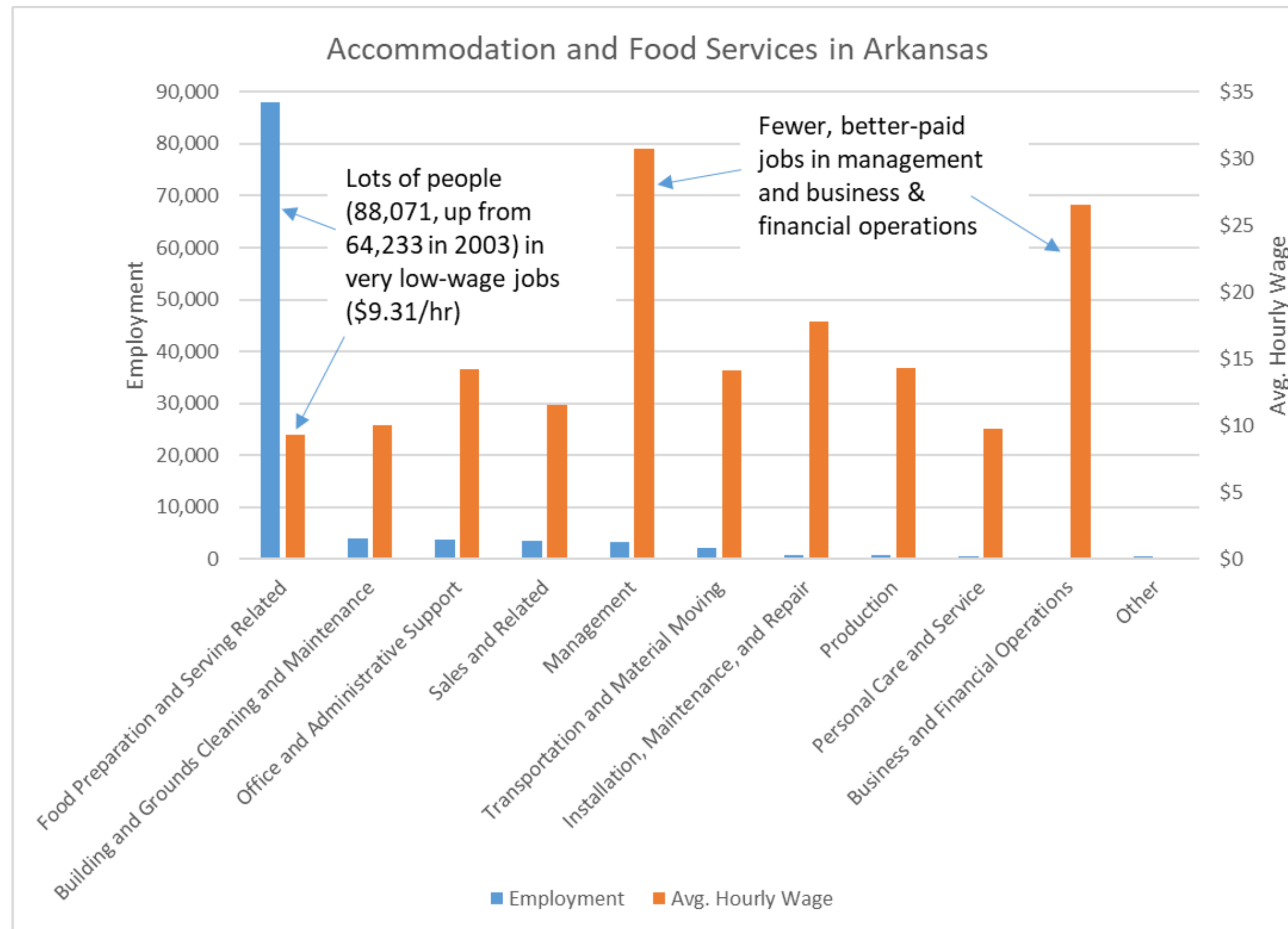
Jobs to Get Away From: Low-Wage Employment in the Retail Industry



We can complement this with education and skill requirements. Also, sometimes, even if there's no lack of certain backgrounds, maybe there's no more demand for a reason, coming from lack of demand of the industries hosting those occupations

Source: EMSI. Geography: Arkansas

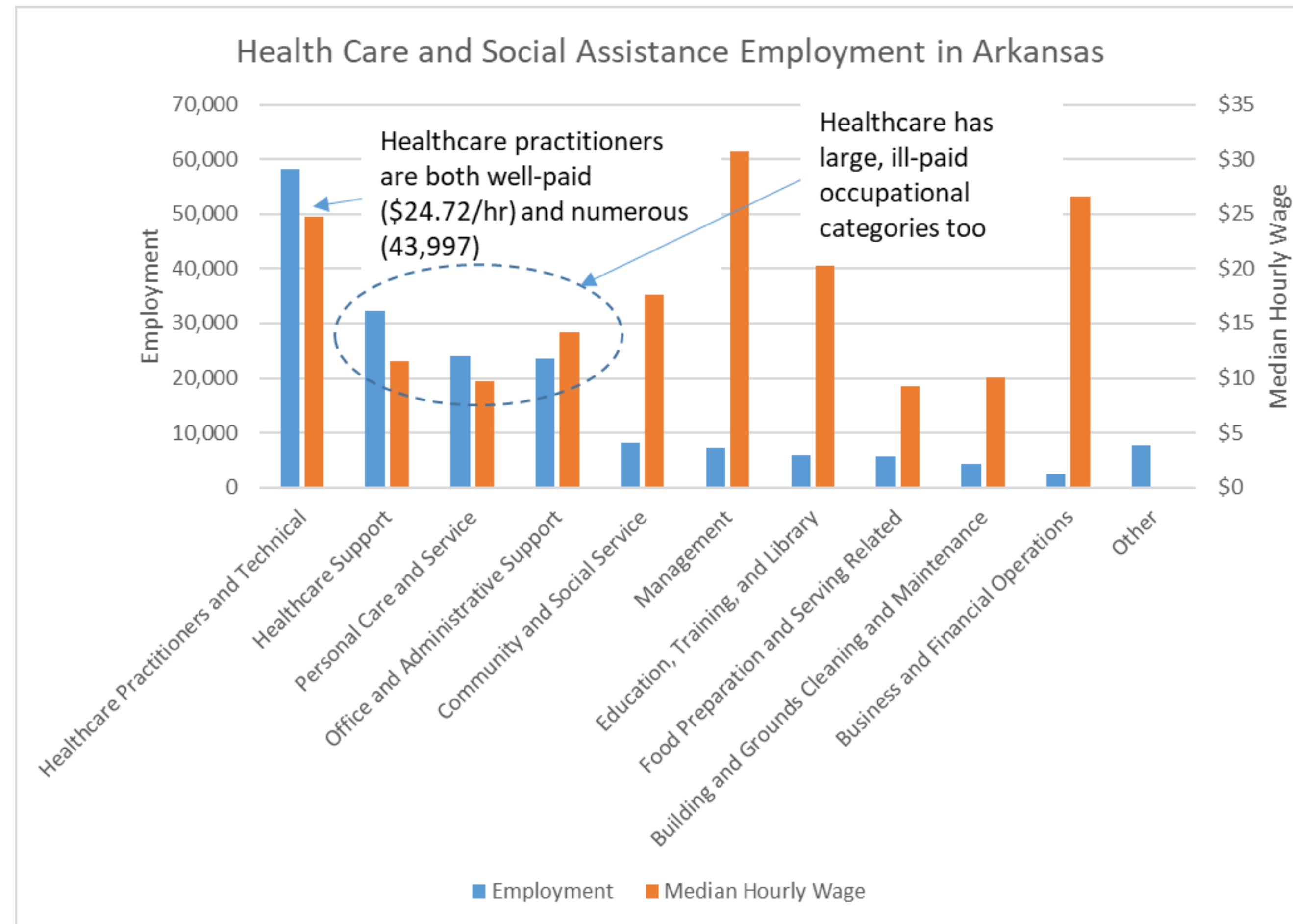
Jobs to Get Away From: Low-Wage Employment in Accommodation and Food Services



Source: EMSI. Geography: Arkansas

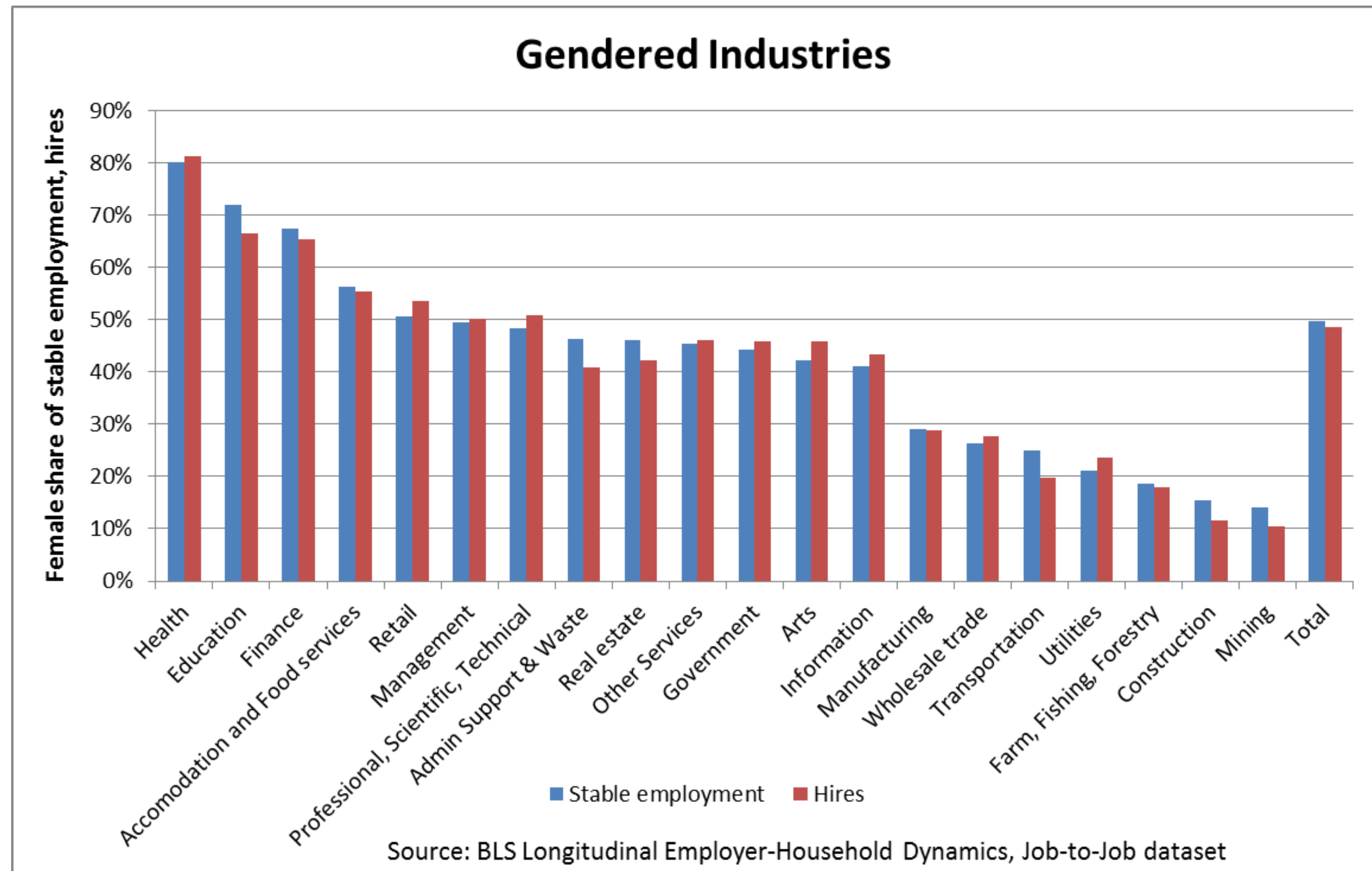
Mass Skilled Employment in the Health Care Sector

For the eye of the untrained, maybe two charts, one for blue and one for orange would be easier to understand (using the same order)



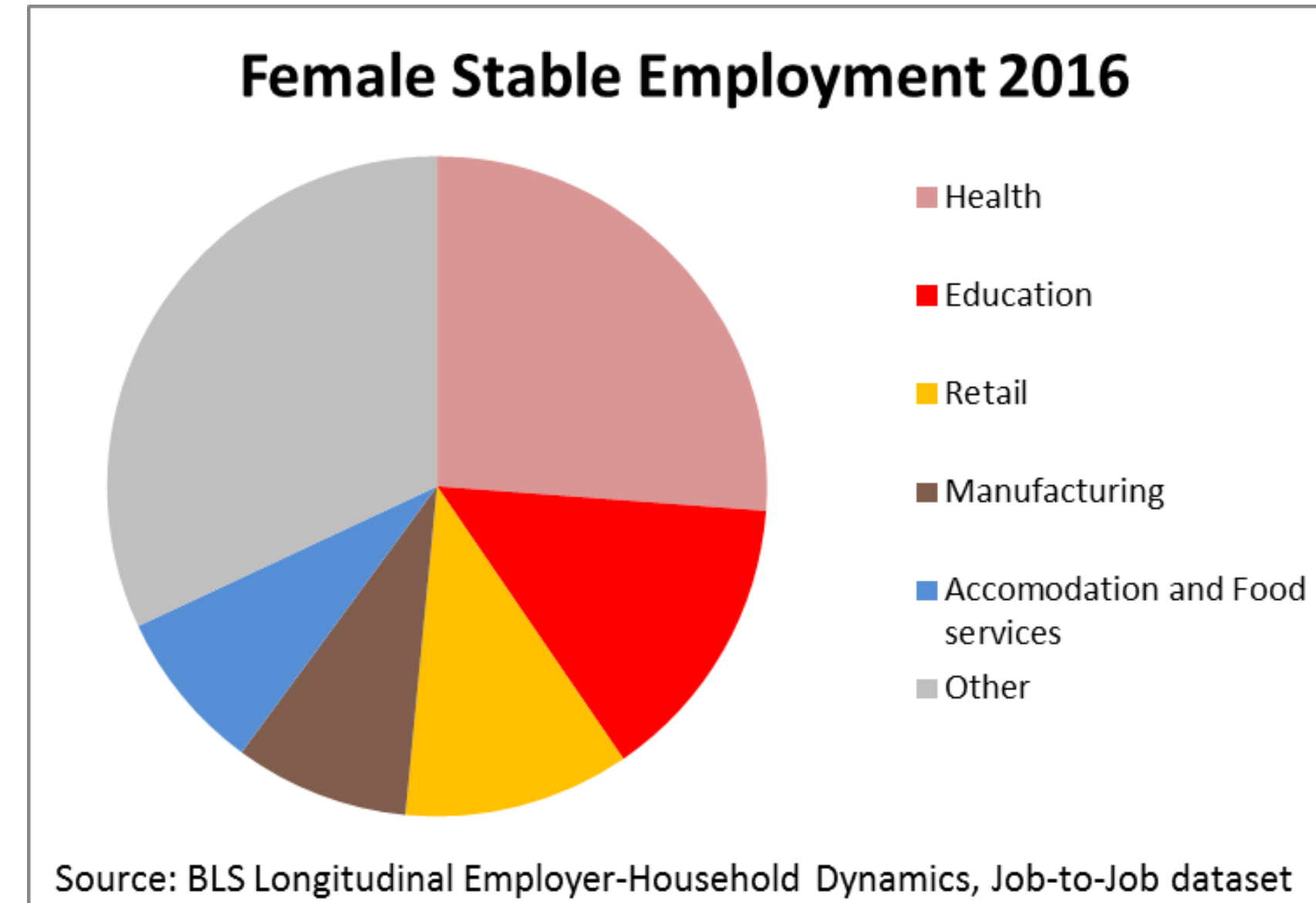
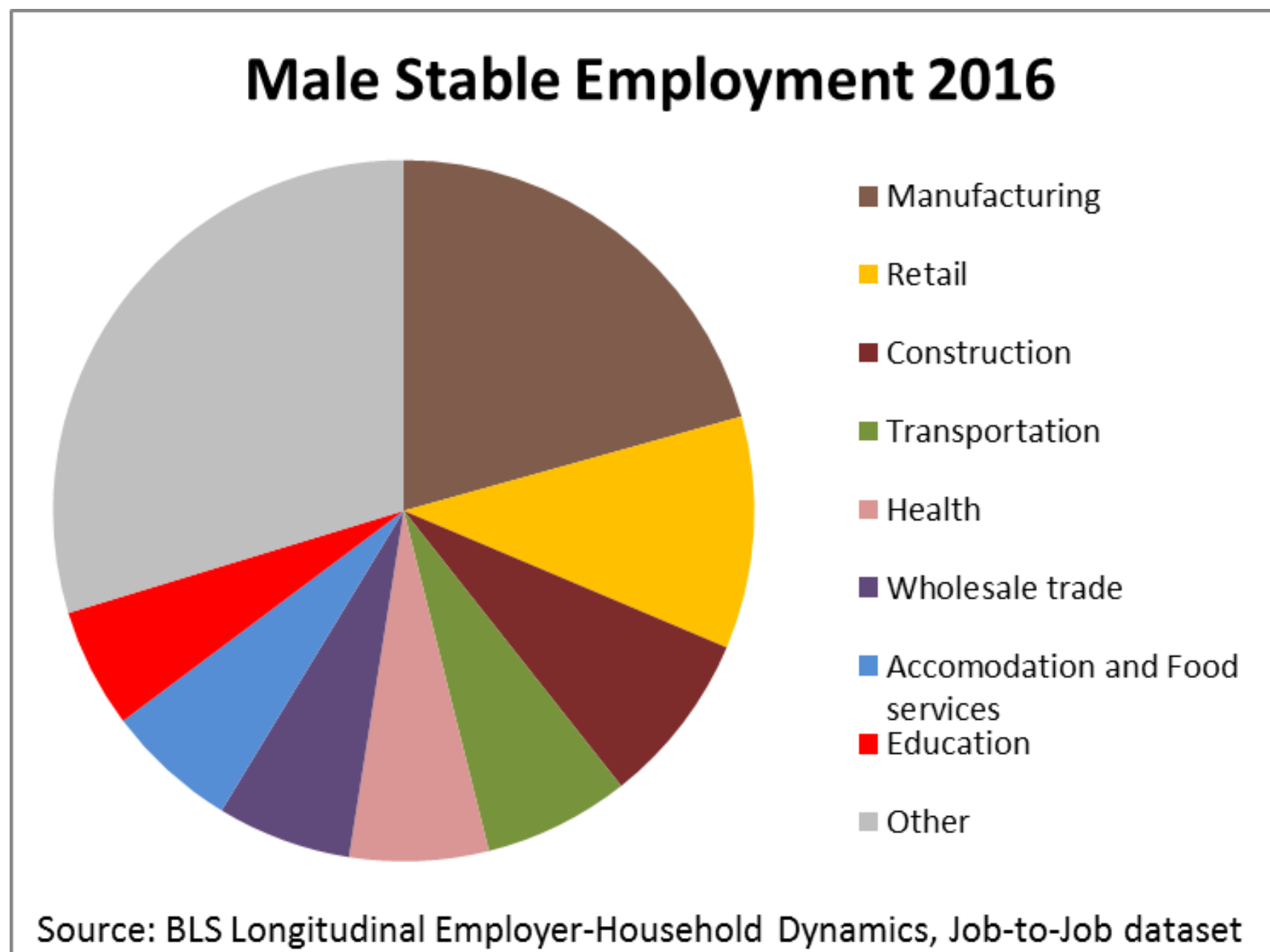
Source: EMSI. Geography: Arkansas

