



Metropolitan Policy Program
at BROOKINGS

The Labor Market for STEM Skills

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Why does STEM matter?

1. Enhanced global, national, and regional consumer welfare via enhanced innovation and entrepreneurship
2. Greater prosperity through higher incomes of STEM workers and their colleagues and spending multipliers
3. Private benefits to those who acquire the skills and the owners of companies who employ them

Defining STEM as a set of skills

What is a STEM Job?

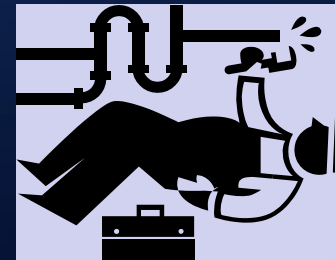
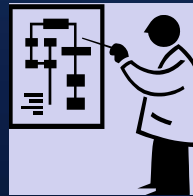
Conventional View:

- Definition uses no clear standard
- Professional jobs only
- 5% of US workforce
- 80 percent have a bachelor's degree or higher



How Brookings defines STEM

- Based on O*NET survey of worker knowledge
- 21% of US workforce
- 50 percent have a bachelor's degree or higher
- Higher correlation with wages and cognitive skill



Major Occupational Categories Sorted by STEM Score, with Share of Jobs that are STEM, 2011

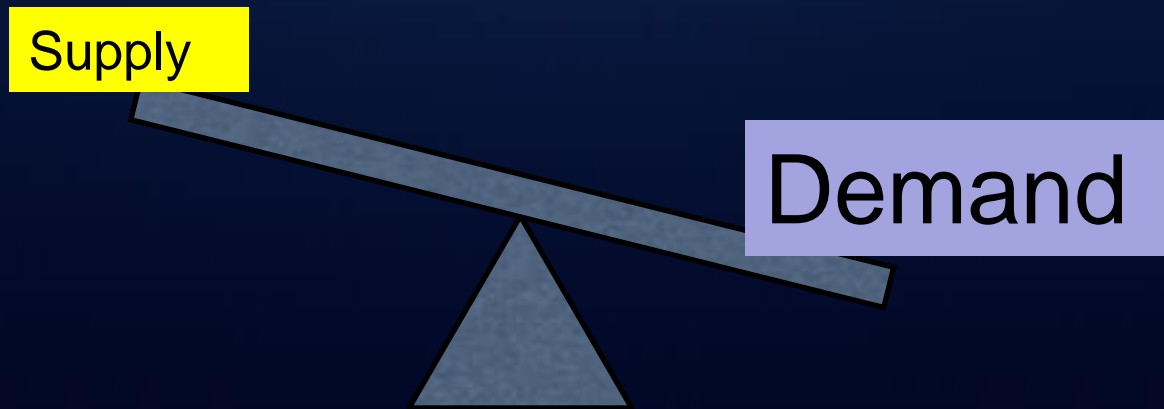
	High-STEM, Percentage of Jobs
Architecture and engineering	100%
Life, physical, and social science	87%
Healthcare practitioner and technical	76%
Computer and mathematical science	100%
Installation, maintenance, and repair	53%
Management	27%
Construction and extraction	40%
Education, training, and library	9%
Business and financial operations	42%
Farming, fishing, and forestry	8%
Production	23%
Arts, design, entertainment, sports, and media	16%
Sales and related	0%
Legal	0%

Source: The Hidden STEM Economy (Brookings Institution, 2013)

The US STEM Labor Market

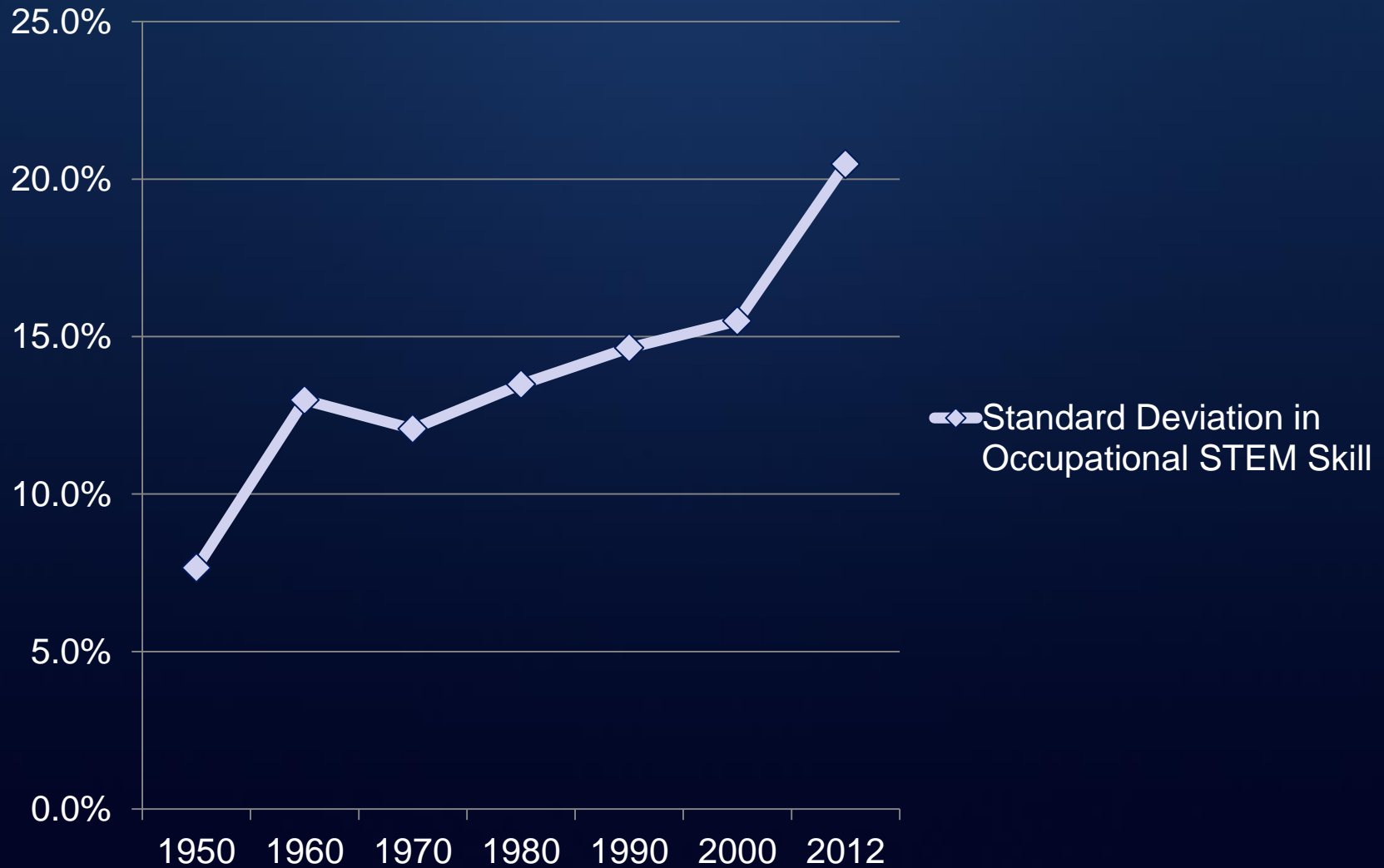
The STEM Labor Market

- Long-run shortage, temporarily ameliorated by the recession



- Weak response in supply, even as salaries have increased

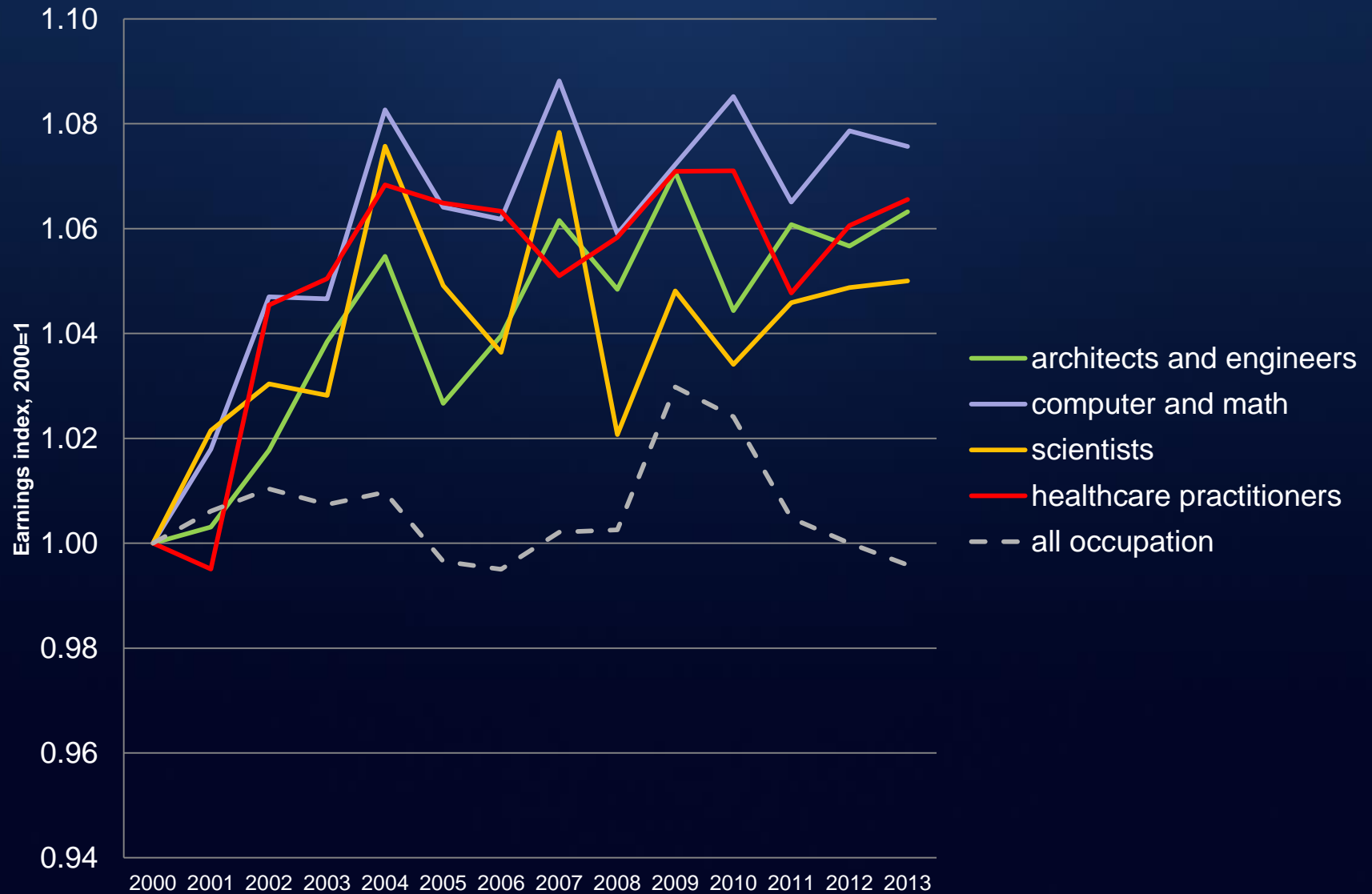
Wage Premium for STEM Skills, Controlling for Experience, Education, and Sex, 1950-2012