Employment in Many Industries is Dominated by One Gender

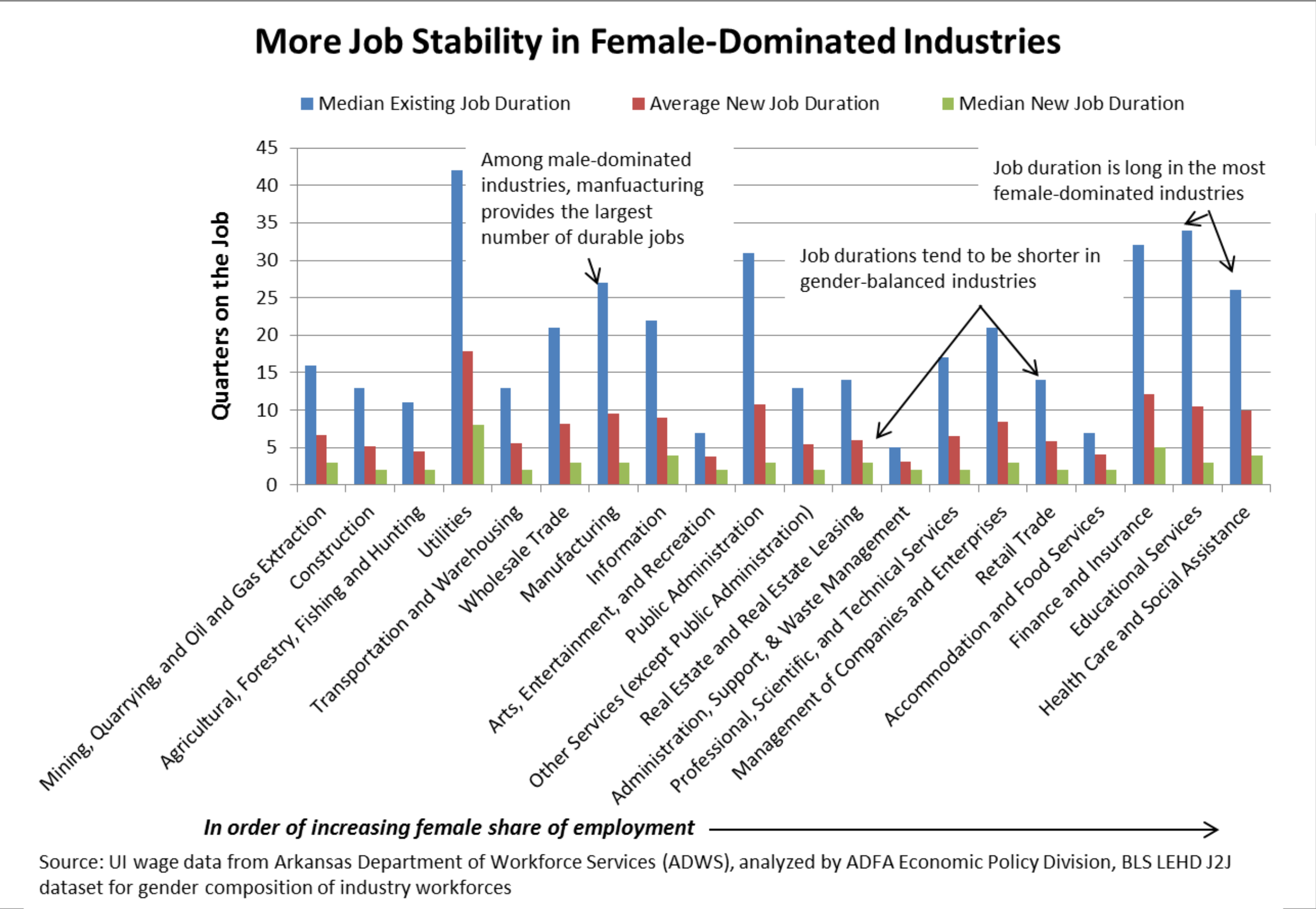


Women are More Concentrated by Industry

- The top three industries (2-digit NAICS) for female employment account for 52% of jobs
- The top three industries for male employment account for only 39% of jobs

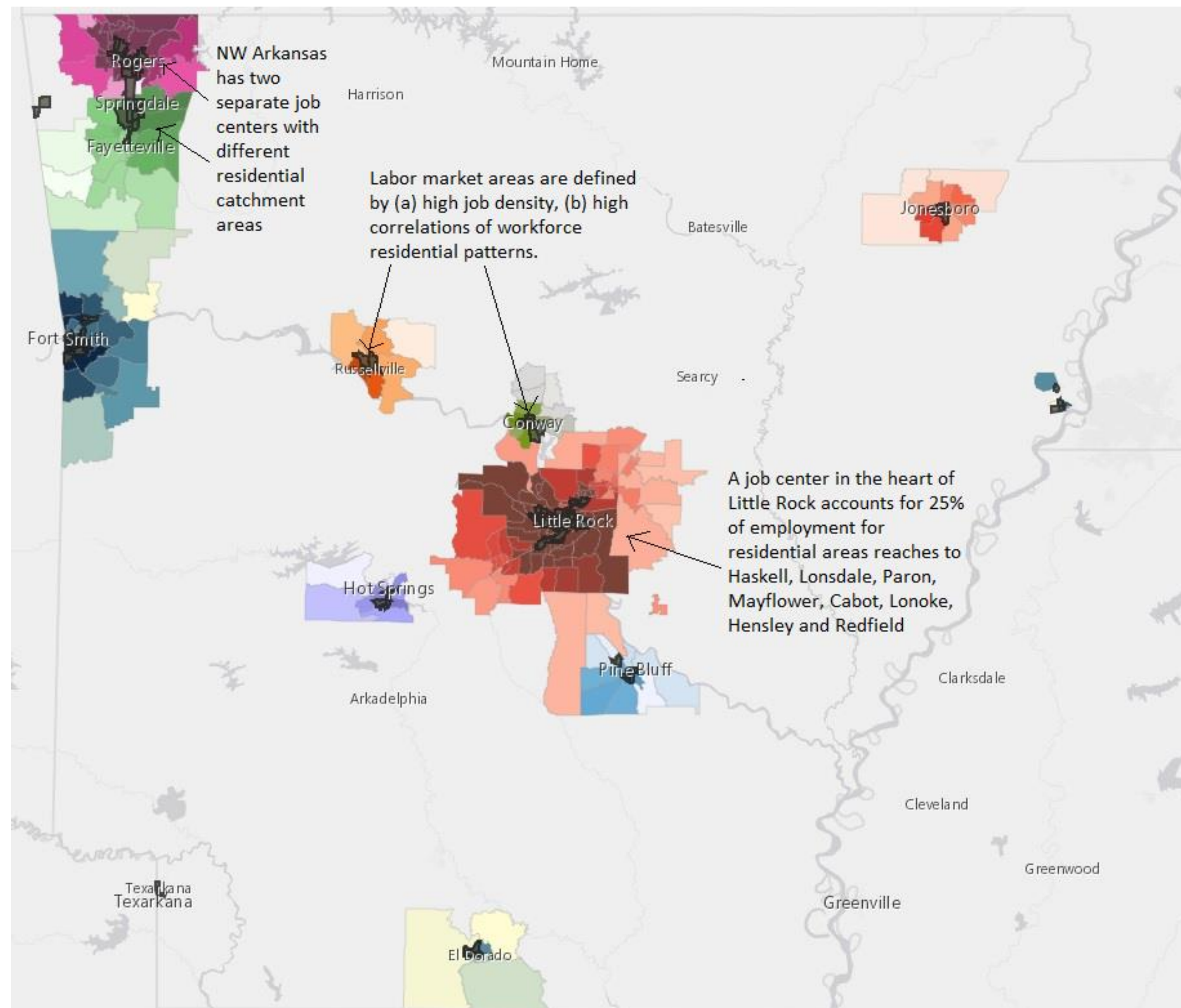


Gendered Industries and Job Stability



Note: we should repeat these charts using the new versions of Uiwage data

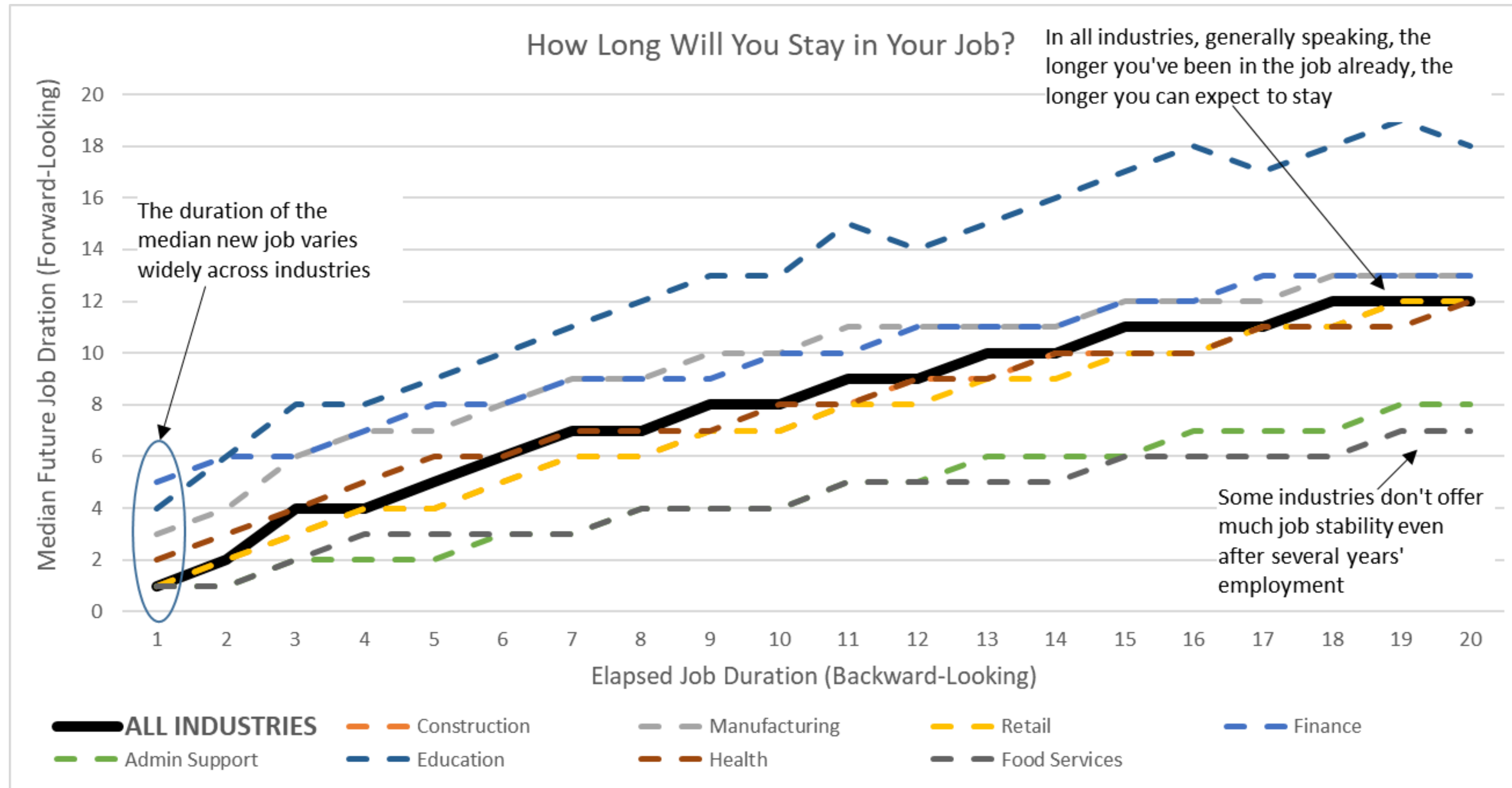
Analysis of Labor Sheds and Commuting Patterns Using BLS Origin-Destination Data



A second chart zooming in to one particular area, maybe W-NW Arkansas, so people can identify the counties/areas

The Importance of Job Stability

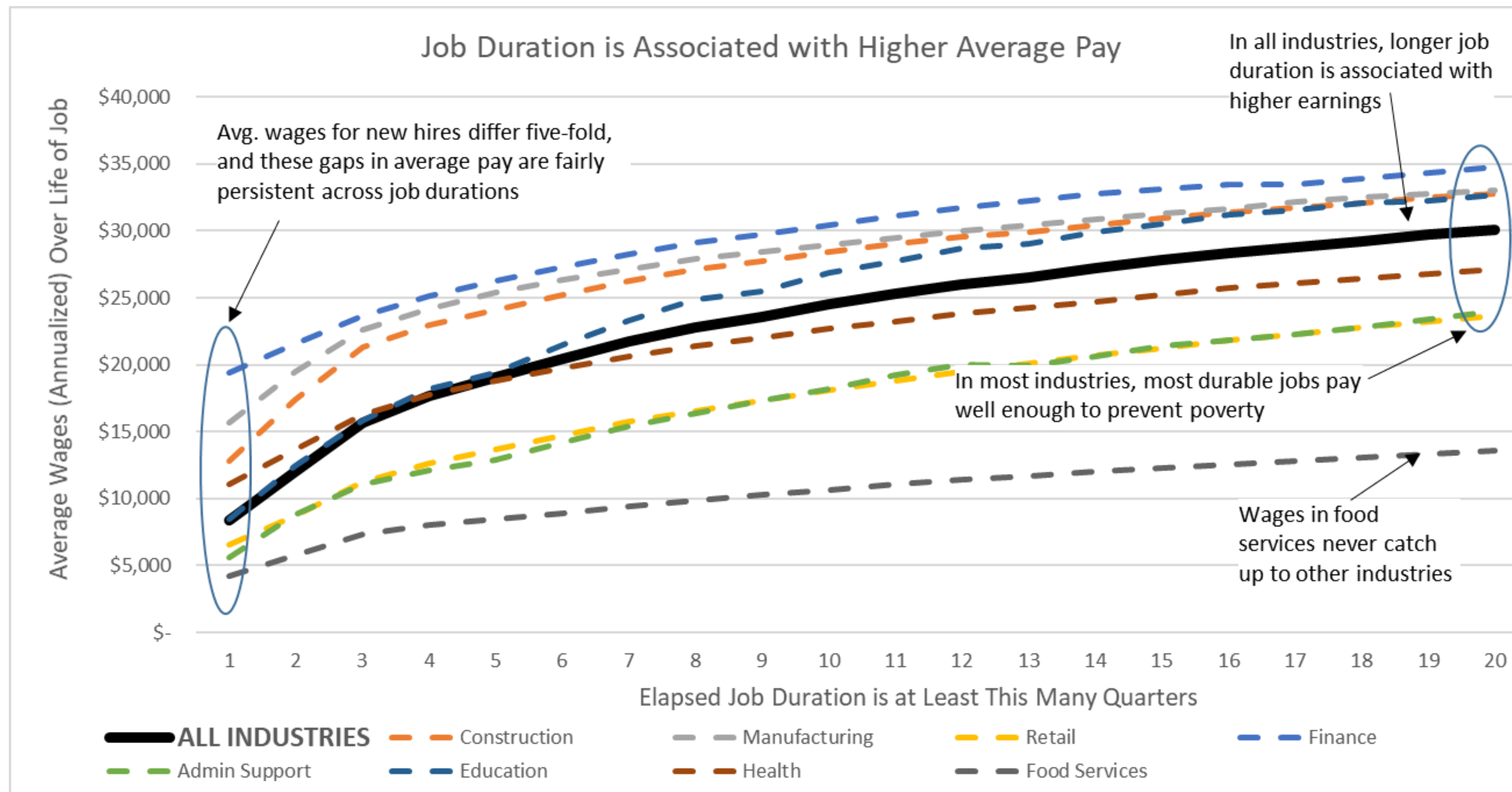
Most New Hires Don't Last a Year



Source: UI Wage Data. Geography: Arkansas

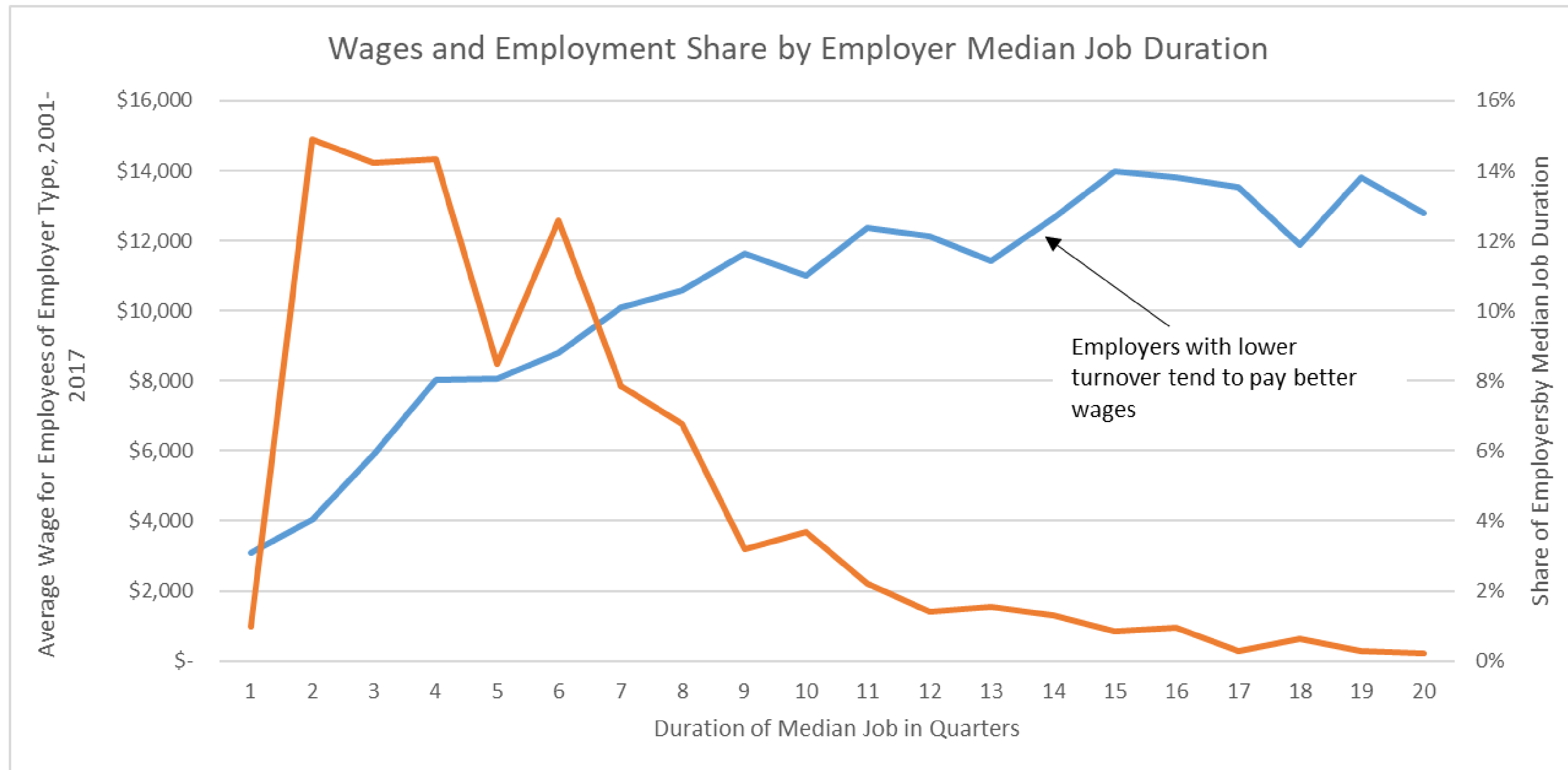
The Importance of Job Stability

Higher Wages Come with More Stable Jobs



Source: UI Wage Data. Geography: Arkansas

Wages and Turnover Patterns: Employers with Lower Turnover Tend to Pay Better



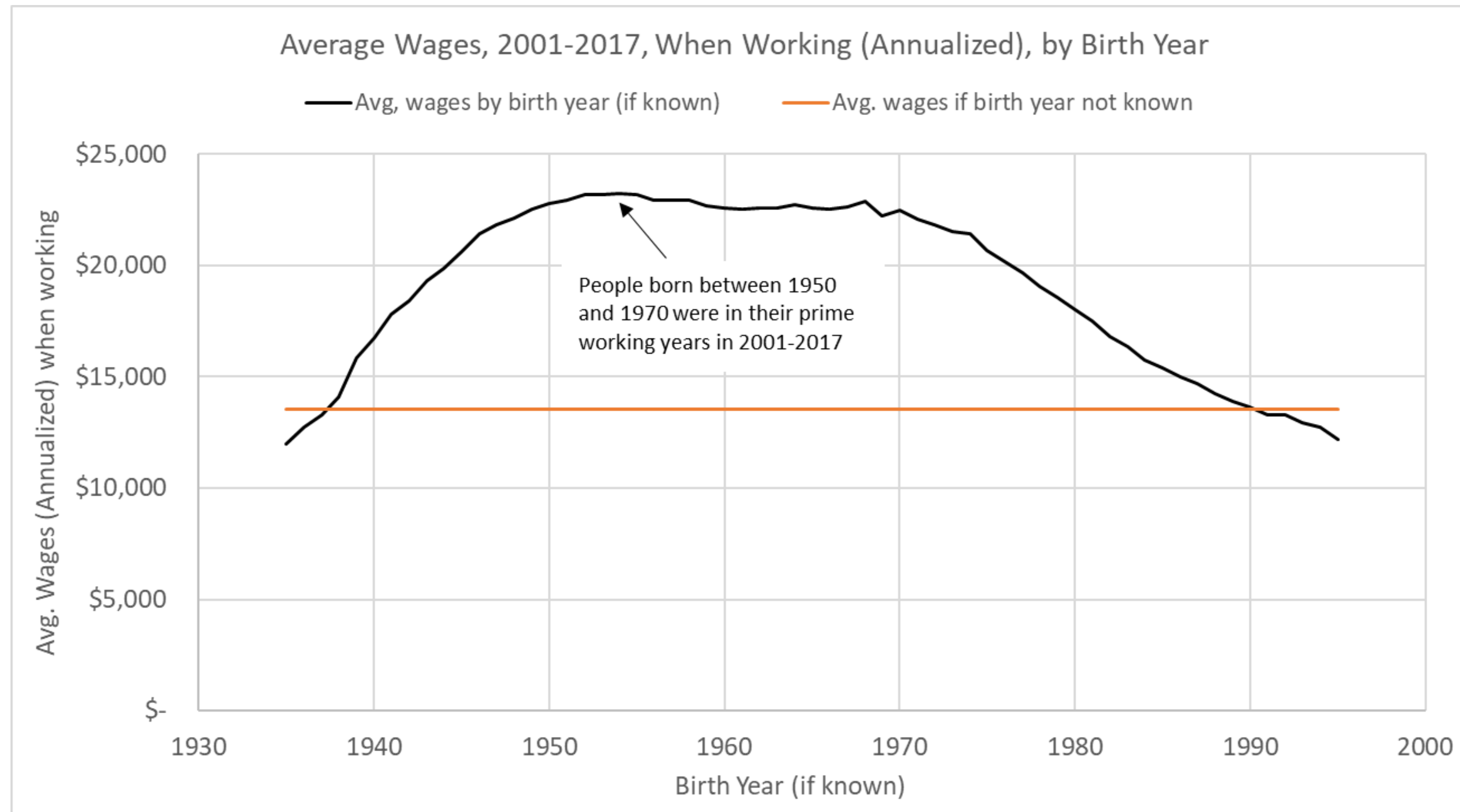
Is the wage quarterly, monthly?

Did you truncate to full quarter or you include those who had a one week job in the same space as those who work for a full period?

Source: UI Wage Data. Geography: Arkansas

The Earnings Life-Cycle

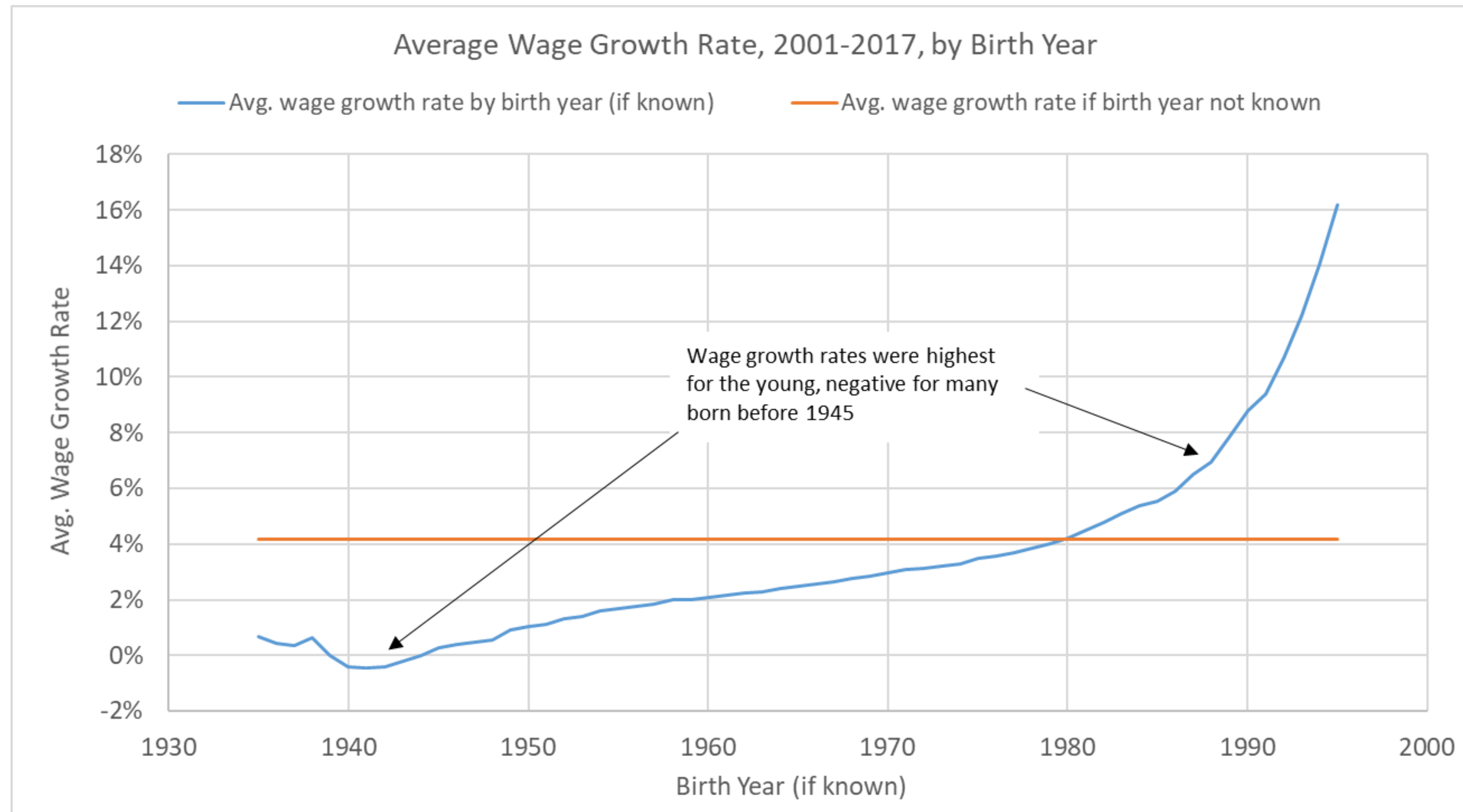
In 2001-2017, Arkansans born between 1950 and 1970 earned the most



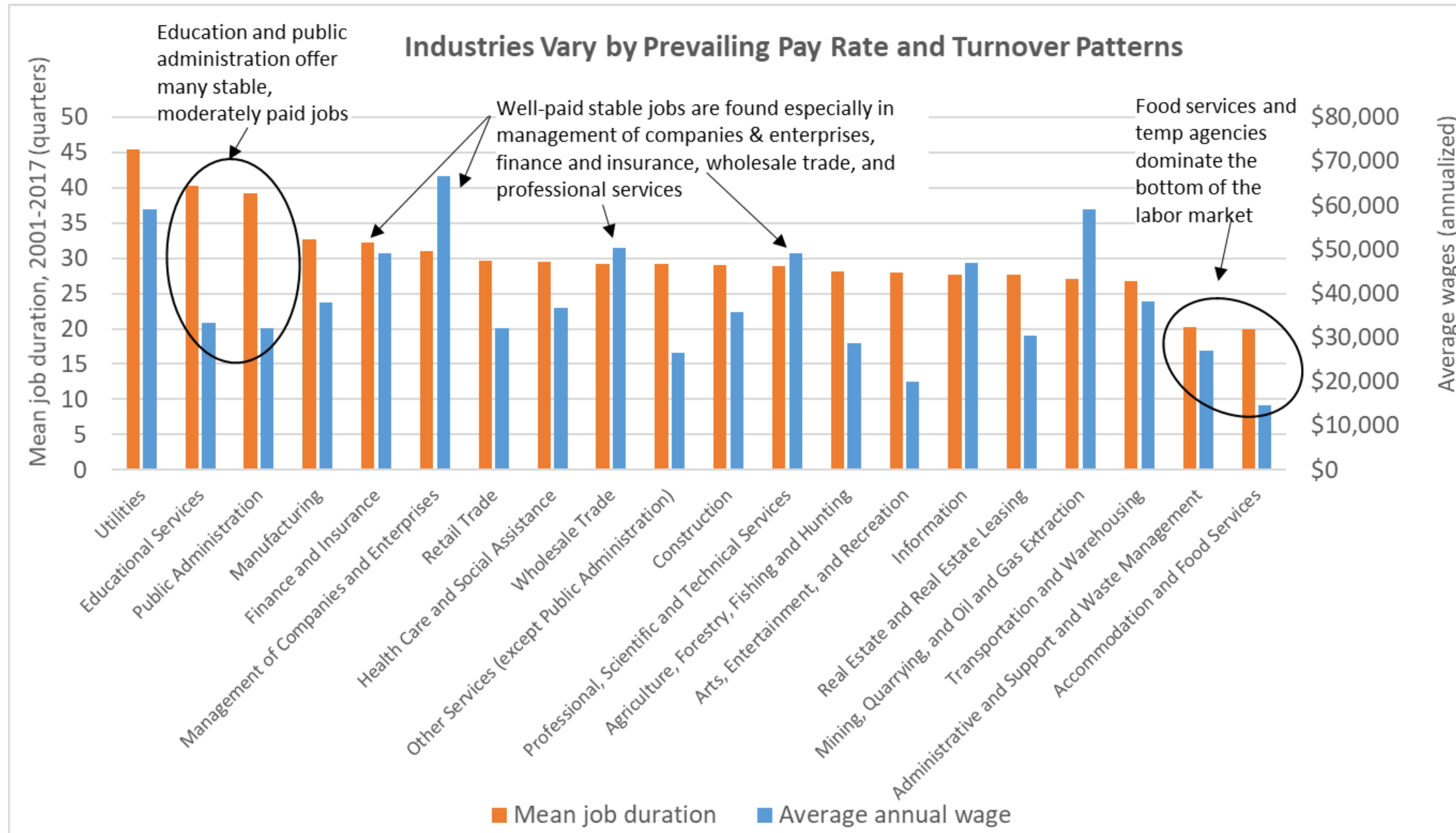
This might backfire
since not all
birthyears would be
of adult & non-senior
age in that period

The Earnings Life-Cycle

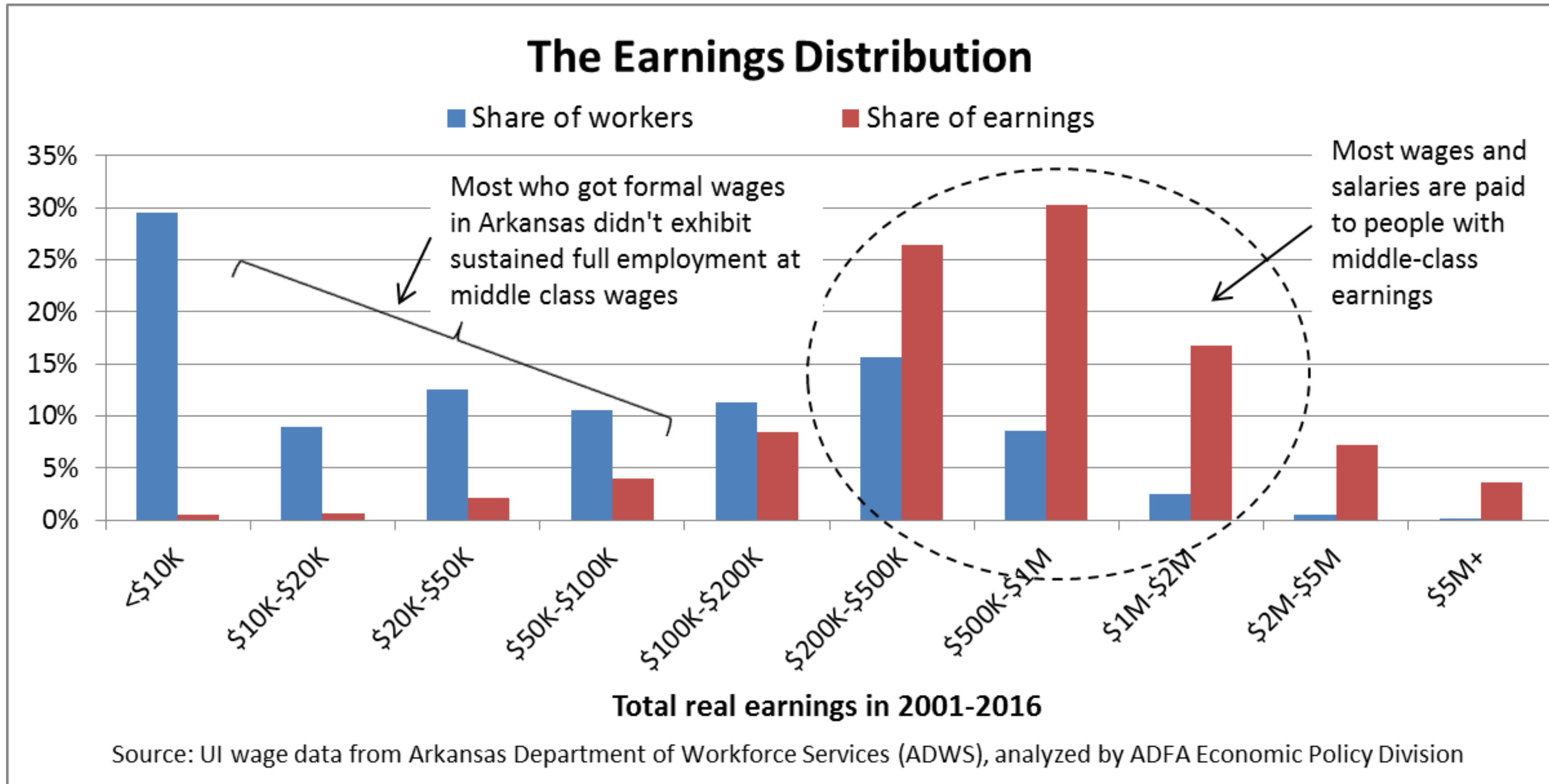
Wage growth rates were fastest for young Arkansans, negative for Arkansans born before 1945