Analysis of data from Census Bureau via Integrated Public Use Microdata Series and O*NET. For methods, see Jonathan Rothwell, "Hidden STEM Economy," (Brookings Institution, 2012).

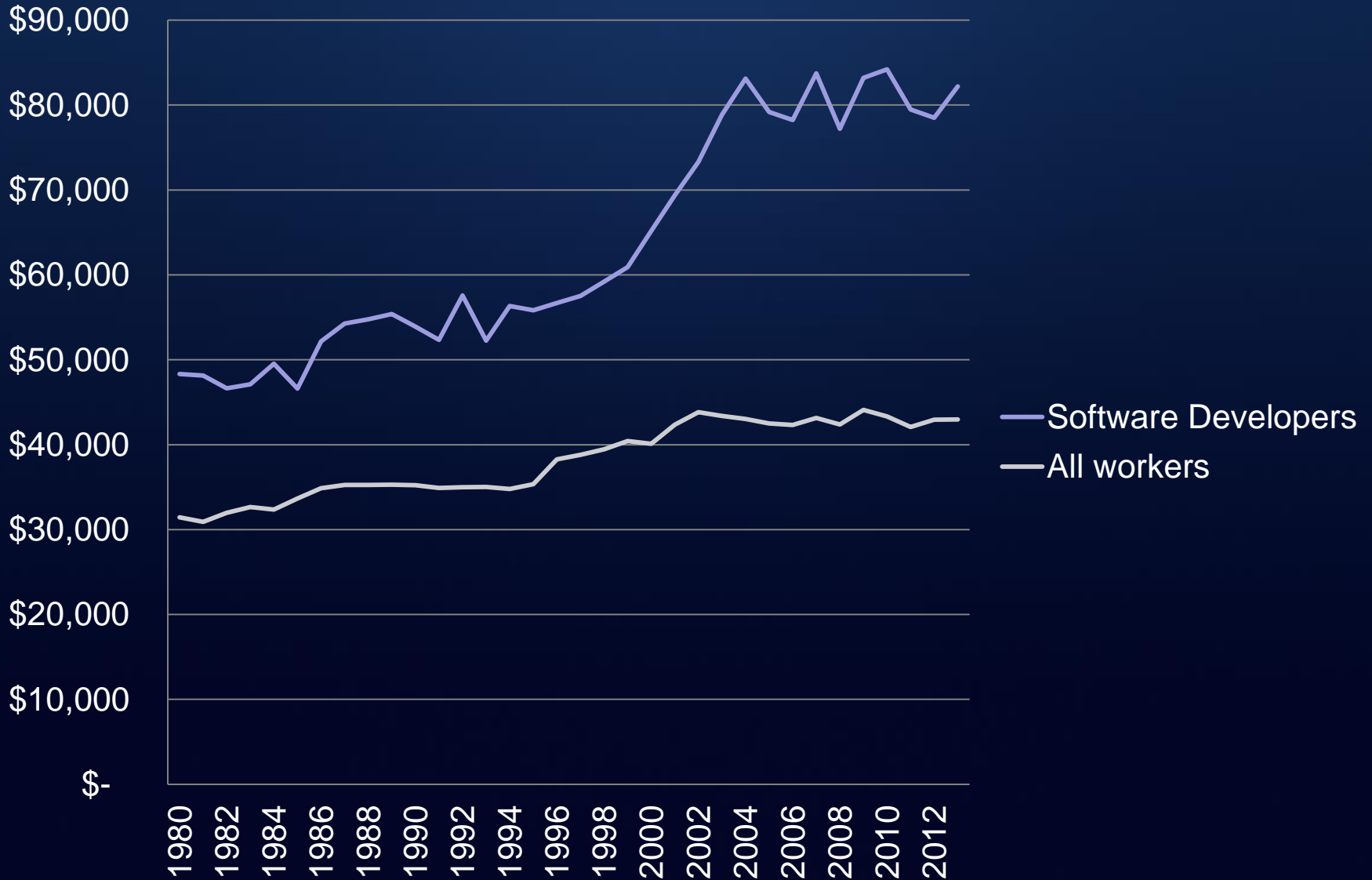
Growth in real median earnings by occupation, 2000-2013

(Source: BLS Current Population Survey)



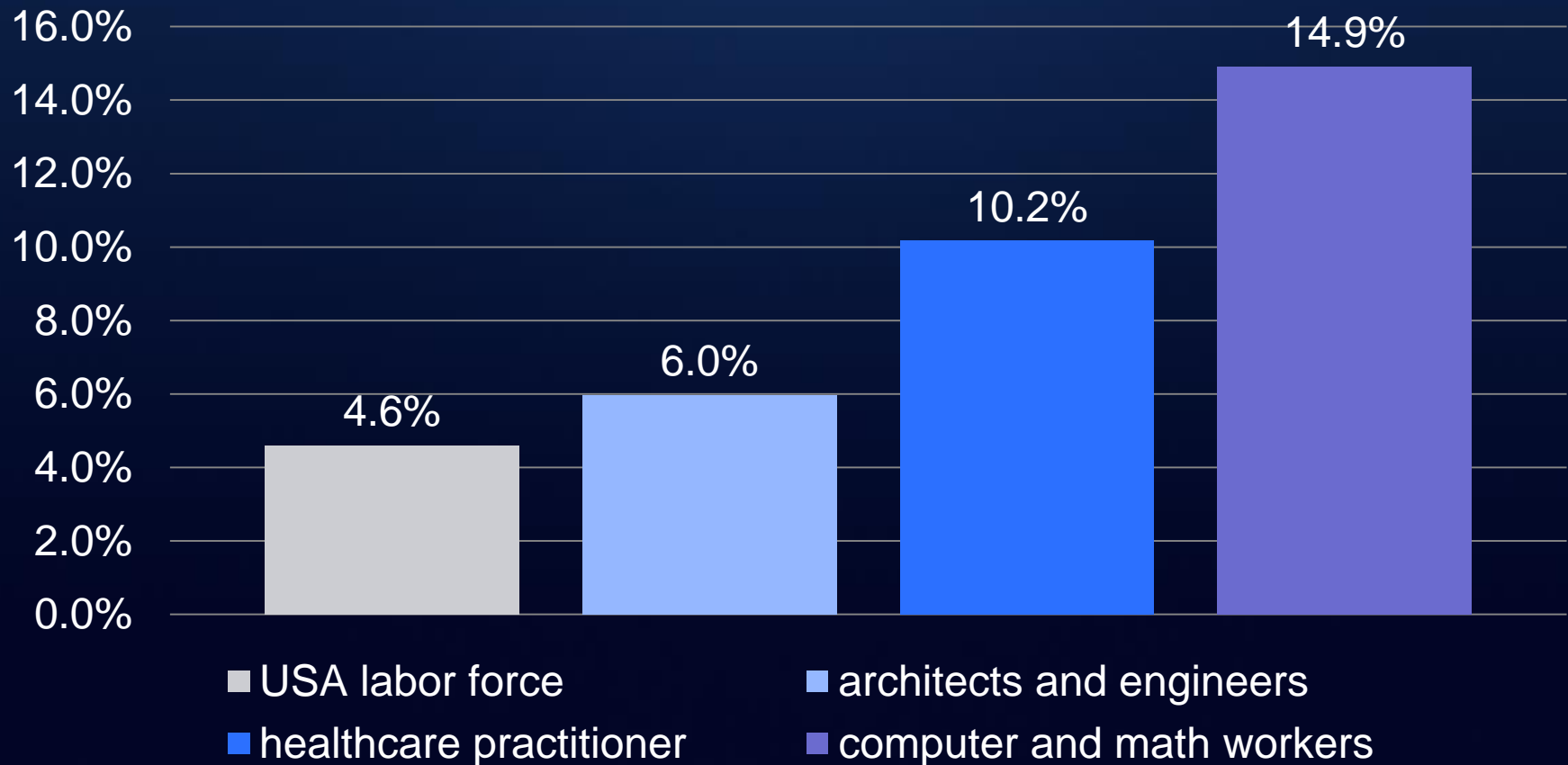
Average salaries of software developers compared to all other workers, in 2013 dollars