Some Industries Offer Many Well-Paid, Stable Jobs In Others, Low Wages and High Turnover Prevail

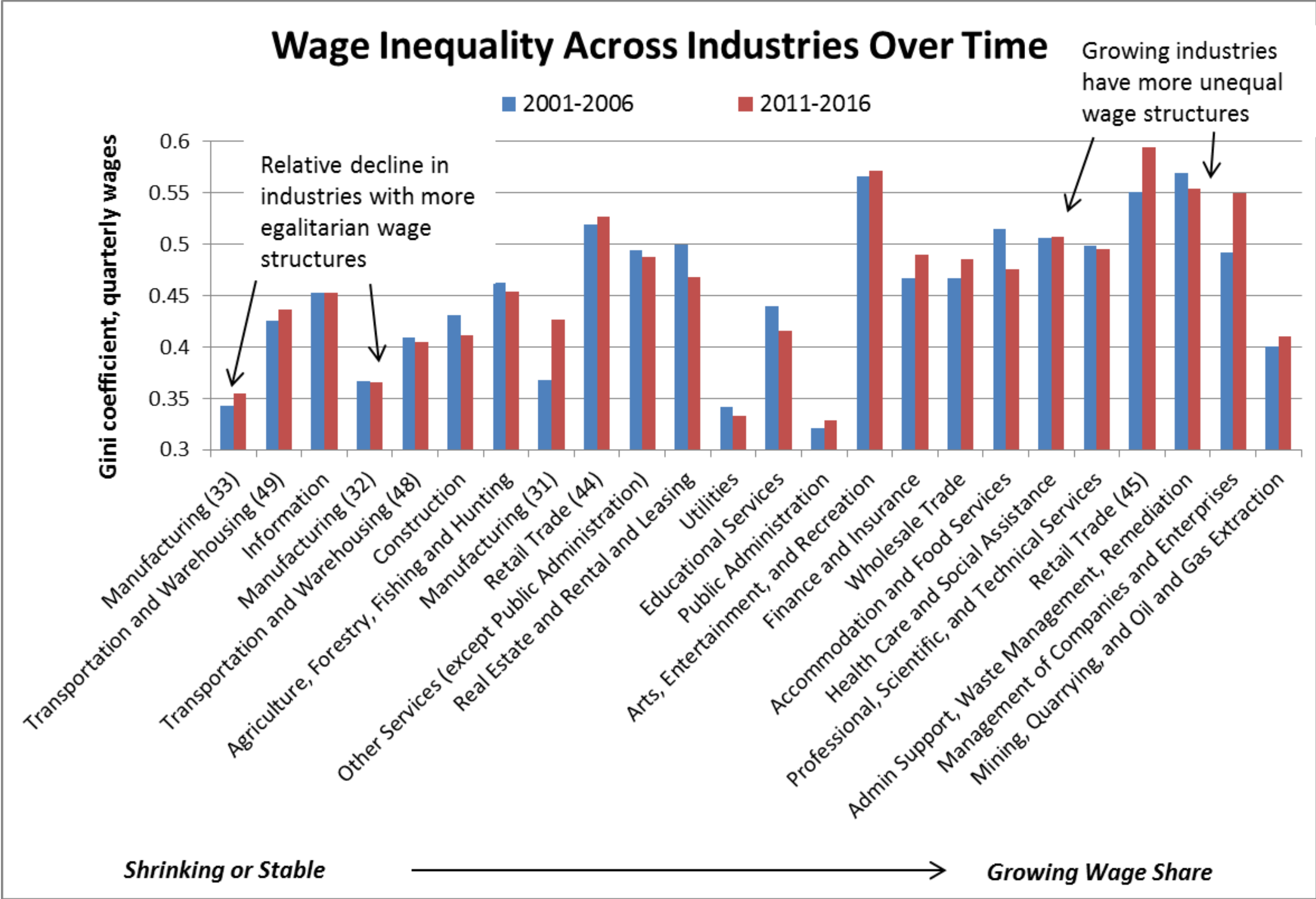


Most Wages Go to the Middle Class



Again, that first group making less than 10k might be deceiving since you have tons of circumstantial workers. Using full quarter might correct for that

Industries with More Wage Inequality Tend to Grow More (Source: UI wage data)



Why Stylized Facts about Labor Markets Matter for Governance and Policymaking

- The sheer volume of low-paid, transient jobs is eye-opening
- Food services and retail create lots of ill-paid, transient jobs which, however, may serve as gateways to the labor market
- Industrial policy is gender policy
 - Men were especially hard hit by the decline in manufacturing in 2000-2010
- Long commutes may be a key indicator of regional economic distress
- The focus should be less on merely “creating jobs” than on the quality of jobs created, and for whom

Why Stylized Facts about Labor Markets Matter for Governance and Policymaking

- Labor market data suggest that long-run gains in living standards depend (among other things) on:
 - Stable jobs
 - Building organizational capacity
 - Lengthening the earnings life-cycle
- Some conclusions that libertarians and/or conservatives may like:
 - Taxing “the rich” will yield diminishing returns because the income share of those with incomes above a middle class level is small
 - Minor barriers to hiring, e.g., minimum wages, insurance requirements, e-Verify, or better labor market data could significantly affect job creation since so many jobs are transient
 - There may be a trade off between job growth and intra-industry wage equality

Business Recruitment, Retention, and Expansion

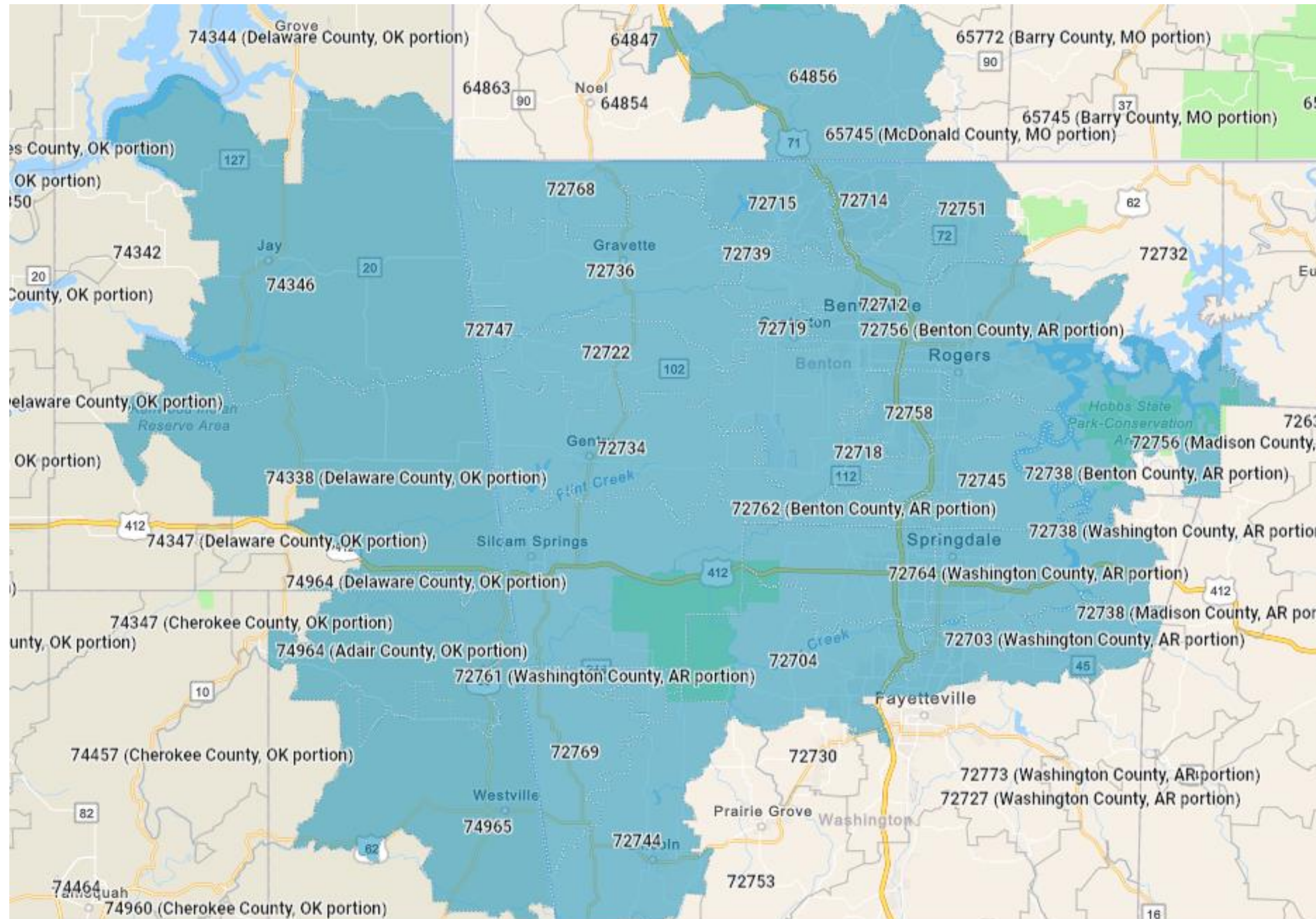
Example: DreamMachine Aerospace is Considering Opening a Facility in NW Arkansas

- DreamMachine Aerospace is a (fictional) innovative aerospace company
- They are considering building a facility in NW Arkansas in order to take advantage of the supply chain and logistics industrial cluster there
 - They might like to sell aircraft to Walmart and/or work with JB Hunt to develop intermodal logistics
- Their questions would include:
 1. Is the corporate tax environment favorable?
 2. How is the infrastructure?
 3. Proximity to suppliers and customers
... but most importantly ...
 4. Does the target region have the WORKFORCE needed to staff the proposed operations?
- Chmura Analytics can enable the Department of Commerce to answer question (4) and help DreamMachine (hopefully) get to yes

DreamMachine expects to need to recruit...

Occupation	SOC	Qty
Aerospace Engineers	17-2011	20
Civil Engineers	17-2051	10
Mechanical Engineers	17-2141	15
Materials Engineers	17-2131	15
Logisticians	13-1081	20
First-Line Supervisors of Production and Operating Workers	51-1011	18
Avionics Technicians	49-2091	8
Financial Analysts	13-2051	4
Software Developers, Applications	15-1132	14
Industrial Production Managers	11-3051	8
Laborers and Freight, Stock, and Material Movers, Hand	53-7062	120
Welders, Cutters, Solderers, and Brazers	51-4121	40
Purchasing Managers	11-3061	3
Assemblers and Fabricators, All Other	51-2099	150
Total		445

Defining the Target Region: 30-Minute Drive Time Radius of Highfill, AR



I can't see where Highfill, AR is

Demand and Supply Analysis for Proposed Project Staffing

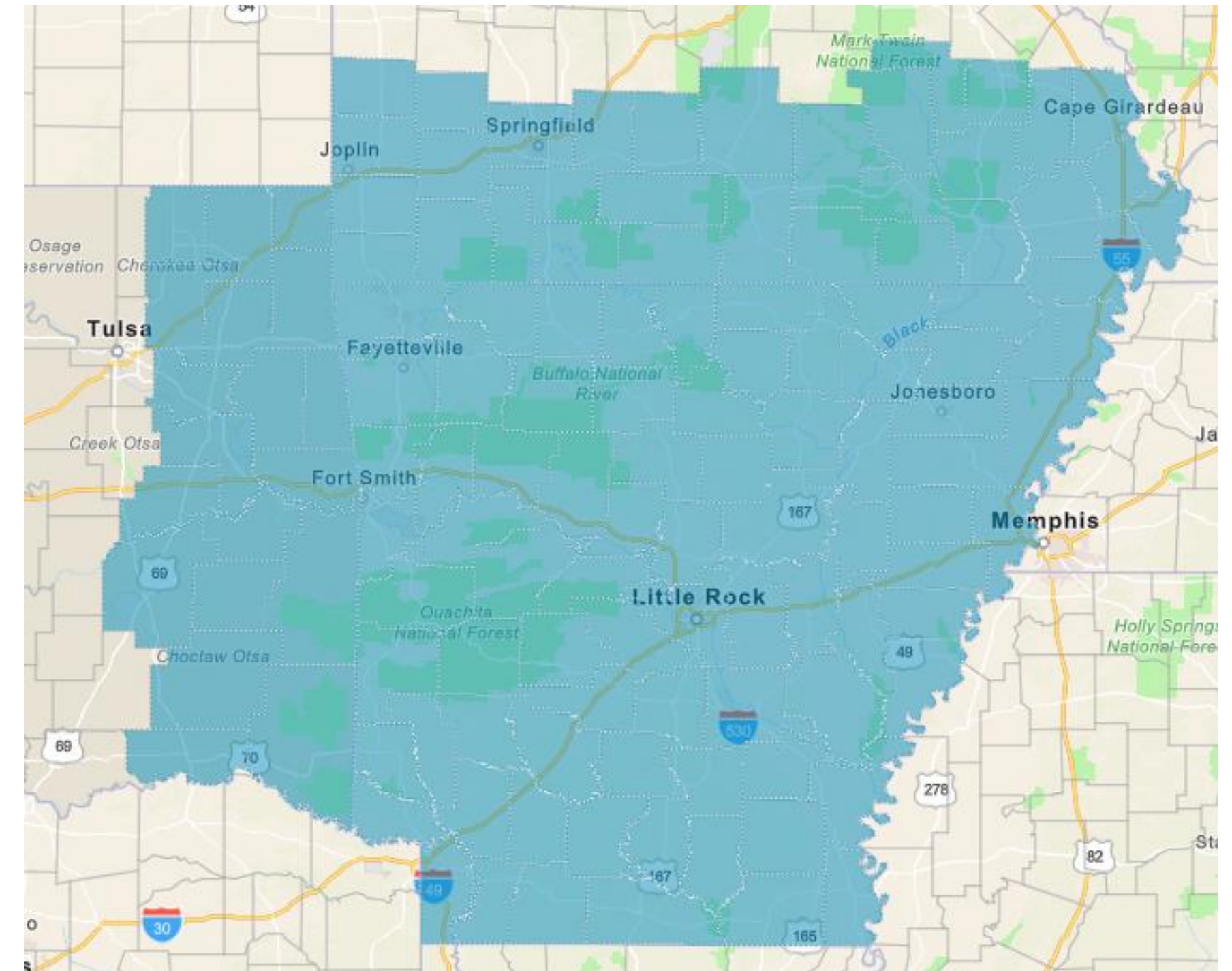
Occupation	Demand: How Many DreamMachine Will Need	Supply: How Many People Work in this Occupation in the Target Region	Demand/Supply
Assemblers and Fabricators, All Other	150	273	54.9%
Avionics Technicians	8	15	53.3%
Aerospace Engineers	20	41	48.8%
Materials Engineers	15	31	48.4%
Welders, Cutters, Solderers, and Brazers	40	455	8.8%
Mechanical Engineers	15	171	8.8%
Civil Engineers	10	323	3.1%
Industrial Production Managers	8	278	2.9%
Laborers and Freight, Stock, and Material Movers, Hand	120	4,630	2.6%
Logisticians	20	823	2.4%
Purchasing Managers	3	186	1.6%
First-Line Supervisors of Production and Operating Workers	18	1,116	1.6%
Financial Analysts	4	302	1.3%
Software Developers, Applications	14	1,837	0.8%

What Supply and Demand Analysis Shows About Workforce Availability for DreamMachine's Project

- There are plenty of software developers, financial analysts, production supervisors and industrial production managers, and logisticians to staff DreamMachine's operation
 - DreamMachine will probably not need to conduct national searches or bid up wages for these types of workers
- DreamMachine would become a major employer (~10%) of welders and mechanical engineers
 - DreamMachine might encounter bottlenecks and/or need to bid up wages
- Apparent “skills gaps” exist where DreamMachine would demand ~50% or more of all supply, namely, for:
 - Aerospace engineers
 - Avionics technicians
 - Assemblers and fabricators, all other
 - Materials engineers