(Source: Analysis of Current Population Survey, via IPUMS)



From 2009-2013, 3 out of every 10 jobs created on net have been in computer and healthcare practitioner occupations

Growth rate in employment by occupation, 2009-2013



U.S. Hiring Difficulty Index, 3-month average

Source: Brookings analysis of JOLTS data, 2004-2014

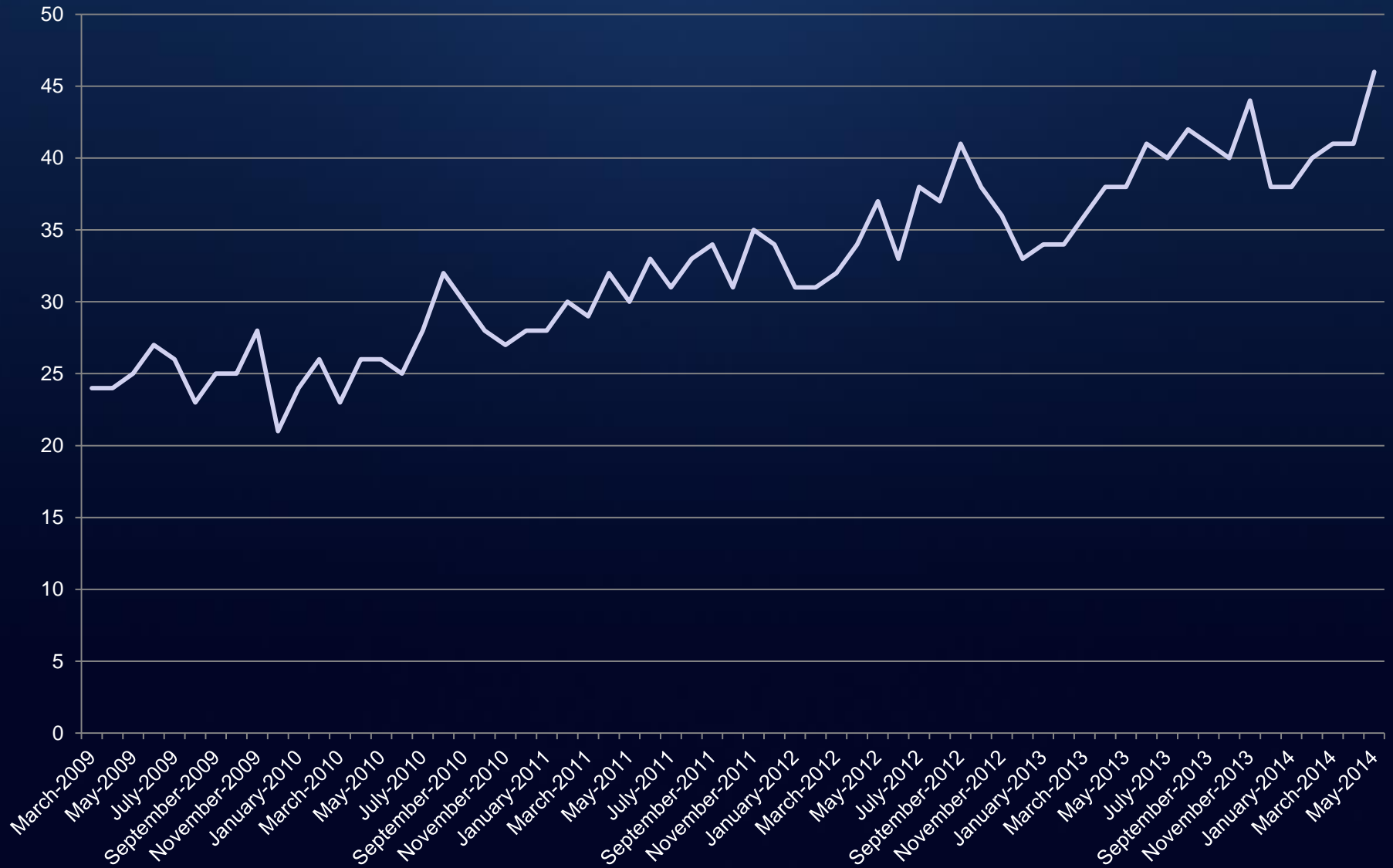


— JOLTS Hiring Difficulty Index, 3-month average

Index = job openings last month per hire this month

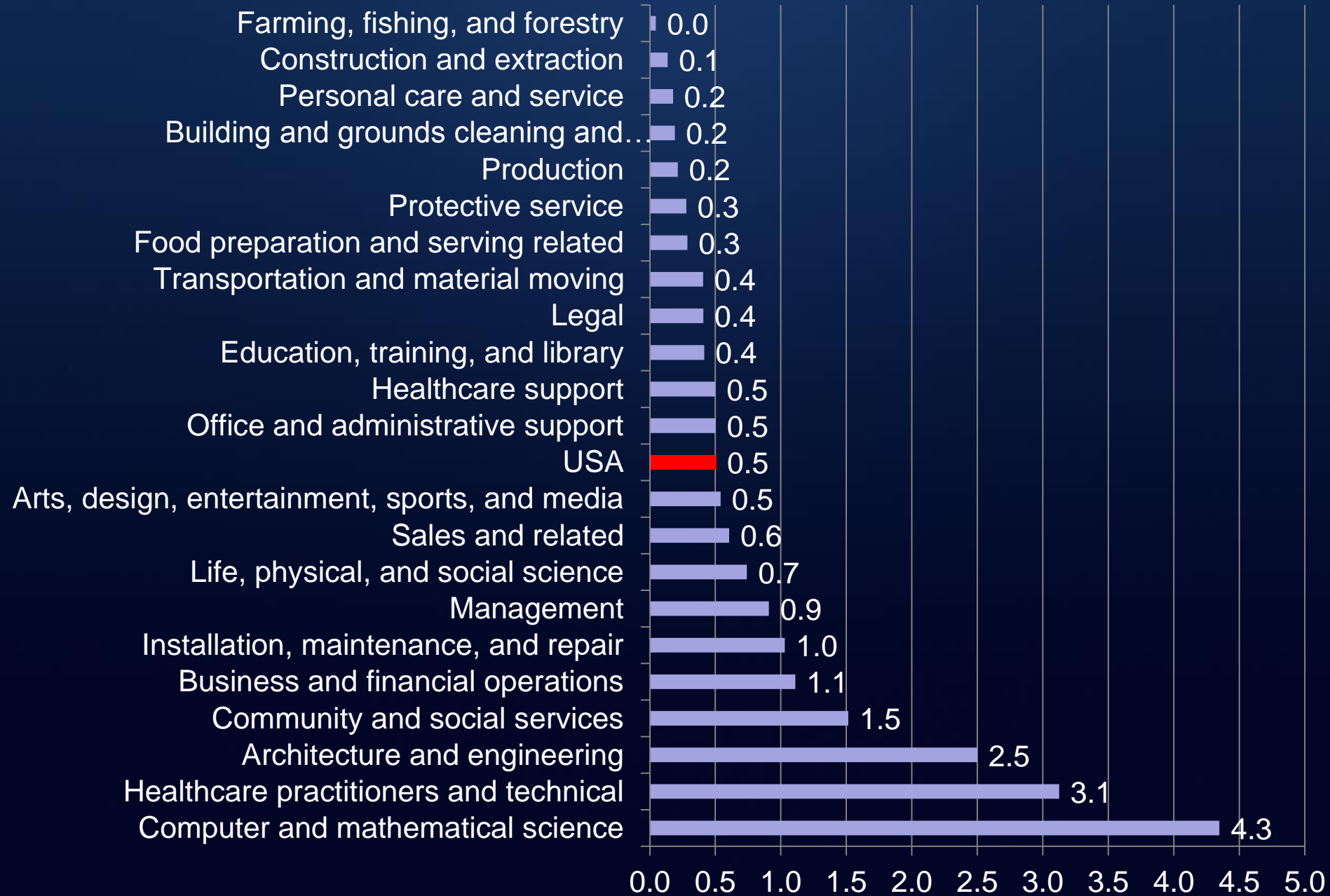
Percent of small businesses reporting few or no qualified applicants, 2009 to May 2014

Source: William C. Dunkelberg and Holly Wade, "NFIB Small Business Economic Trends," (NFIB Research Foundation, June 2014).