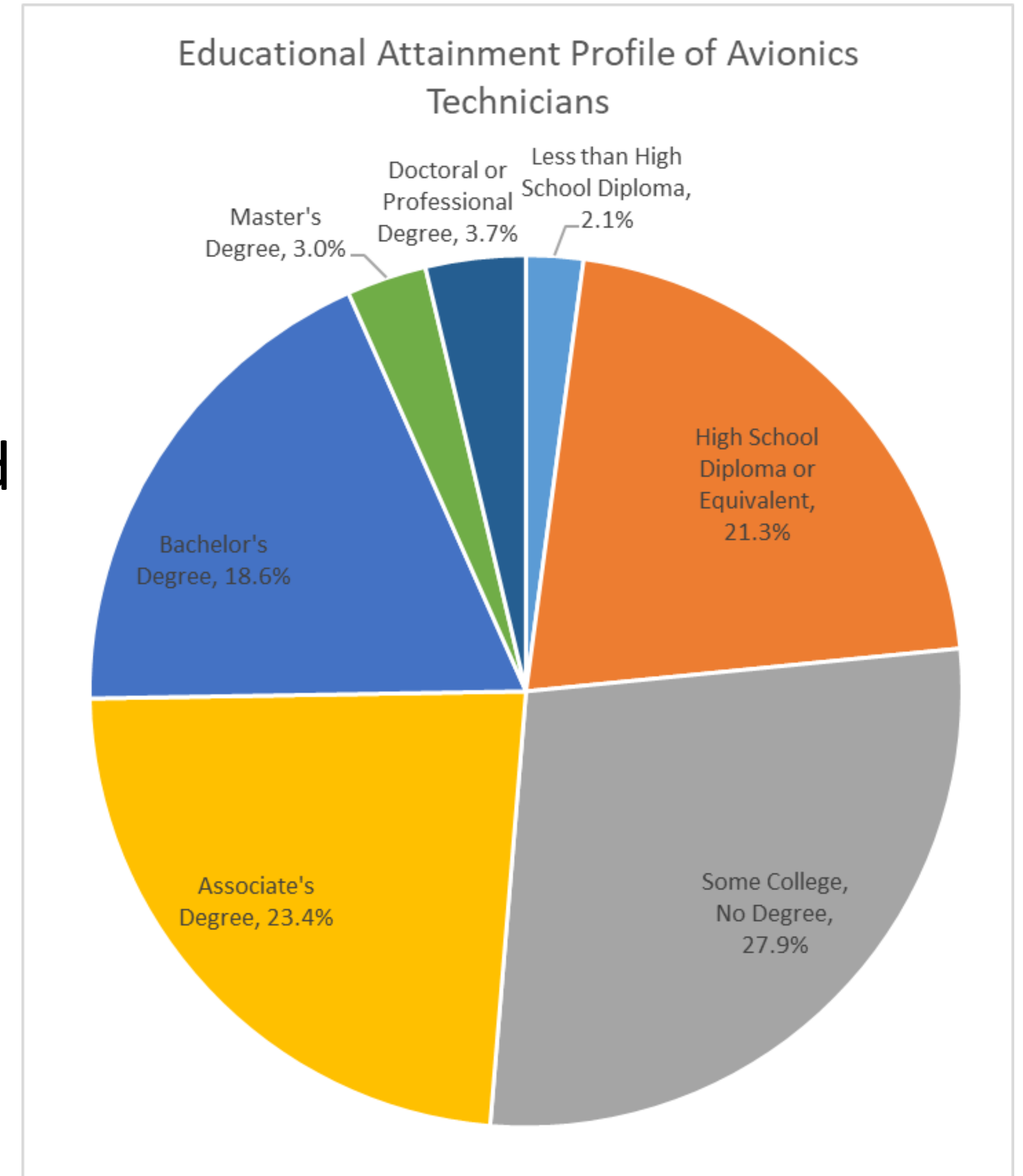
Aerospace Engineers: Not Enough

- A lack of aerospace engineers is a big weakness for NW Arkansas in DreamMachine's site selection process
- Slight talent pipeline:
 - Henderson State's Bachelor's degree in Aviation, with 12 graduates in 2016-2017, is the only degree in aviation and aeronautics in Arkansas or neighboring counties in Missouri and Oklahoma
 - Graduates in related fields like electrical and mechanical engineering might be able to cross-apply their knowledge to aerospace
- DreamMachine's options include:
 - Conducting a national search for aerospace engineers and try to attract them to NW Arkansas
 - Adjusting its business plans so that:
 - The operations at a NW Arkansas facility would need fewer aerospace engineers, and
 - Aerospace engineering-intensive functions would take place elsewhere
 - Not locating in NW Arkansas



Avionics Technicians: DreamMachine Can Train

- DreamMachine probably couldn't meet its needs by recruiting among workers in the avionics technician field resident in NW Arkansas
- BUT this occupation seems to have relatively undemanding entry qualifications
- DreamMachine could probably train the avionics technicians it needs



Assemblers and Fabricators, All Other

SOC	Occupation	Employment in Target Region
<i>A 6-digit SOC is targeted</i>		
51-2099	Assemblers and Fabricators, All Other	273
<i>The 5-digit SOC in which it is nested may also be indicate of the supply of suitable workers</i>		
51-2090	Miscellaneous Assemblers and Fabricators (includes Fiberglass Laminators and Fabricators; Team Assemblers; Timing Device Assemblers and Adjusters)	1,402
52-2092	Of which: Team Assemblers	1,107
<i>Even the 3-digit SOC might be relevant, though in this case it doesn't add much</i>		
51-2000	Assemblers and Fabricators	1,801
51-0000	Production Occupations	17,467

Probably in this case, the apparent “skills gap” is illusory, and DreamMachine could recruit from the pool of workers who take assembly and other production jobs.

DreamMachine's Labor Costs in Arkansas vs. USA

You have to be very careful when describing this. On one side, the Walmart effect in this occupation, given the high weight of its HQ in the area could make the mean for Purchasing Managers to be skewed (addressed in the next slide). Moreover, this is a comparison of a small geographic area with the country as a whole. Lower cost doesn't mean that it could rank high. Finally, it could also mean that the quality of workers is lower, else they would have moved to the best paying areas

		Estimated Payroll Cost						
		USA Mean	Wage ratio,				% of Payroll,	
		NWA Mean Wage	NWA/USA	Demand	NWA	USA	USA wages	
11-3051	Industrial Production Managers	\$99,500	\$110,600	90.0%	8	\$796,000	\$884,800	3.9%
11-3061	Purchasing Managers	\$168,600	\$121,800	138.4%	3	\$505,800	\$365,400	1.6%
13-1081	Logisticians	\$67,600	\$78,700	85.9%	20	\$1,352,000	\$1,574,000	6.9%
13-2051	Financial Analysts	\$90,400	\$99,400	90.9%	4	\$361,600	\$397,600	1.8%
15-1132	Software Developers, Applications	\$90,800	\$106,700	85.1%	14	\$1,271,200	\$1,493,800	6.6%
17-2011	Aerospace Engineers	\$94,100	\$115,300	81.6%	20	\$1,882,000	\$2,306,000	10.2%
17-2051	Civil Engineers	\$77,000	\$91,800	83.9%	10	\$770,000	\$918,000	4.0%
17-2131	Materials Engineers	\$80,200	\$98,600	81.3%	15	\$1,203,000	\$1,479,000	6.5%
17-2141	Mechanical Engineers	\$70,000	\$91,500	76.5%	15	\$1,050,000	\$1,372,500	6.0%
49-2091	Avionics Technicians	\$56,600	\$63,700	88.9%	8	\$452,800	\$509,600	2.2%
51-1011	First-Line Supervisors of Production and Operating Workers	\$52,600	\$62,700	83.9%	18	\$946,800	\$1,128,600	5.0%
51-2099	Assemblers and Fabricators, All Other	\$29,000	\$33,200	87.3%	150	\$4,350,000	\$4,980,000	21.9%
51-4121	Welders, Cutters, Solderers, and Brazers	\$38,000	\$43,400	87.6%	40	\$1,520,000	\$1,736,000	7.6%
53-7062	Laborers and Freight, Stock, and Material Movers, Hand	\$26,400	\$29,700	88.9%	120	\$3,168,000	\$3,564,000	15.7%
TOTAL						\$19,629,200	\$22,709,300	
RATIO						86.4%	100.0%	

NW Arkansas Looks Competitive on Labor Costs

- In general, DreamMachine should incur lower payroll costs if they launch in NW Arkansas, compared to elsewhere in the US
 - Purchasing managers look more expensive, though this reflects the presence of Walmart and is probably misleading
- Where there are “skills gaps,” especially for aerospace engineers, DreamMachine might have to bid up wages to attract talent from out of state
 - On the other hand, aerospace engineers might not need to be paid premium wages to live in a place with much lower housing costs than, say, Seattle

How Better Data Could Help Attract and Retain Business

- Companies may be more confident locating in Arkansas because they know more about the local workforce
 - DreamMachine might be persuaded that aerospace engineers is the only “skills gap,” and decide to face the costs and difficulties of national recruitment for the sake of NW Arkansas’s other advantages
- If the Department of Commerce can show companies high-quality, relevant workforce data, that can build businesses’ confidence in Arkansas’s government as a partner and stakeholder
 - DreamMachine might find promises to adapt academic programs or infrastructure to meet its future needs more plausible if the state shows high capacity in delivering workforce data
- Quality data puts negotiators in a stronger position to discern what tax incentives, if any, might be needed to recruit or retain a particular business
 - Knowing that DreamMachine should save money on overall payroll costs by locating in NW Arkansas might help state officials resist unreasonable demands for big tax incentives

I would suggest adding one slide, after comparing masters-bacc-assoc, basically showing some of the low education good prospects, showing those associate degrees and certificates that pay well, maybe as a table showing examples, of the degrees/majors and the average earnings, so they are not induced to think that they should encourage kids necessarily to go to college/grad school.

Academic Program Planning

ADHE Workforce Analyses for Proposed Academic Programs

- Since March 2019, the ADFA Economic Policy Division (since July 1st, the Department of Commerce Research Division) has been conducting workforce analyses for the Arkansas Department of Higher Education (ADHE)
- Triggered by proposals of new academic programs by Arkansas public colleges and universities
- Main data sources used:
 - EMSI
 - Chmura Analytics
 - ARC Economic Security Report
 - Sometimes American Community Survey (Census Bureau) microdata
- Report sections
 - Matched occupations
 - Job placement track record of similar programs
- Data with narrative

The Growing College Premium

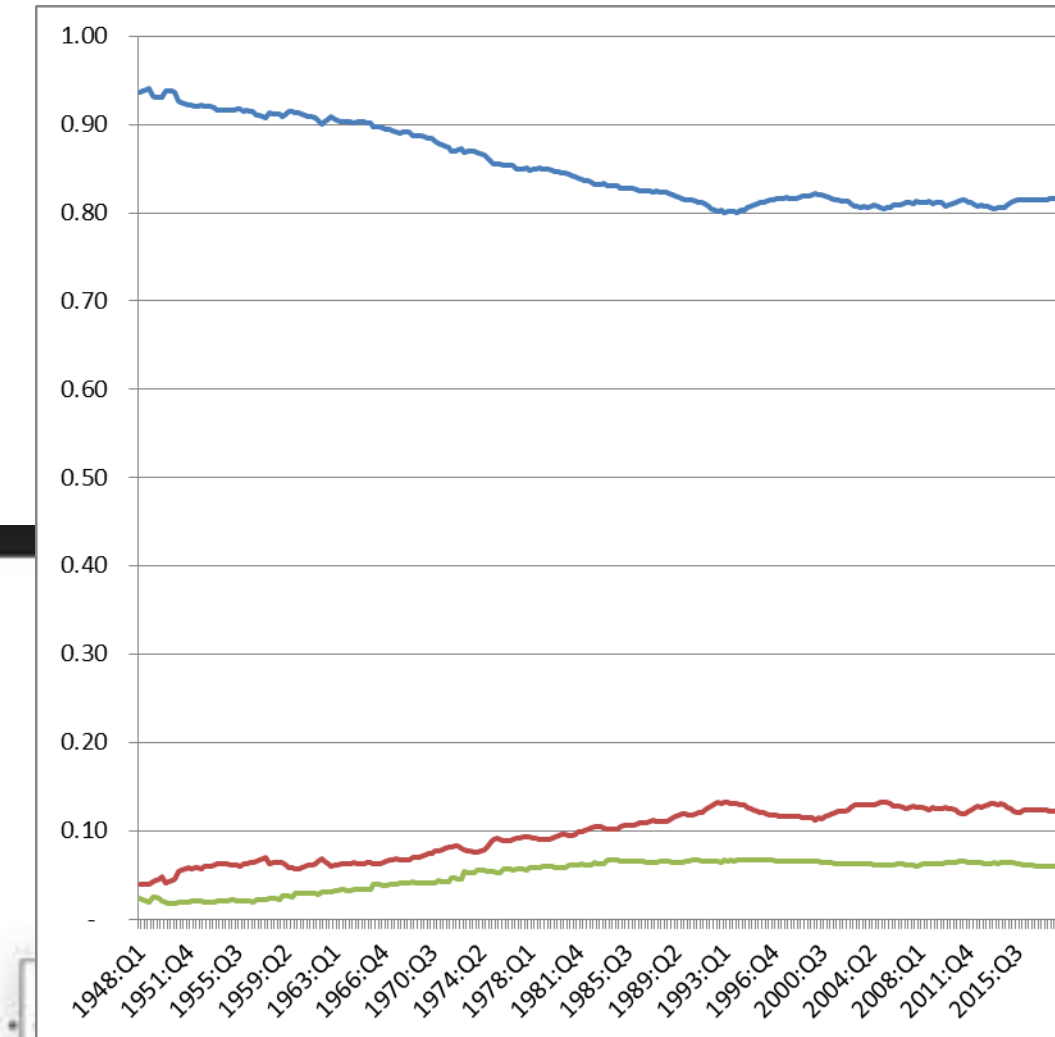
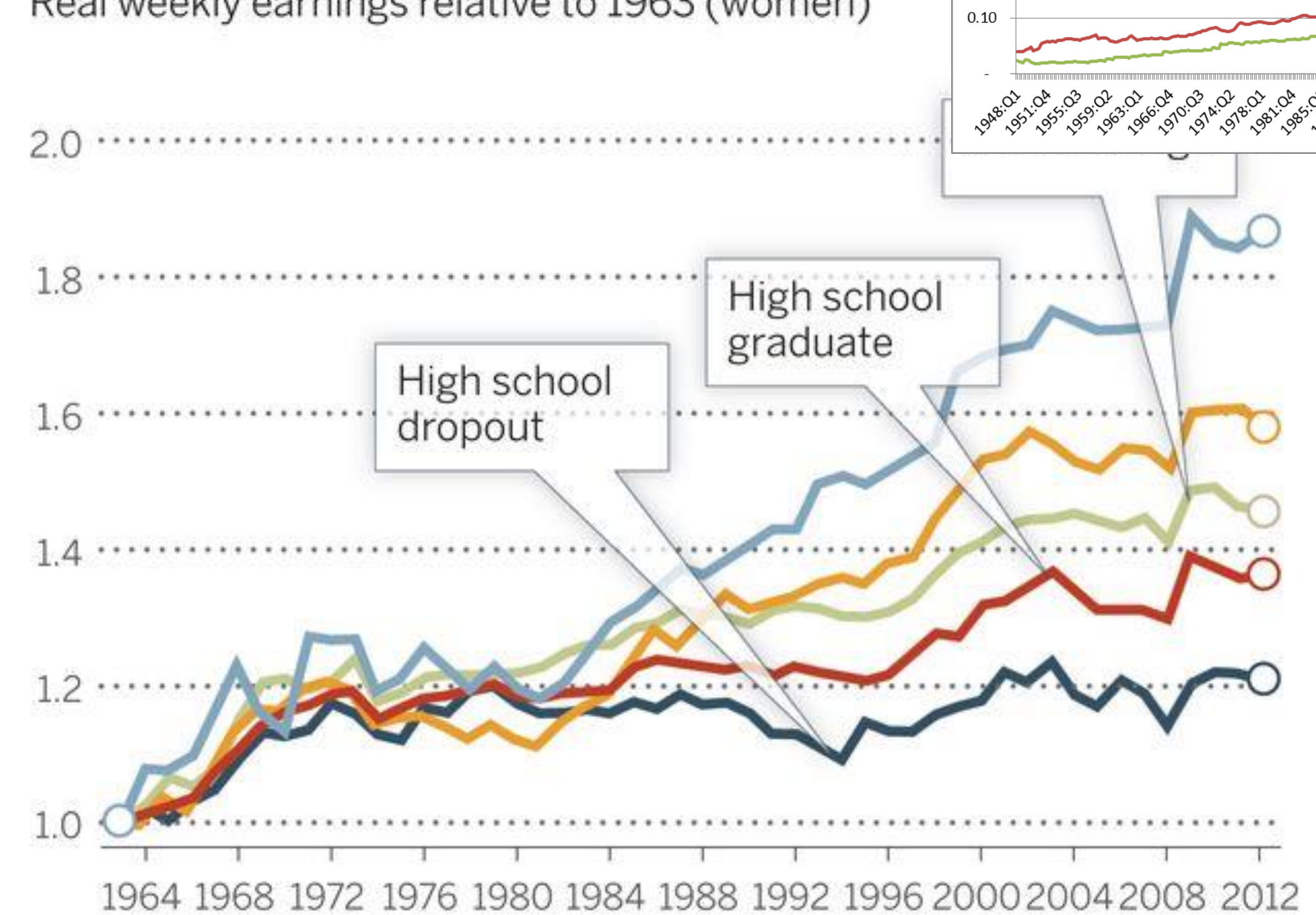
I think we talked about wages vs compensation. The chart on the right is from BEA, where the 1960-1990 trend sort of matches

Changes in real wage levels of full-time U.S. workers by sex and education, 1963–2012