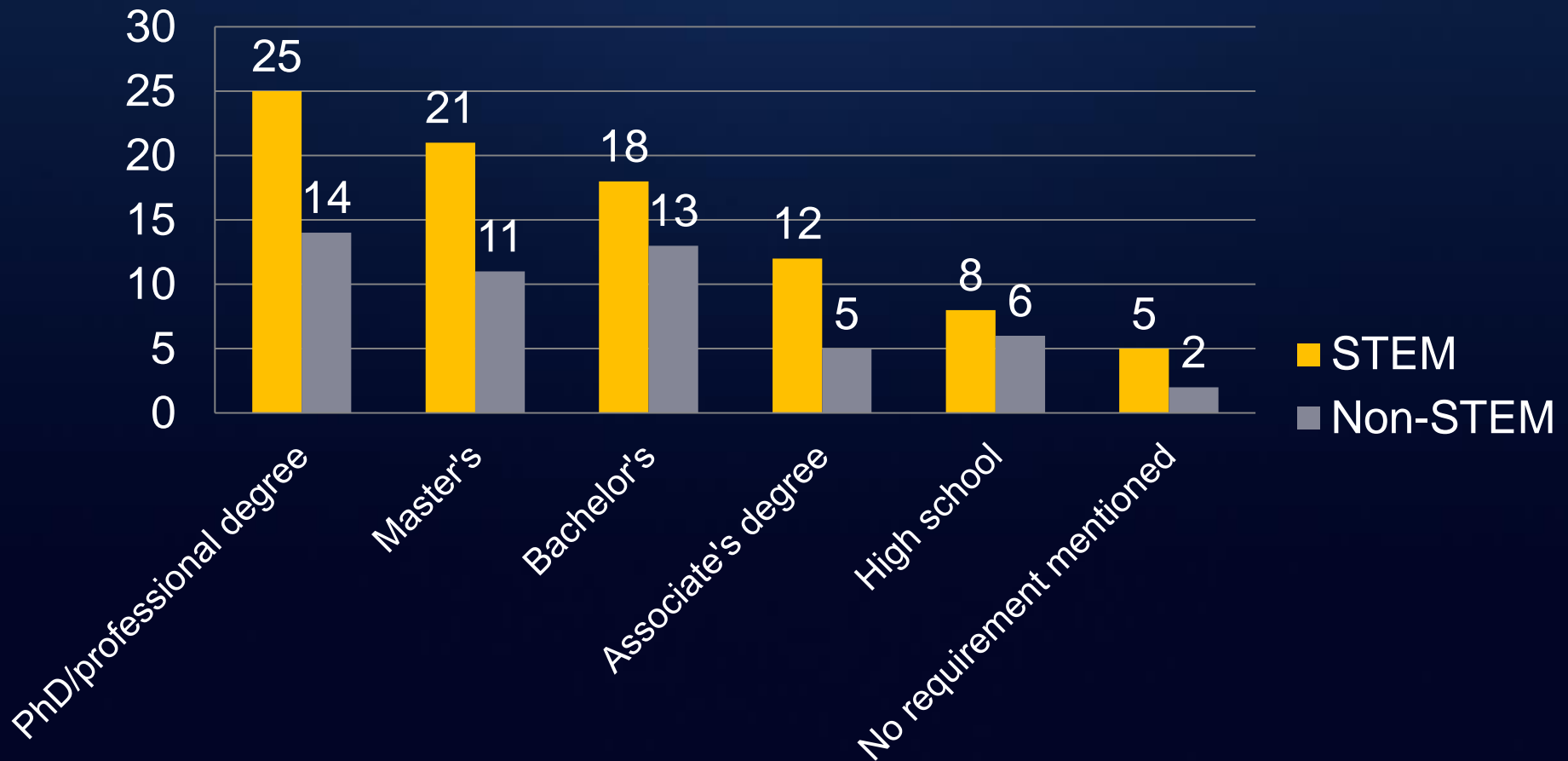
Openings per unemployed worker, April 2014

(Source: Conference Board, HWOL)



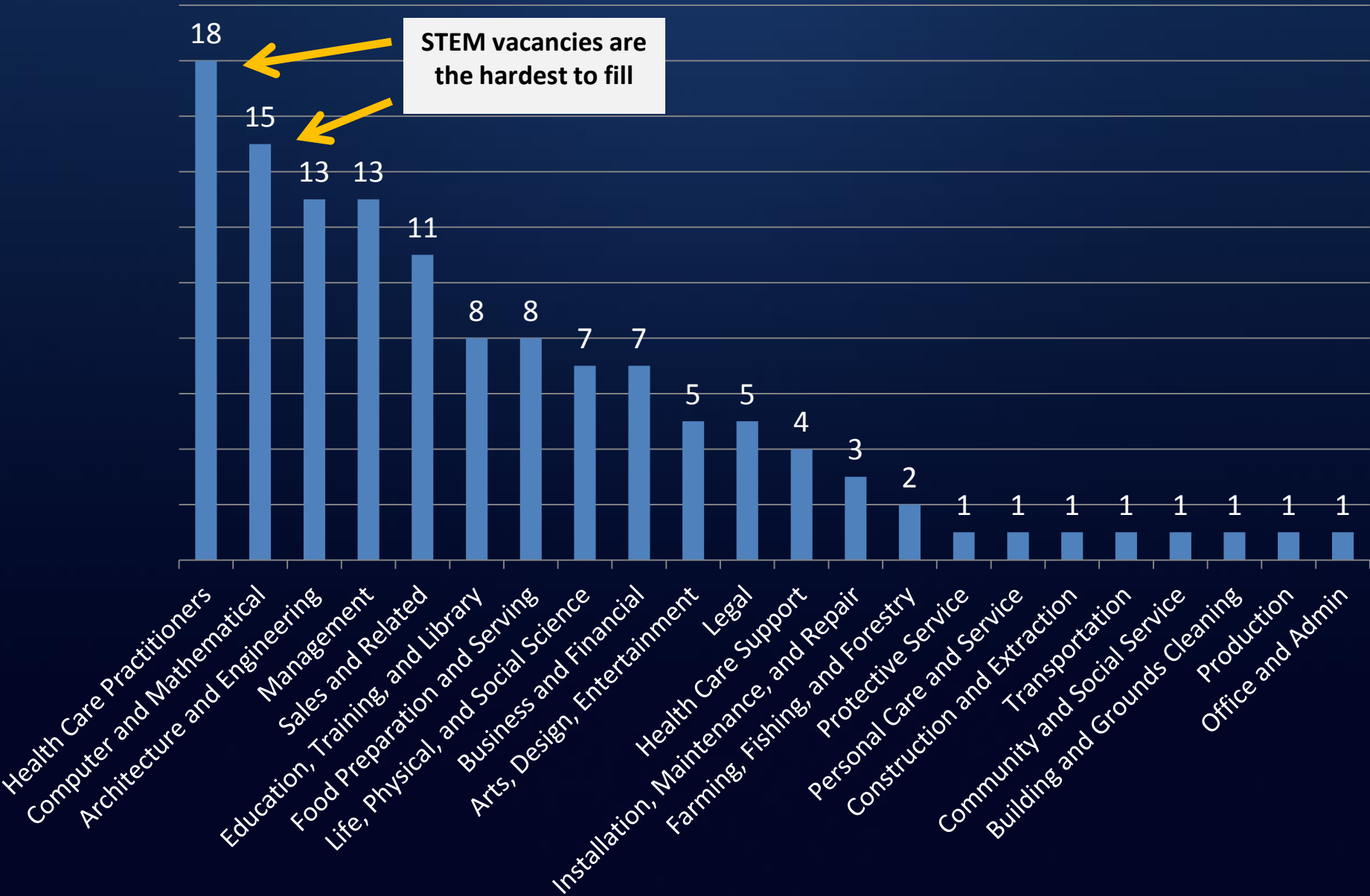
Median Duration
All STEM: 11 days
All Non-STEM: 5 days

Median duration of job advertisements posted in 2013-Q1 in days by STEM skill and minimum education required



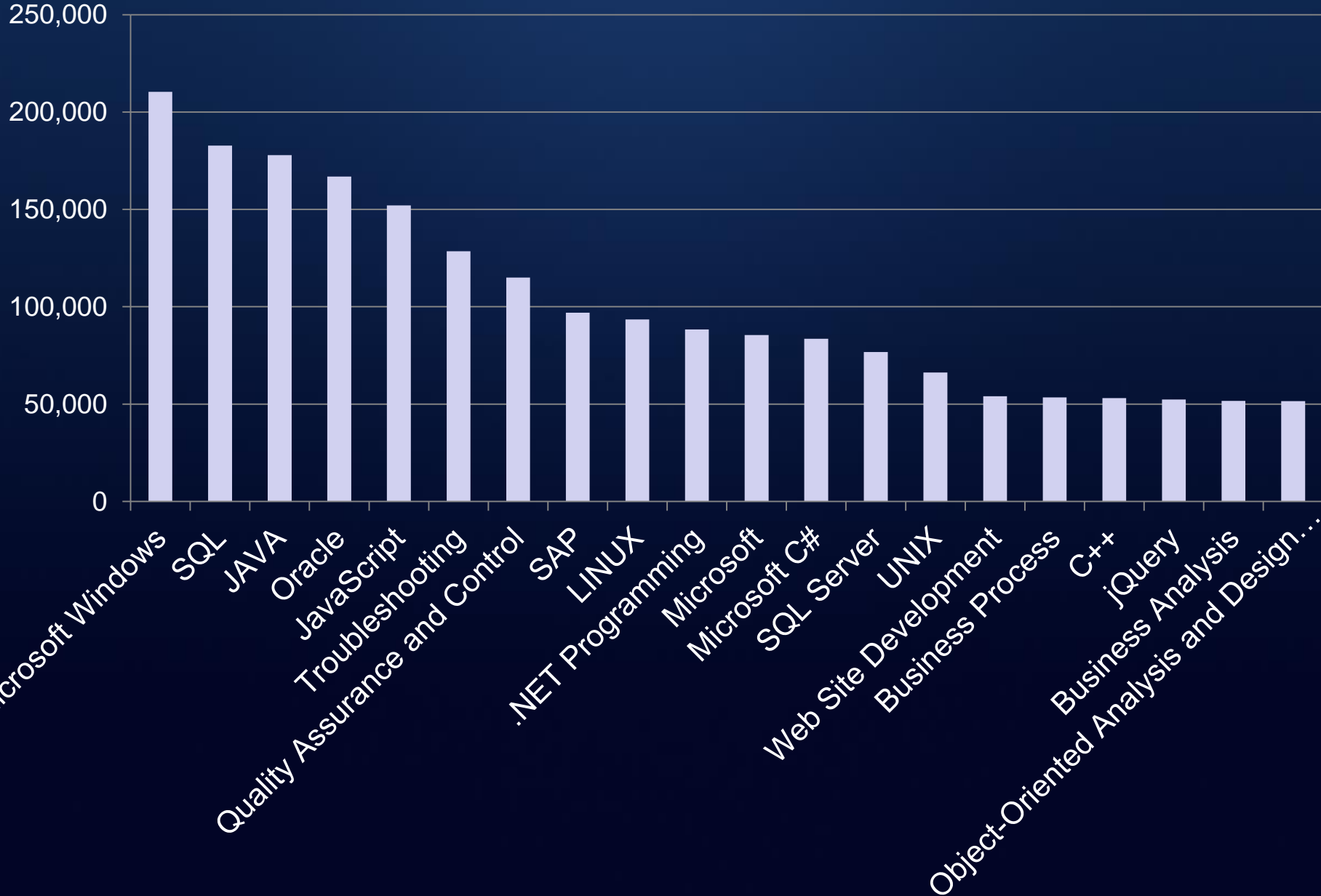
Median duration of 2013-Q1 vacancy advertisement by occupation