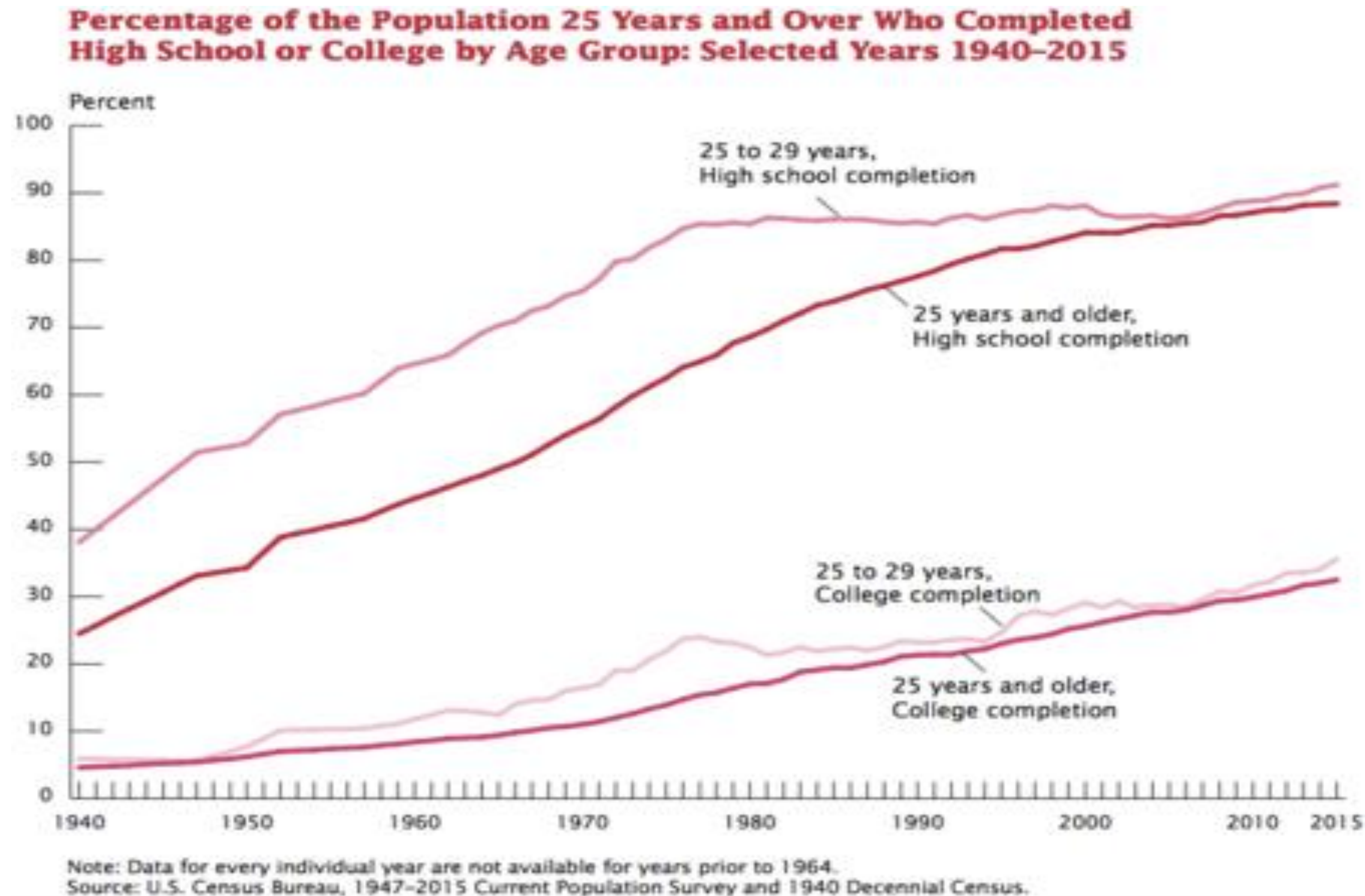
Real weekly earnings relative to 1963 (men)



Real weekly earnings relative to 1963 (women)

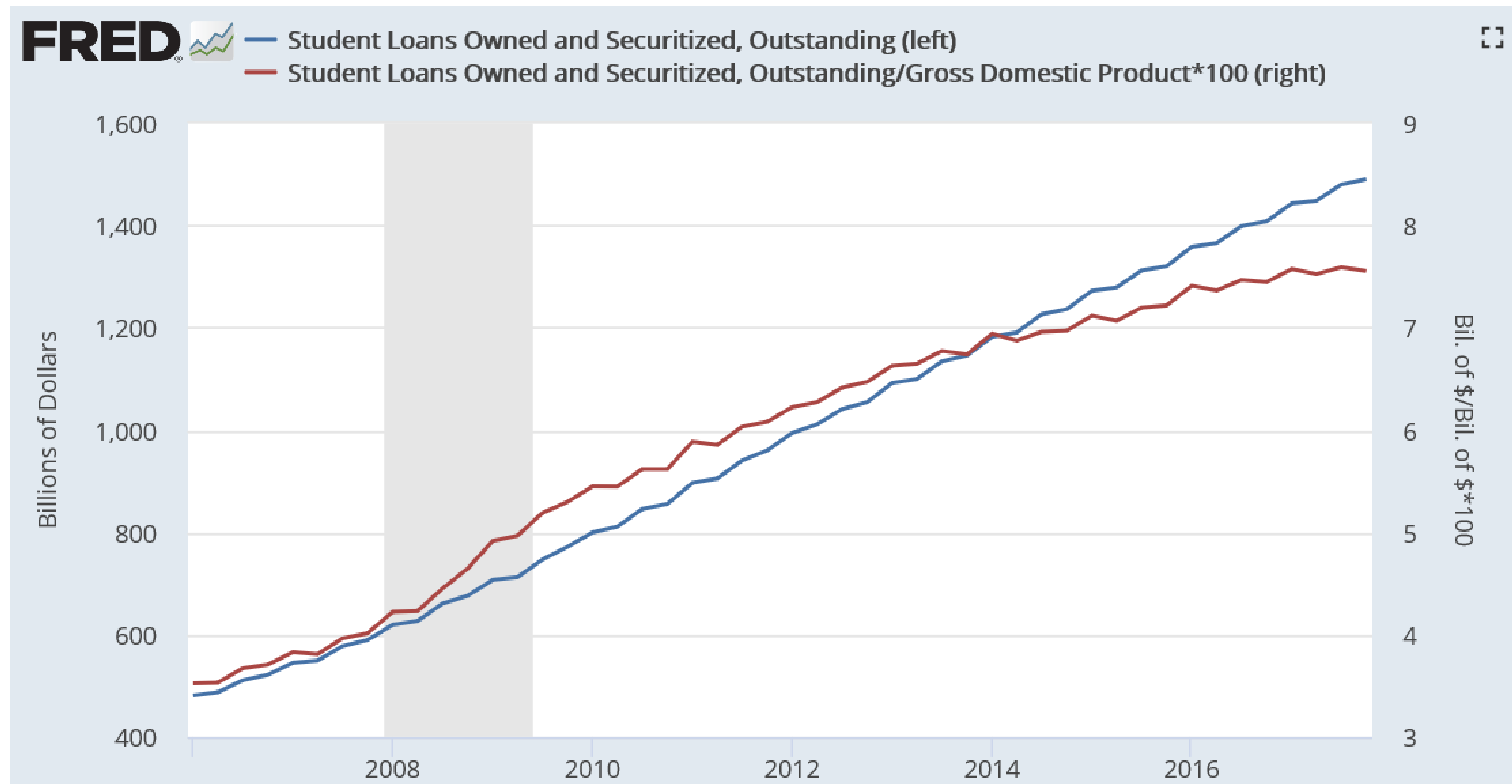


College Attainment Plateaued from 1975-1995, then Has Climbed Since 2008



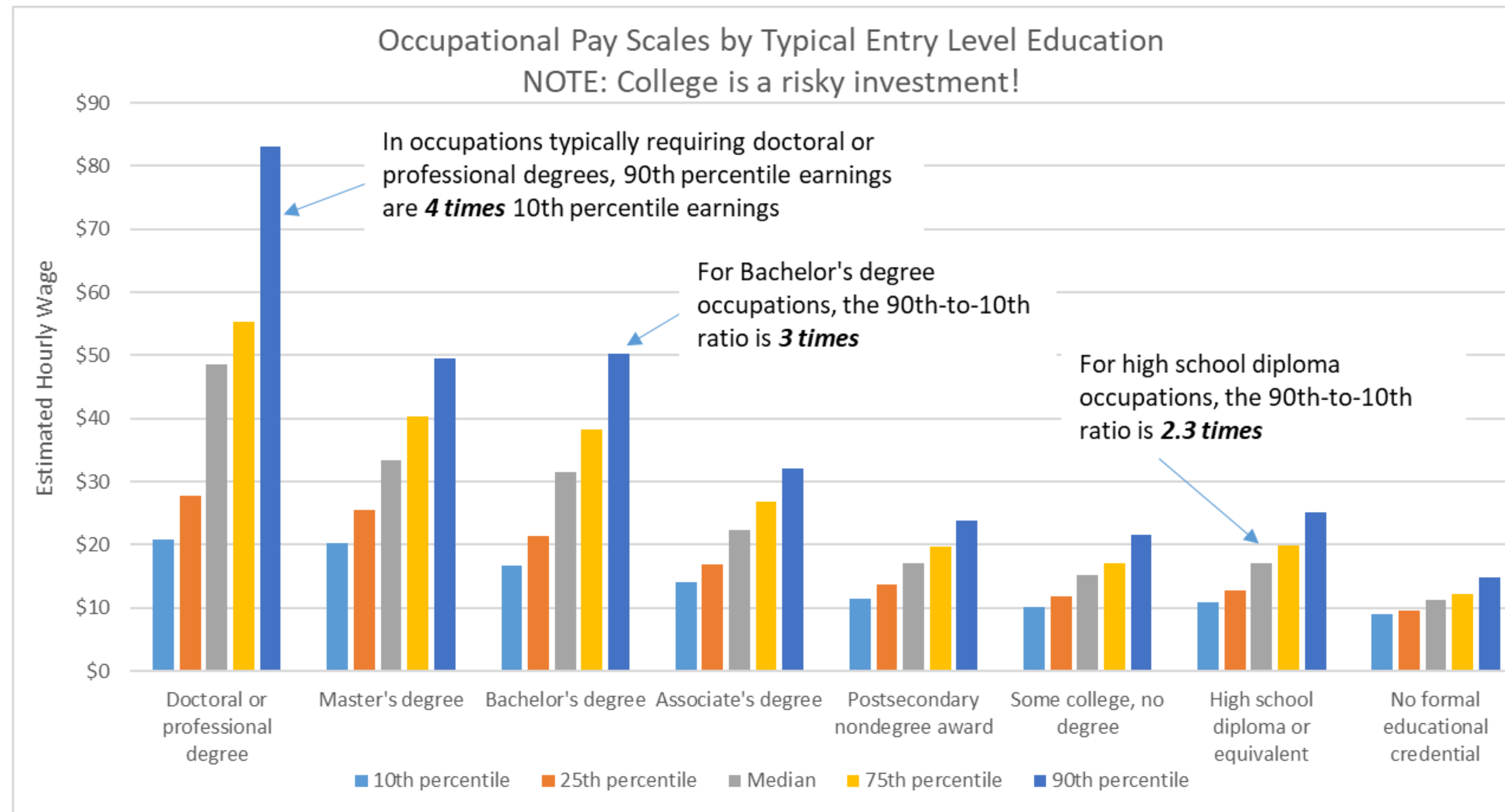
Source: Census Bureau. Geography: National

The Uptick in College Attainment Has Been Accompanied by a Surge in Student Debt



Source: St. Louis Fed. Geography: National

Occupations with Higher “Typical Levels of Education” Pay More

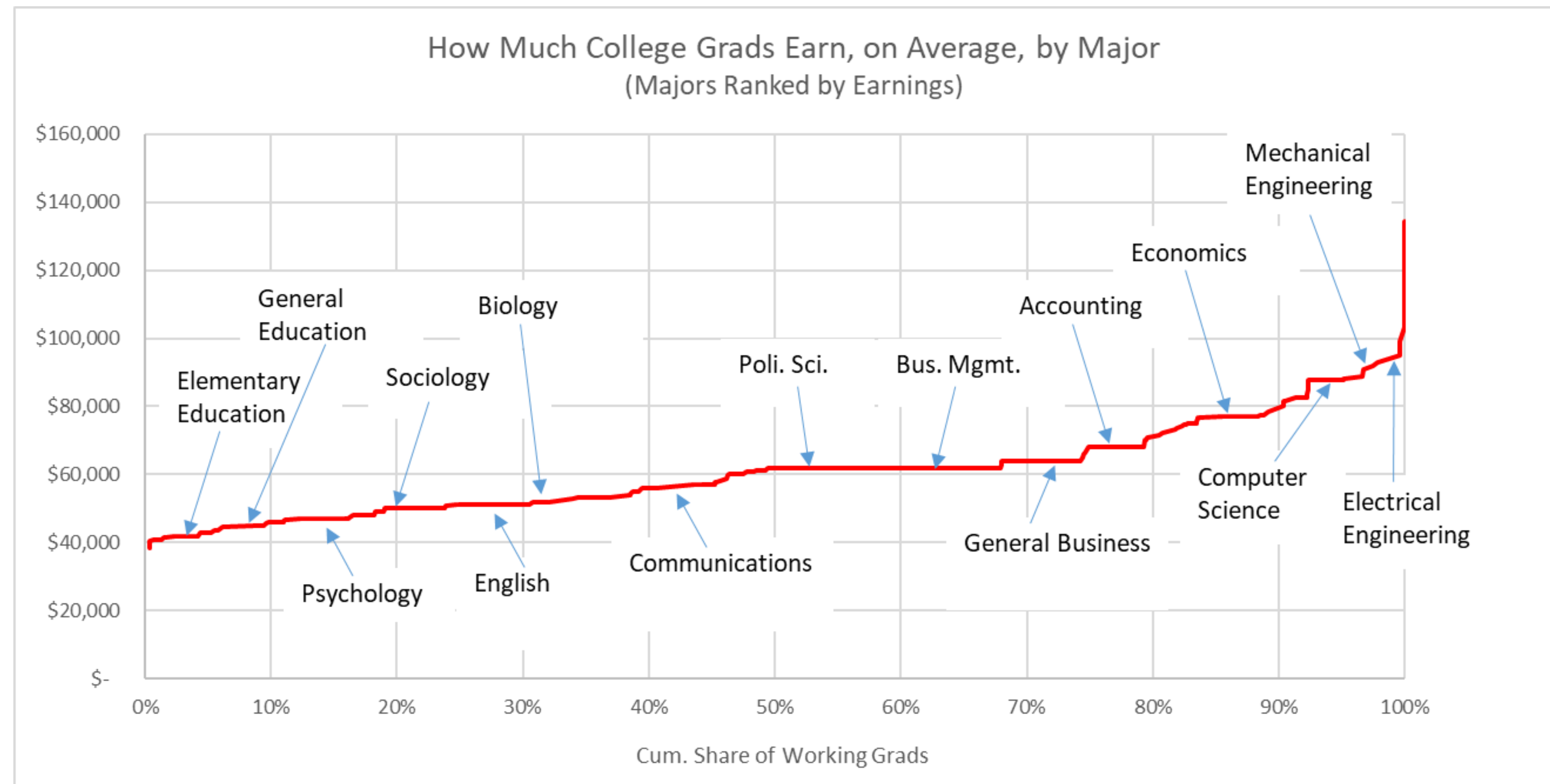


Source: EMSI. Geography: Arkansas

Aligning Higher Ed with Workforce Needs

- The need to align higher education with workforce needs is stronger than ever because:
 - The wage premium for a college degree has risen
 - But college is a risky investment
 - After a long stagnation, college attainment rates are rising again
 - But this rise is being financed by surging student debt
- More than half (51%) of US adults regret an education decision (e.g., degree level, school, or field of study)
- Students need better information about the labor market consequences of their educational choices
- Higher education can play a crucial role in catalyzing and nourishing industrial clusters and generally promoting economic development

Some Majors Pay Better than Others

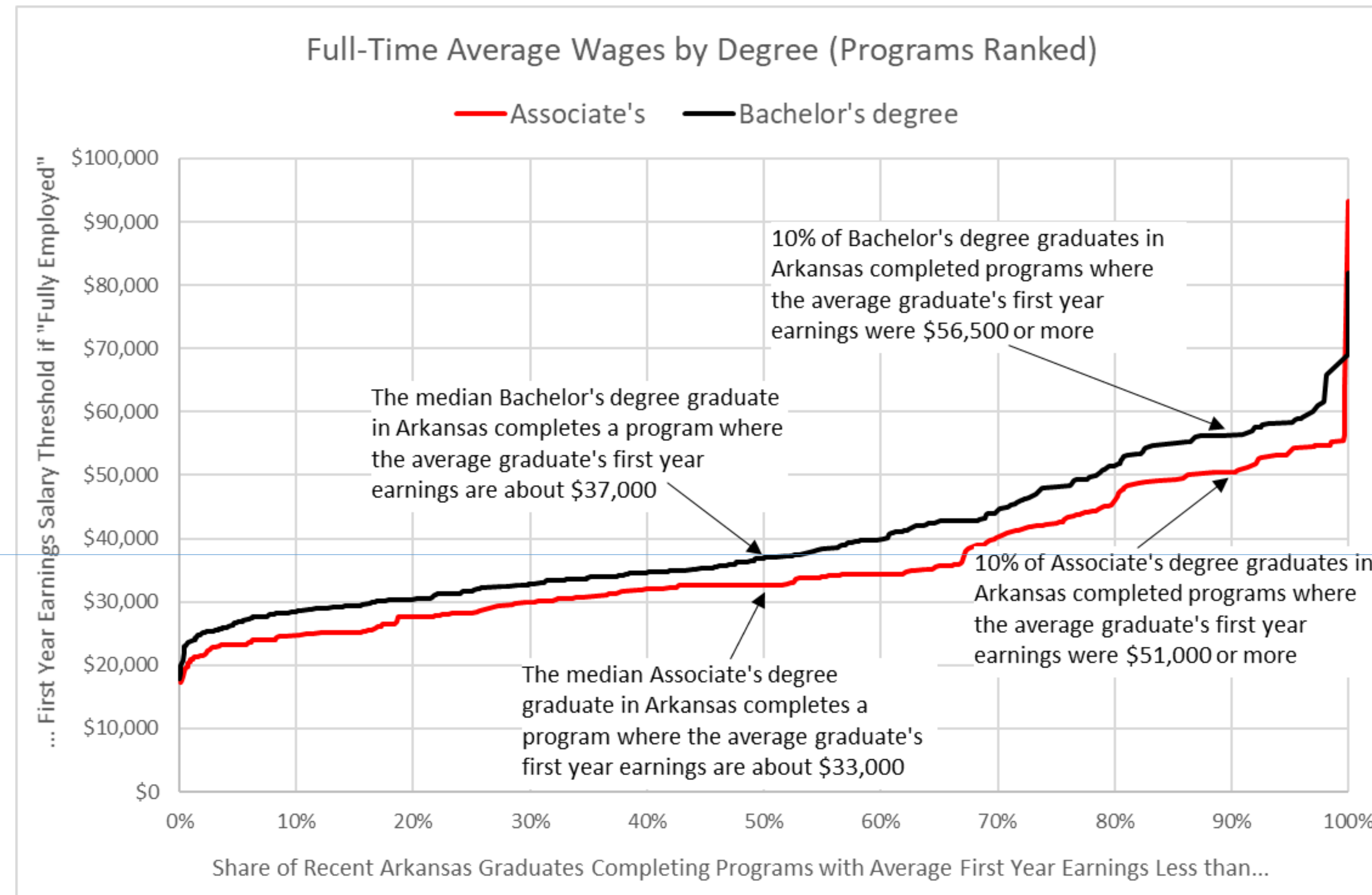


Median
earnings?