(Source: Brookings analysis of Burning Glass)



The Computer Skills Most Commonly Requested by Employers by number of advertised vacancies in 2013

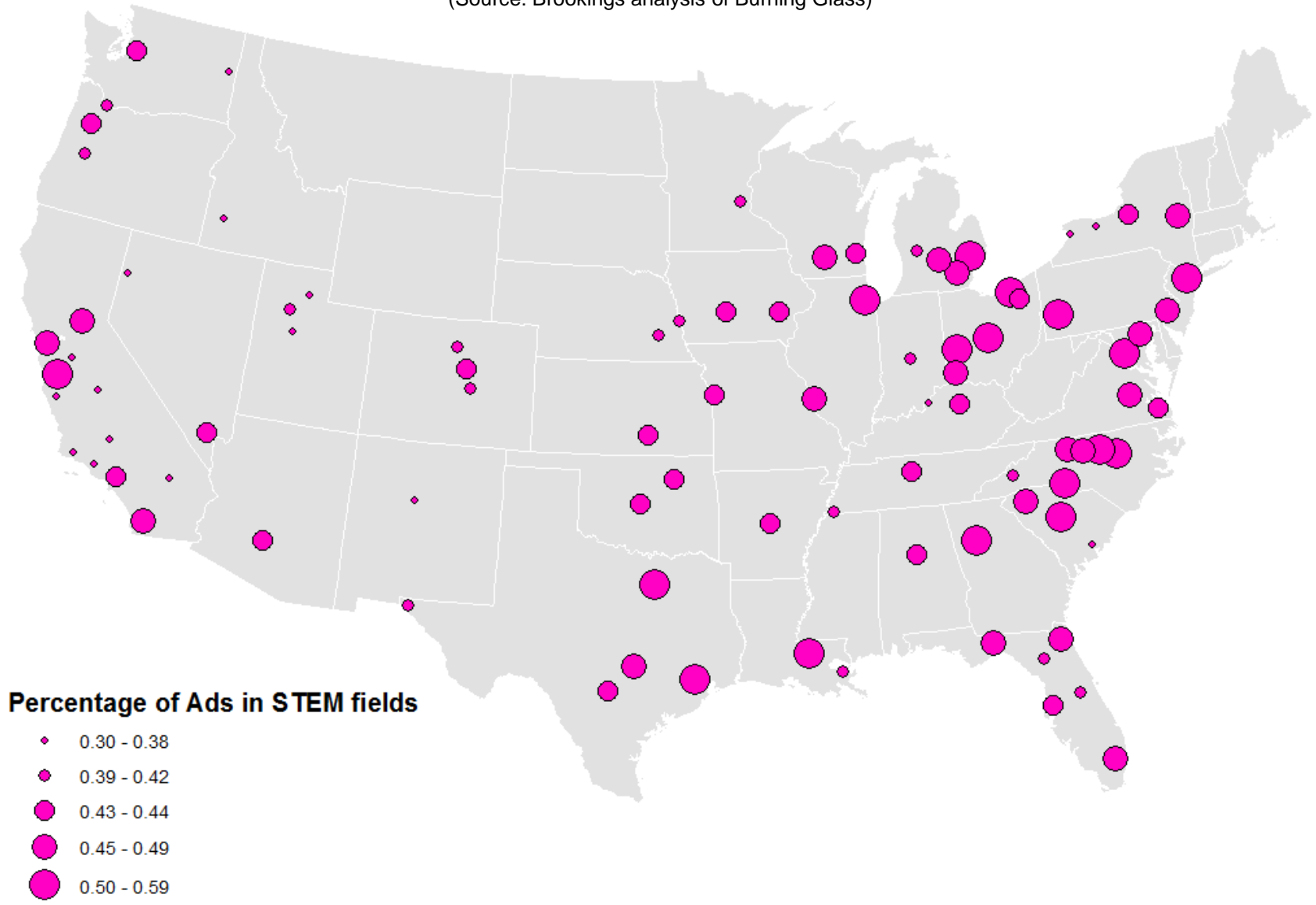
(Source: Brookings analysis of Burning Glass)



Regional Variation in STEM Markets

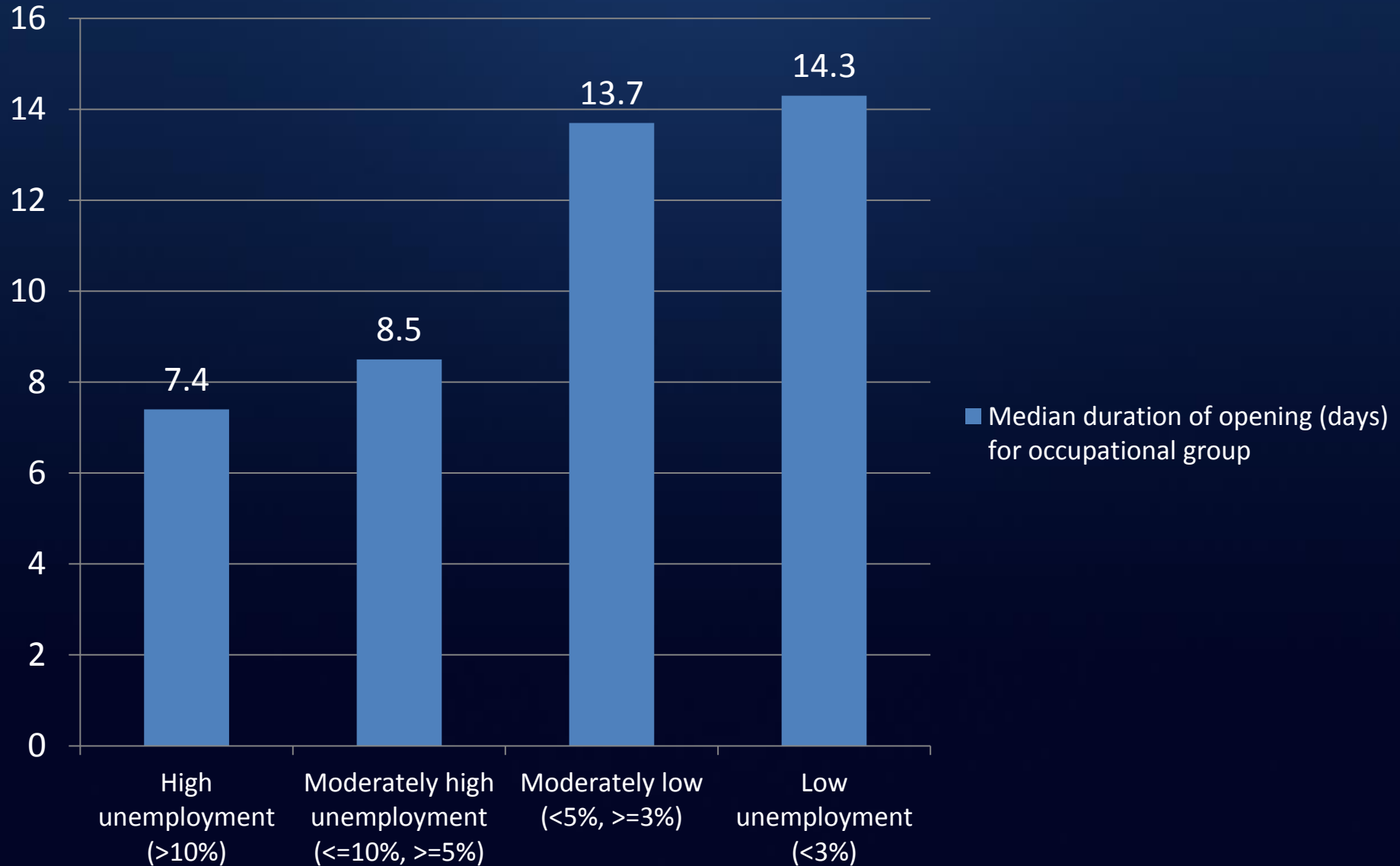
Percentage of Advertised Vacancies in STEM Occupations for metro areas with at least 50,000 vacancies, 2013

(Source: Brookings analysis of Burning Glass)