Source: Census Bureau ACS. Geography: National

How Much Education is Worth Getting?

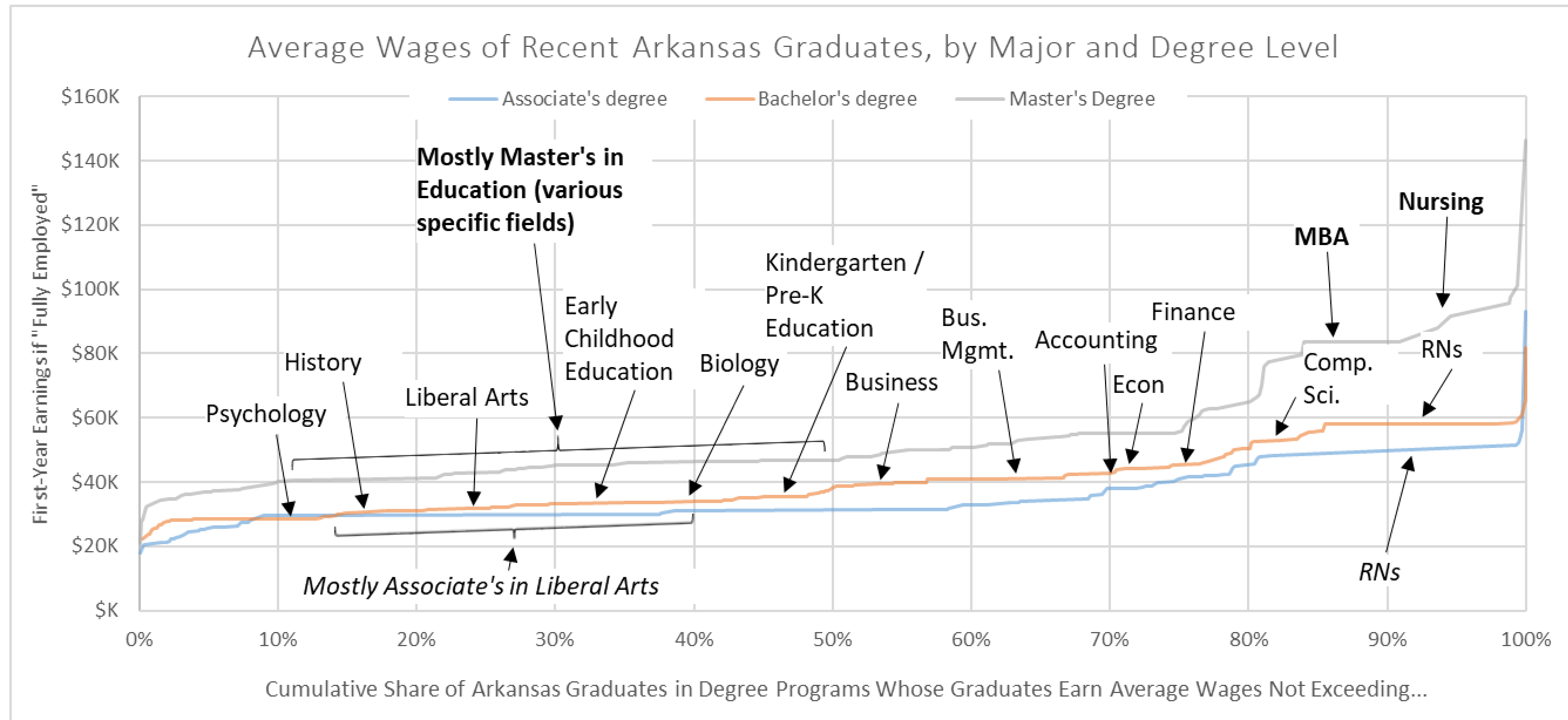
ARC Data on First Year Earnings



Using the bar I artificially pasted below, you can see that the top 50% of associate degree graduates earn more than the bottom 30% of the undergrads (and also have an extra 2 years of earnings instead of being at school), and the top 1/3 of associate degrees earn more than the bottom 50% of bachelors

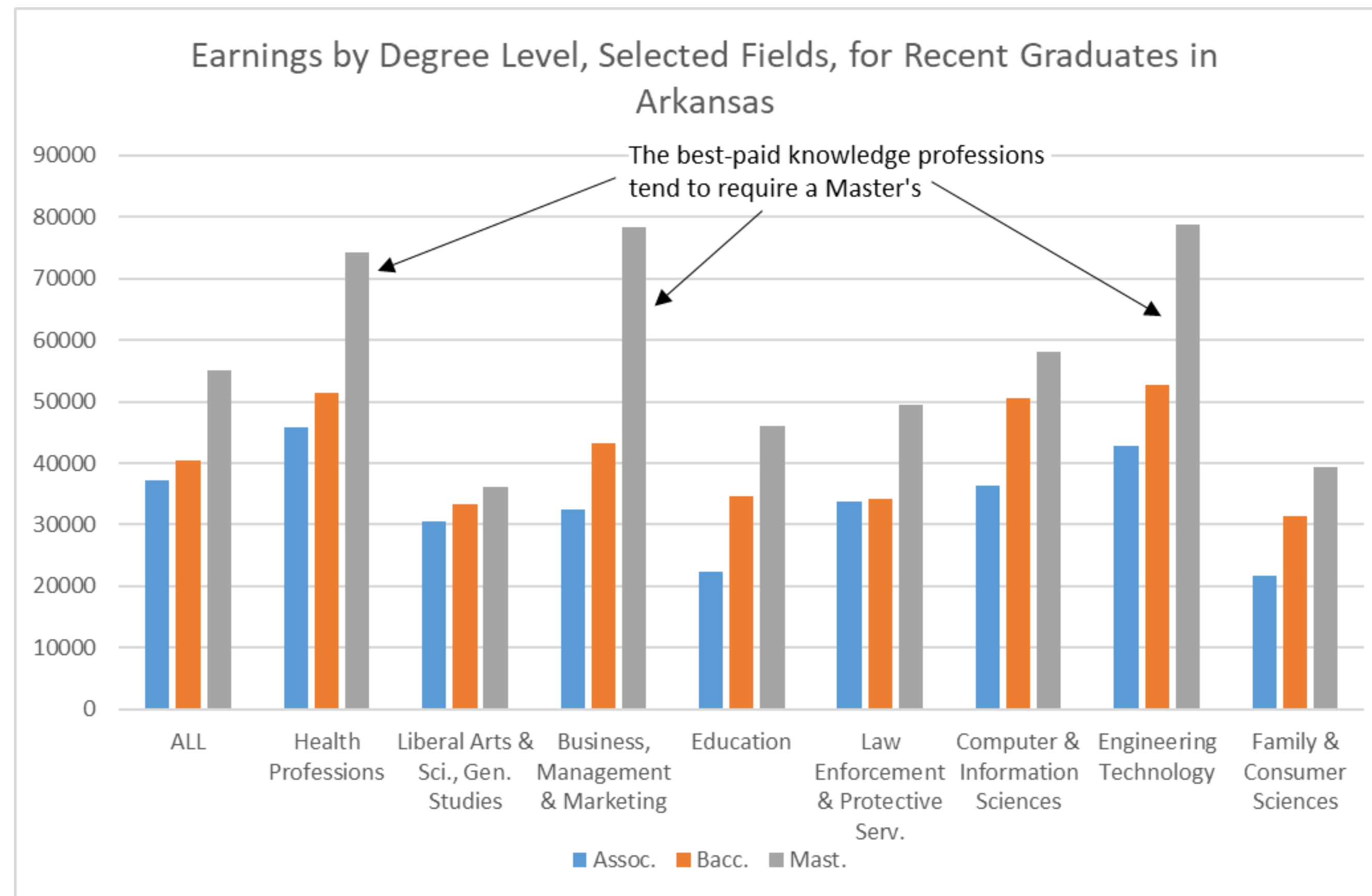
Source: ARC's Economic Security Report. Geography: Arkansas

How Well Majors Pay (First-Year Earnings) in Arkansas, by Degree Level



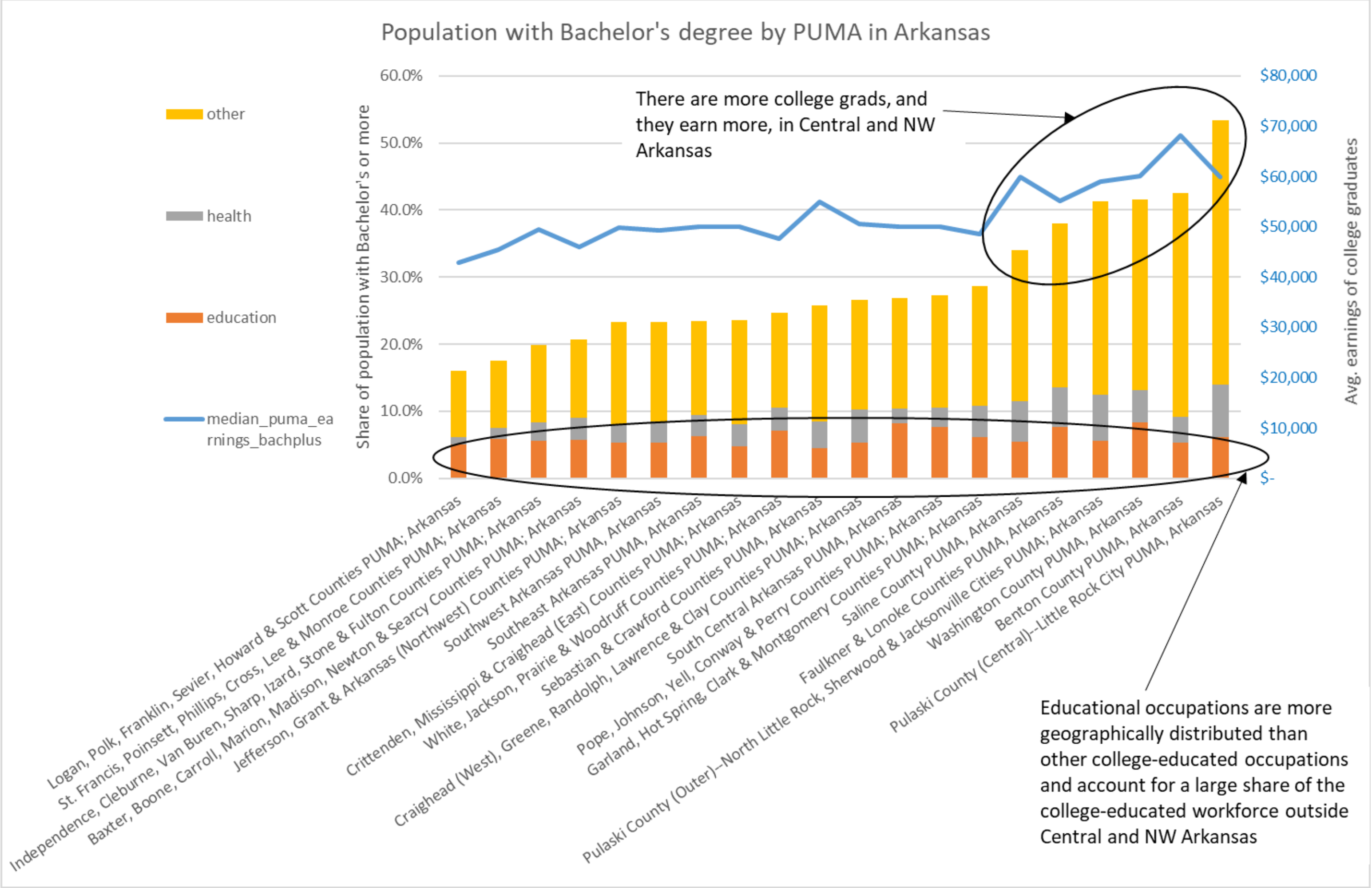
Source: ARC's Economic Security Report. Geography:
Arkansas

The Impact of Degree Level on Labor Market Payoffs Varies by Field



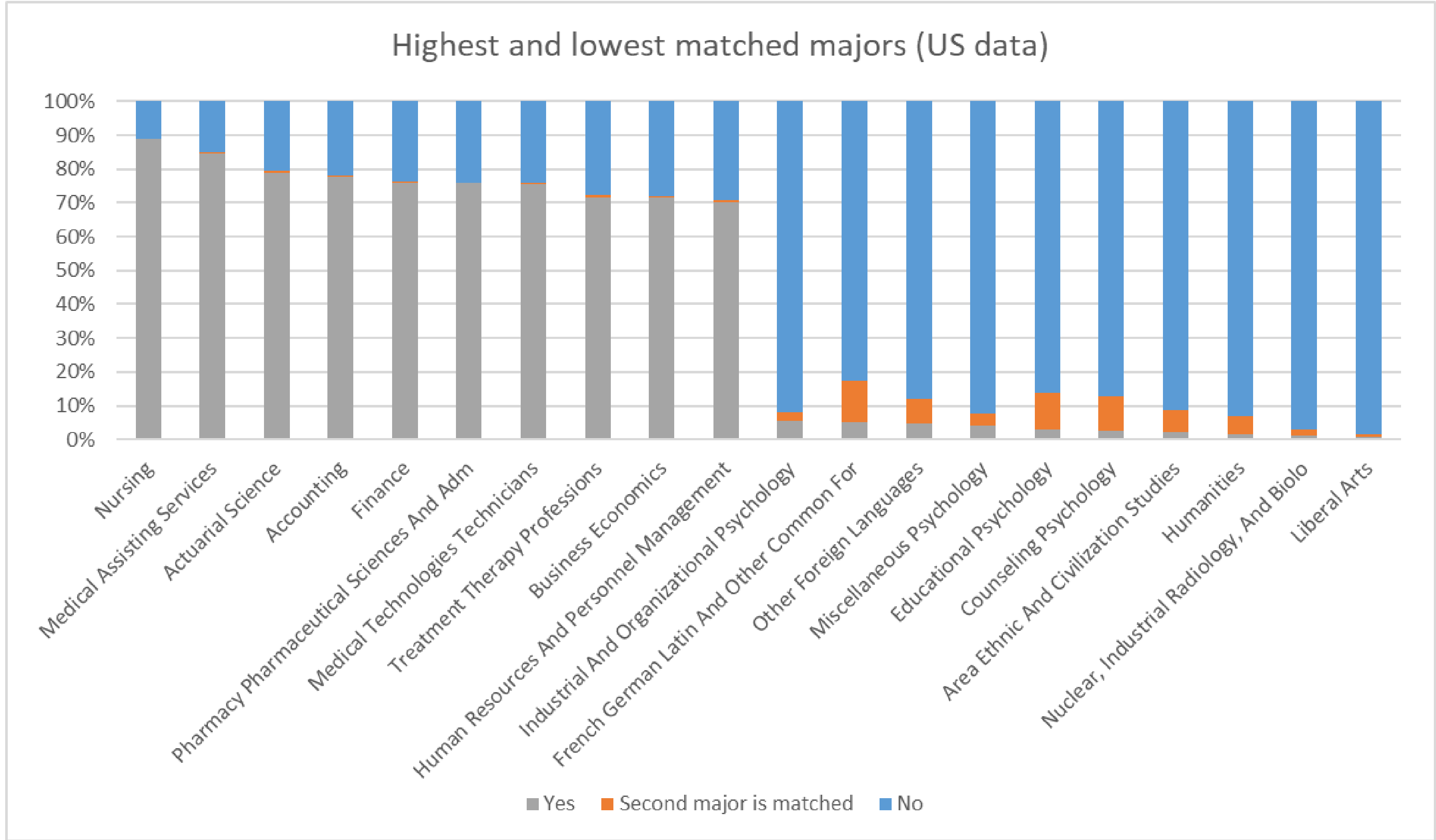
Source: ARC's Economic Security Report. Geography: Arkansas

College Graduates are Disproportionately Urban Outside Central and NW Arkansas, a Large Share are Educators



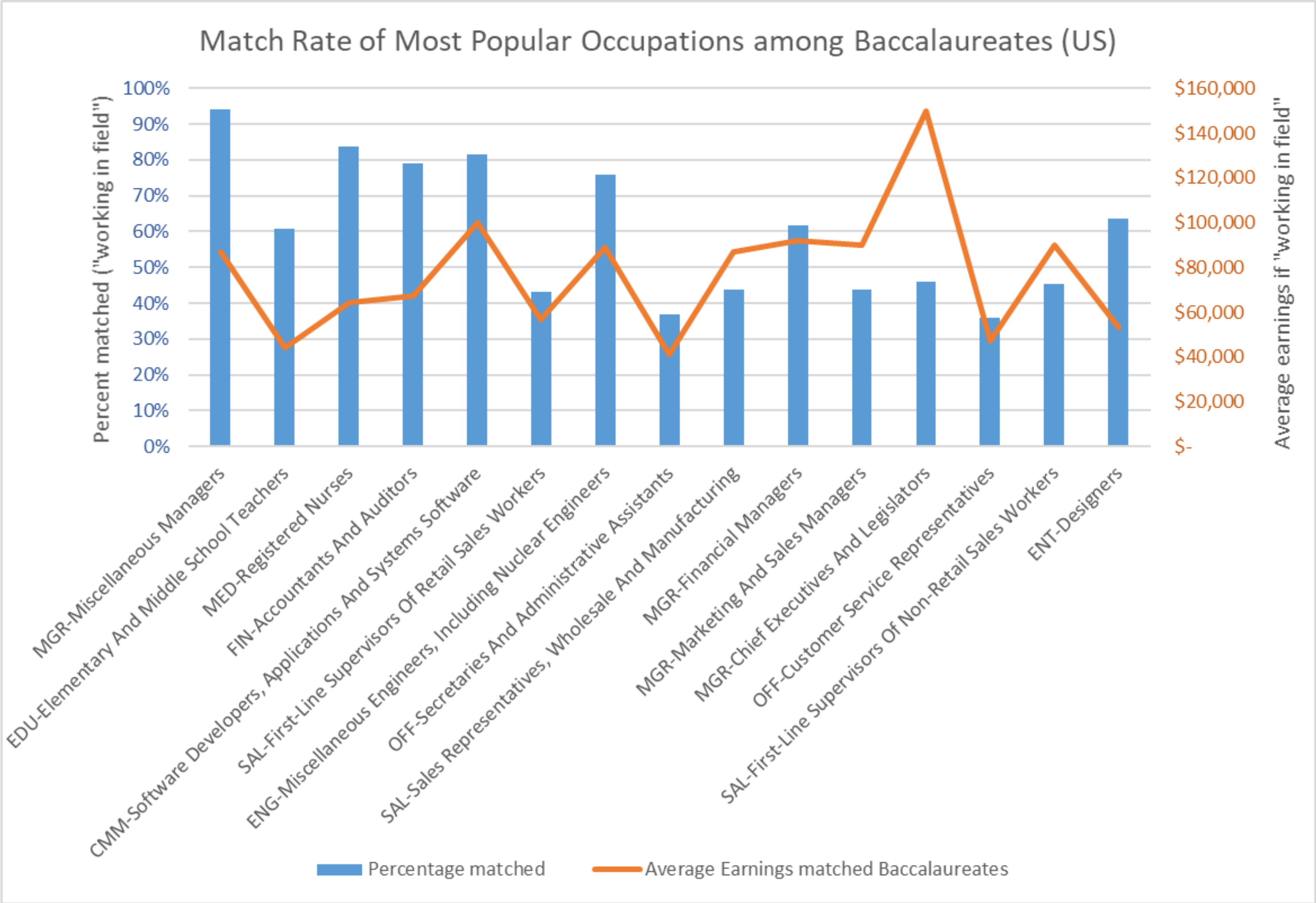
The stronger the private sector...