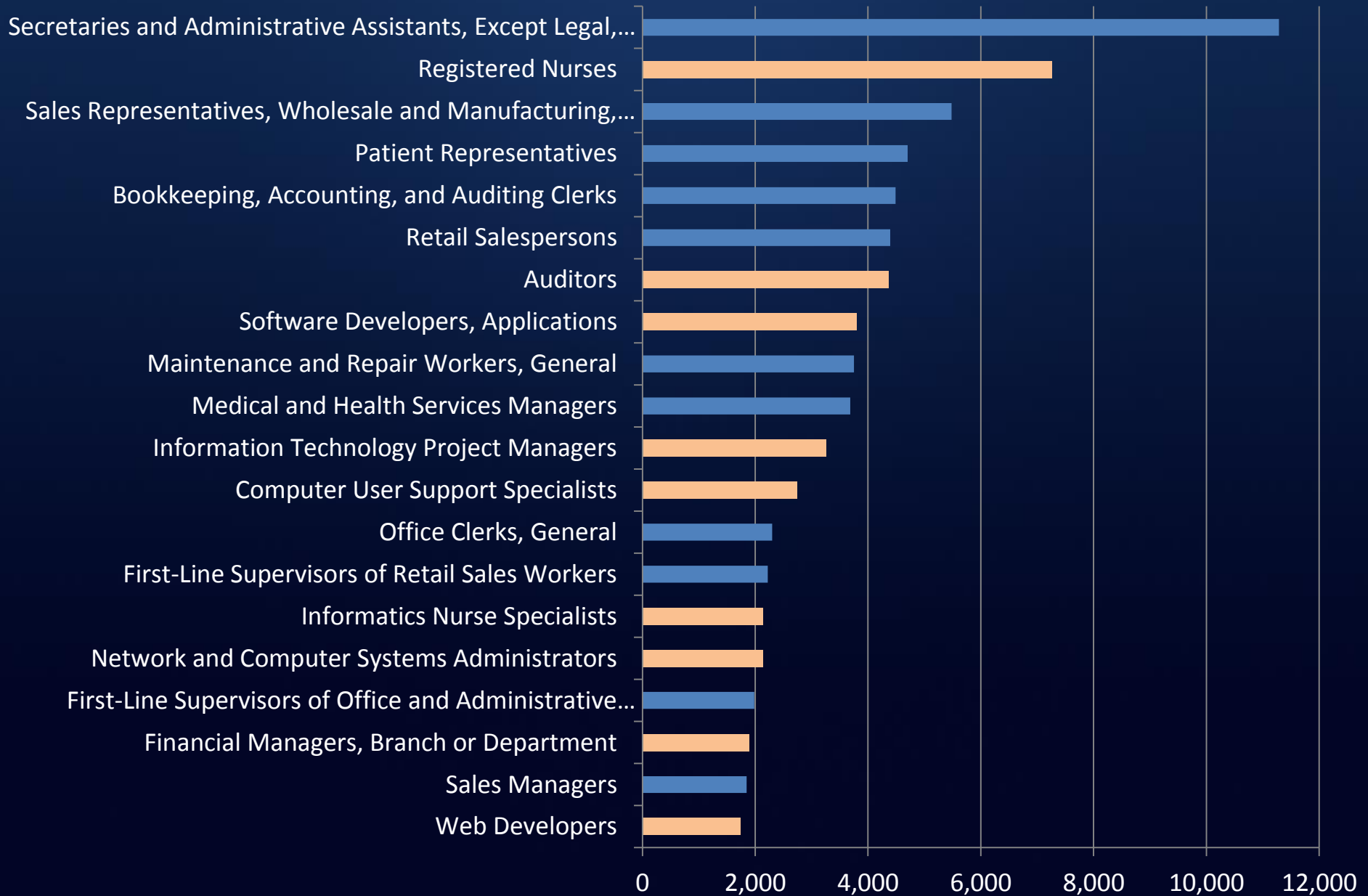
Average occupational hiring difficulty by regional unemployment rate

(Source: Brookings analysis of Burning Glass and 2012 Census microdata via IPUMS)



How does the STEM labor
market look in Nevada?

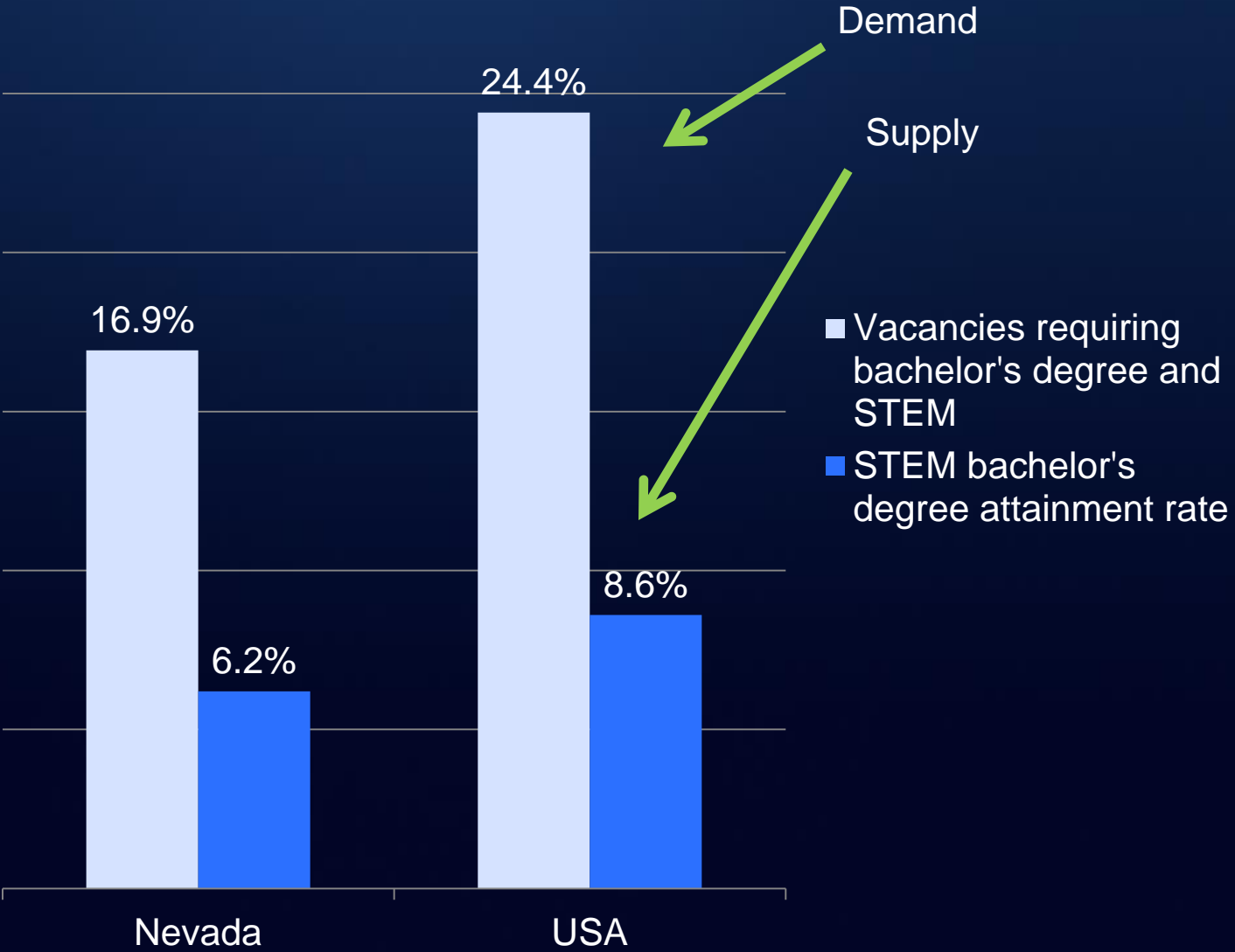
Of Nevada's 20 Most Common Occupations with Vacancies Advertised in 2013, 9 are STEM jobs



In Nevada's professional level STEM economy, relatively low demand is met with even lower supply

Share of total openings typically requiring bachelor's degree or higher in STEM occupations (2013) versus STEM degree attainment for population 25 and older (2012), Las Vegas MSA,