Most and Least Job-Relevant Majors



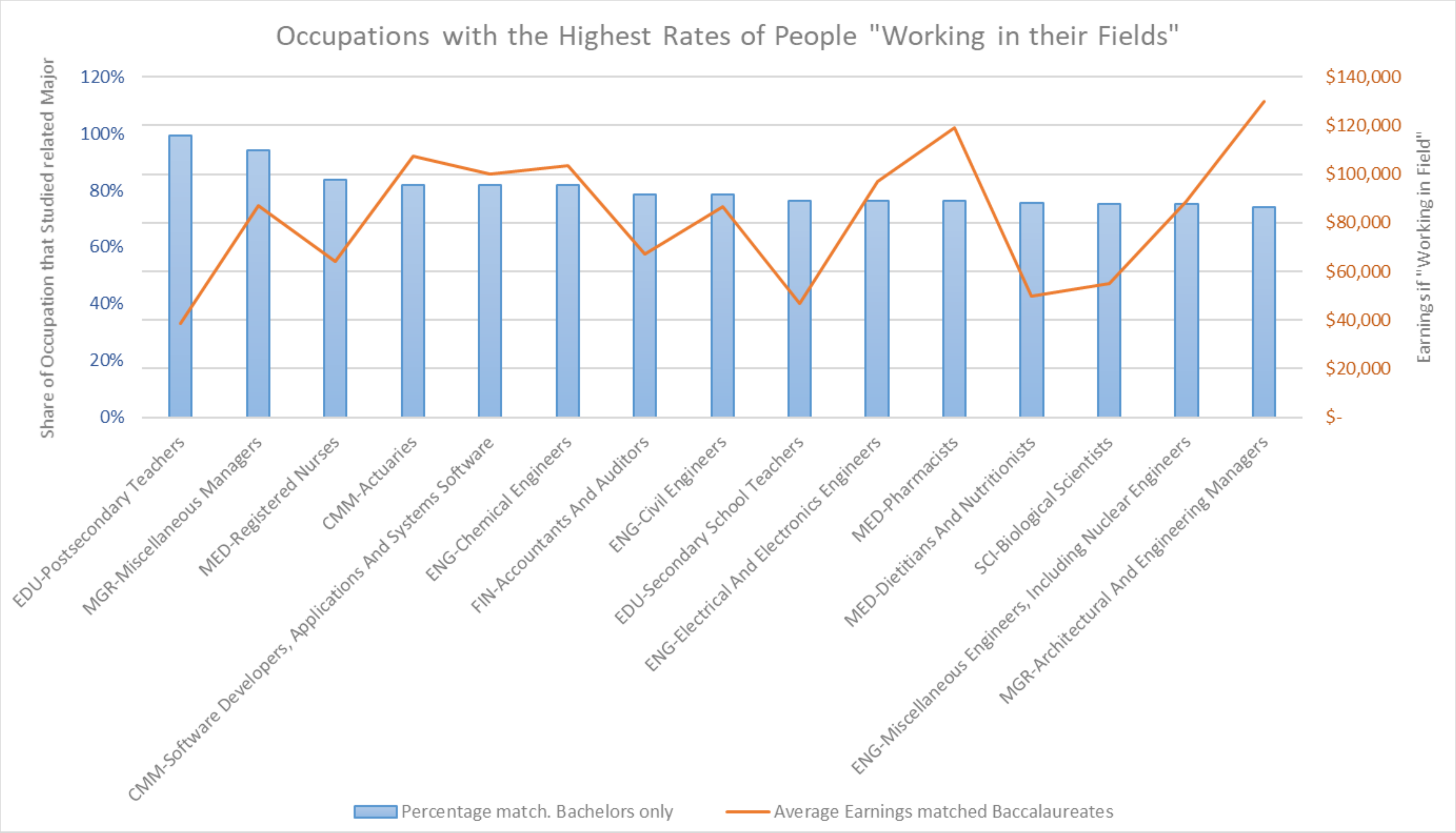
Do People Work in Their Fields?

In Some of the Most Common Occupations, Fewer than Half of College Grads Had a Related Major



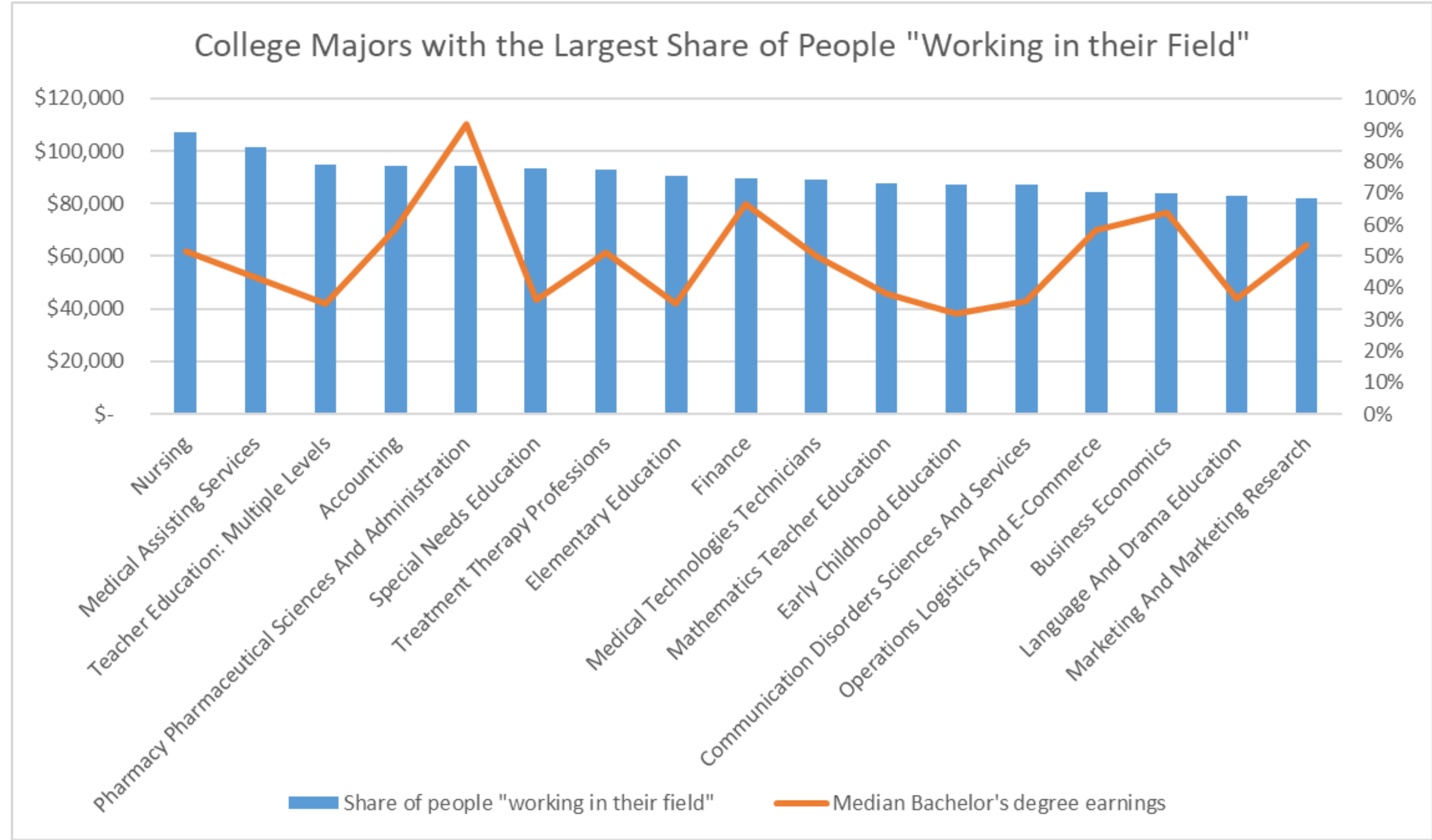
Do People Work in Their Fields?

Occupations with the Highest Rates of Job-Relevant Education



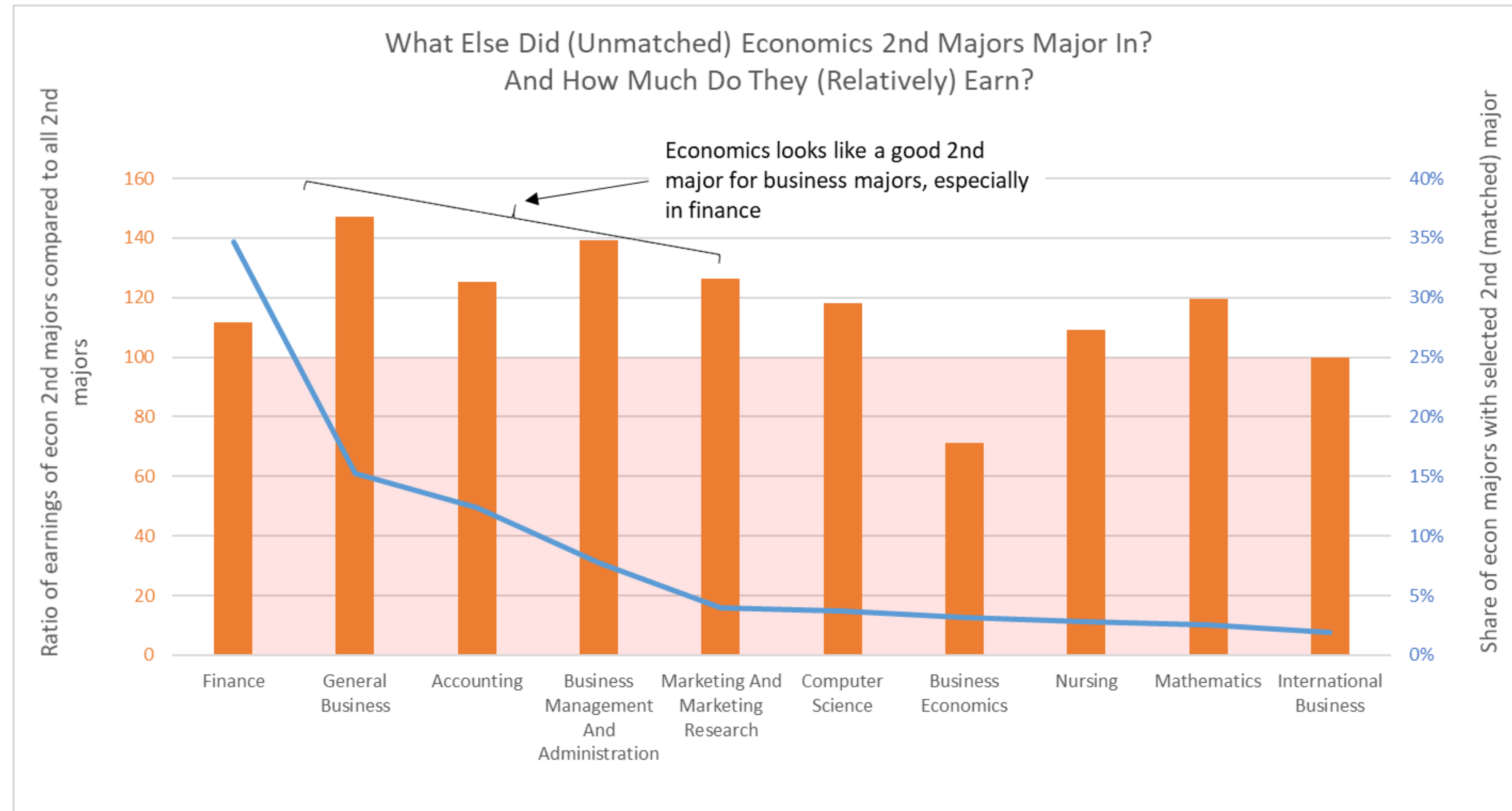
Do People Work in their Fields?

College Majors With the Largest Share of Graduates Working in Related Jobs

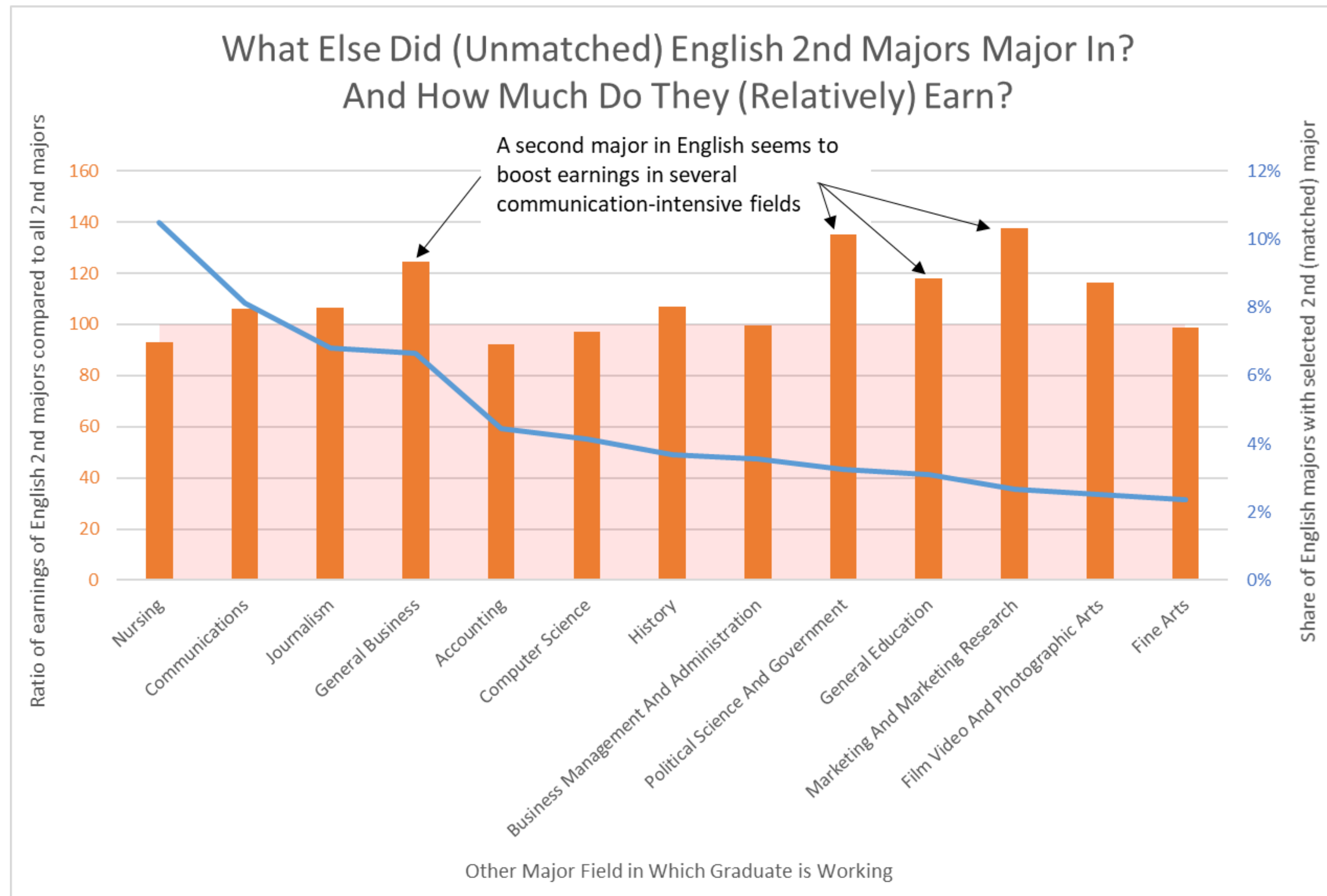


If you still have the chart, try to invert the order of the vertical axis to match the previous slides (%-\$)

The Indirect Value of a Major: Economics



The Indirect Value of a Major: English



Non-Obvious Patterns in the Labor Market

Payoff to College

- Earnings outcomes are driven heavily by major but
 - Some simple stories, e.g., “STEM programs are the most useful,” miss the mark
 - Biology majors tend to earn less than political science majors
 - About half of engineering majors don’t work in their field
- There is an education \Leftrightarrow urbanization link:
 - College attainment rates are higher in urban areas
 - Education and health care comprise a larger share of the college educated workforce in less urban areas
- Do people work in their fields? Should they?
 - Some majors are *far* more likely than others to see graduates working in occupations matched with their fields of study
 - In many common occupations, e.g., management, sales, and customer service, more than half the college-educated workers have an irrelevant major
 - College still tends to pay off when people don’t work in their field (signaling?)
 - E.g., English and economics majors pay off as *second* majors

Higher Ed Alignment Reconsidered

- The task of aligning higher education with labor market needs is complicated by signaling and people not working in their fields
- Seemingly impractical “intellectual” majors sometimes see better labor market returns than more vocationally-oriented majors