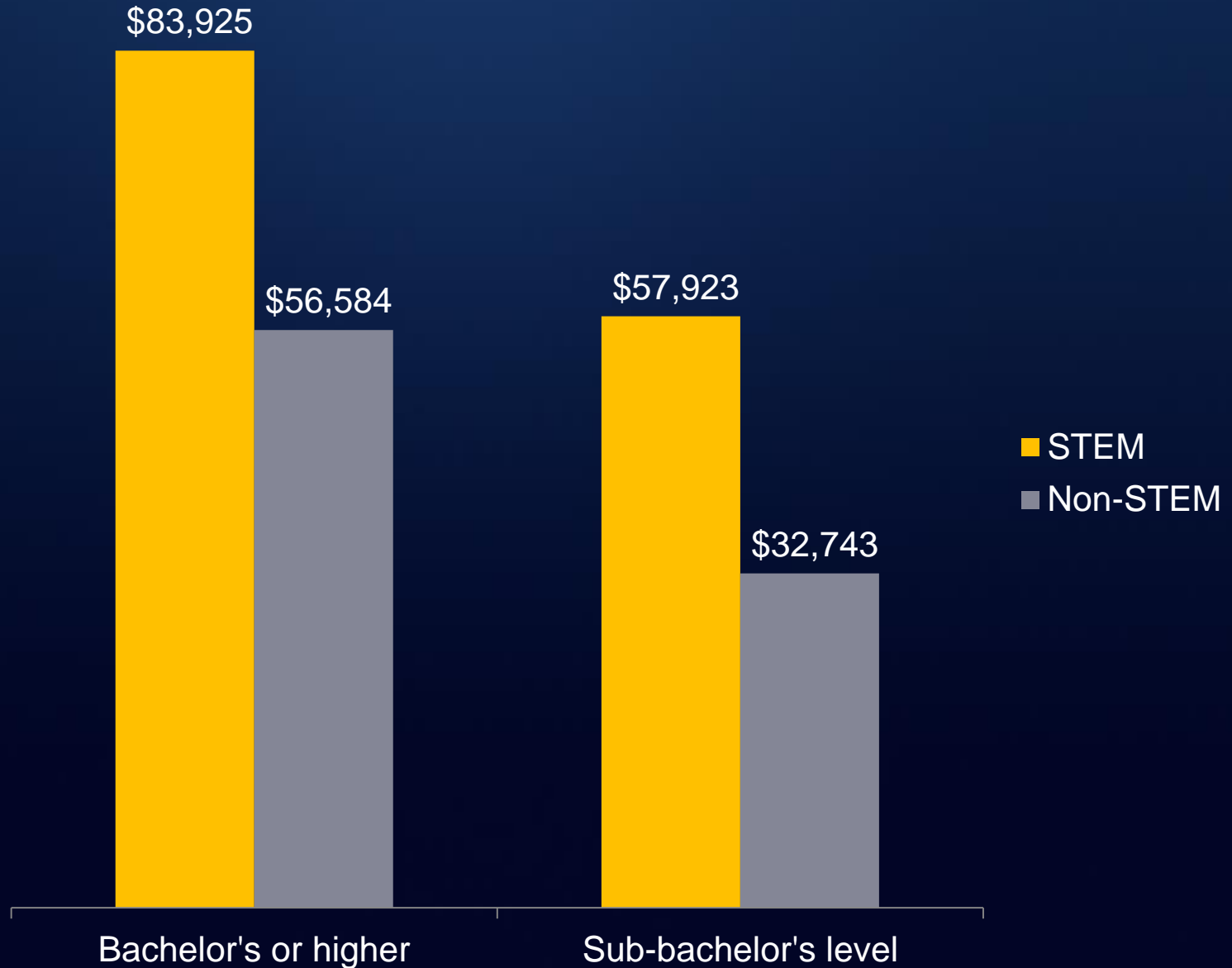
Source: Brookings analysis of 2013Q4 Burning Glass data, O*NET, and 2012 American Community Survey



STEM jobs in Nevada pay higher salaries at high and low levels of education

Wages of STEM and non-STEM jobs by educational requirements of occupations, Nevada, 2013

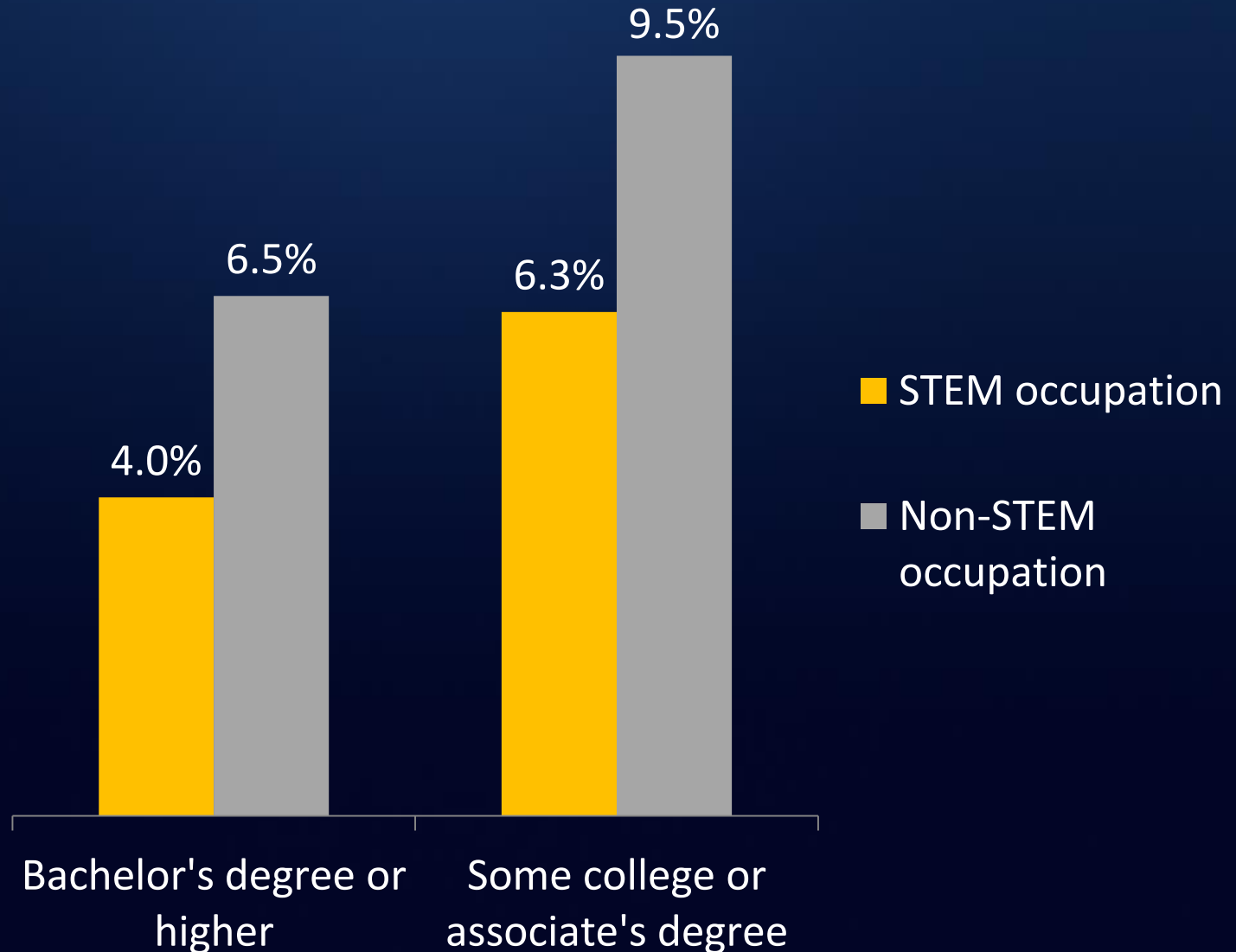
Source: Brookings analysis of Bureau of Labor Statistics OES data and O*NET



STEM workers in Nevada experience lower unemployment at both high and mid levels of educational attainment

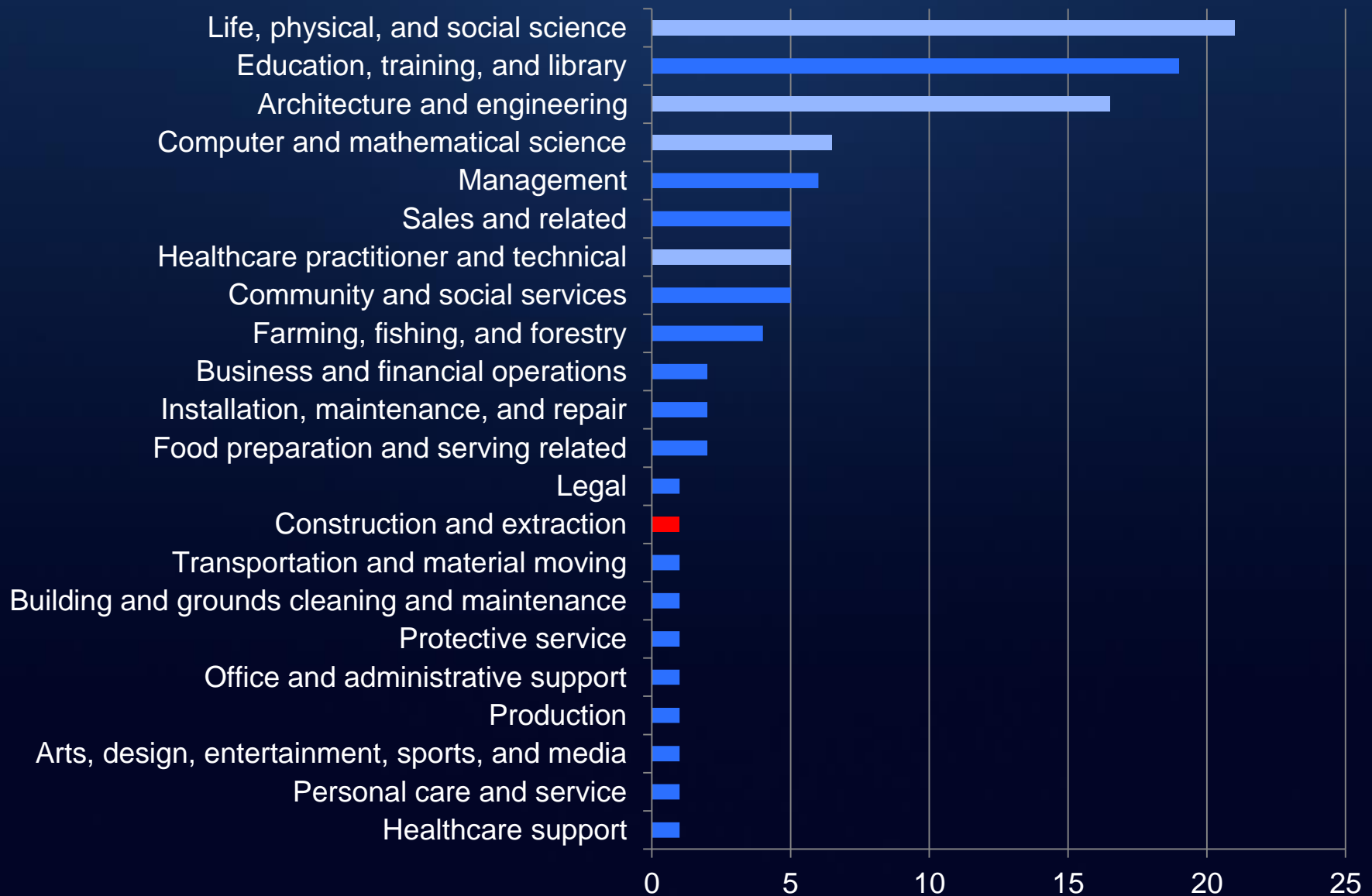
2012
Unemployment
Rate in Nevada
by STEM status
of Occupation and
Level of
Education

(Source: Analysis of 2012 American
Community Survey via IPUMS and
O*NET)



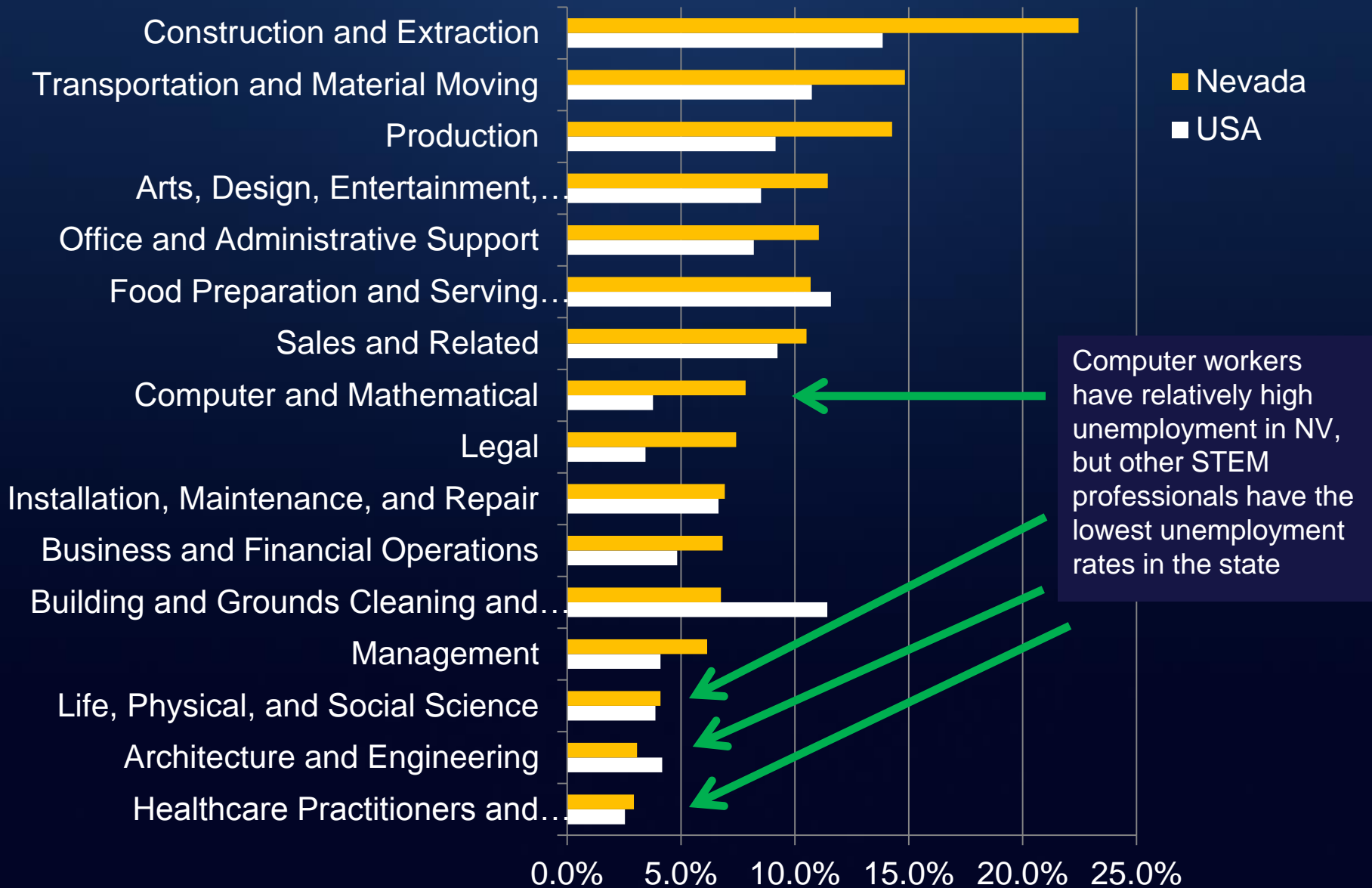
Median duration of vacancies in Las Vegas for major occupations, 2013-Q1

(Source: Brookings analysis of Burning Glass data, 2013-Q1)



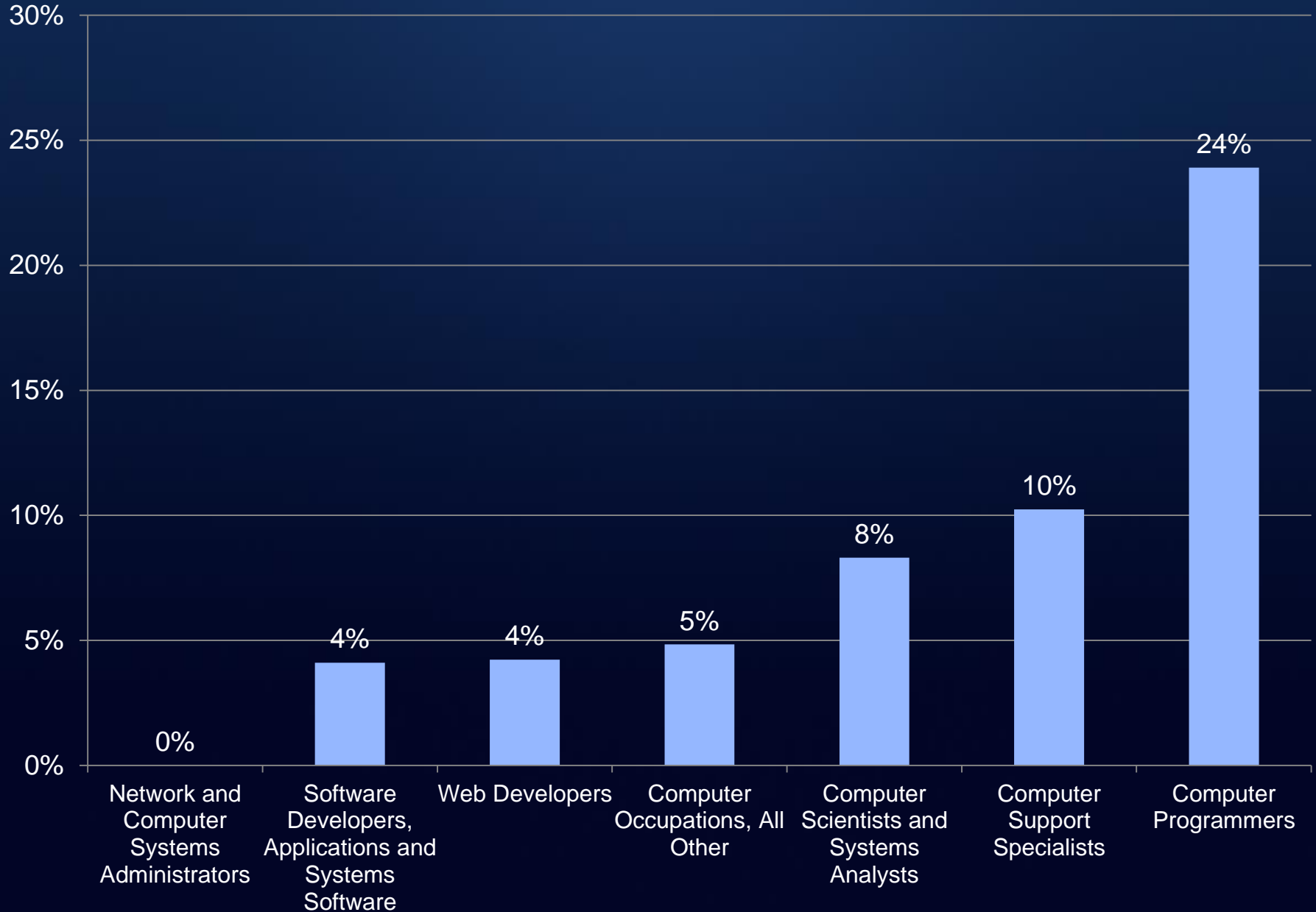
2012 Unemployment by Occupation in Nevada vs the United States

Source: 2012 American Community Survey via IPUMS



Unemployment Rates of Computer Occupations in Nevada with at Least 1000 Workers in 2012

(Source: 2012 American Community Survey via IPUMS)



Computer jobs advertised in Las Vegas require easier-to-find skills than those advertised in most metropolitan areas

Mean advertisement duration in days of average skill requested in computer occupations advertised in 100 metropolitan areas with most vacancies, 2013

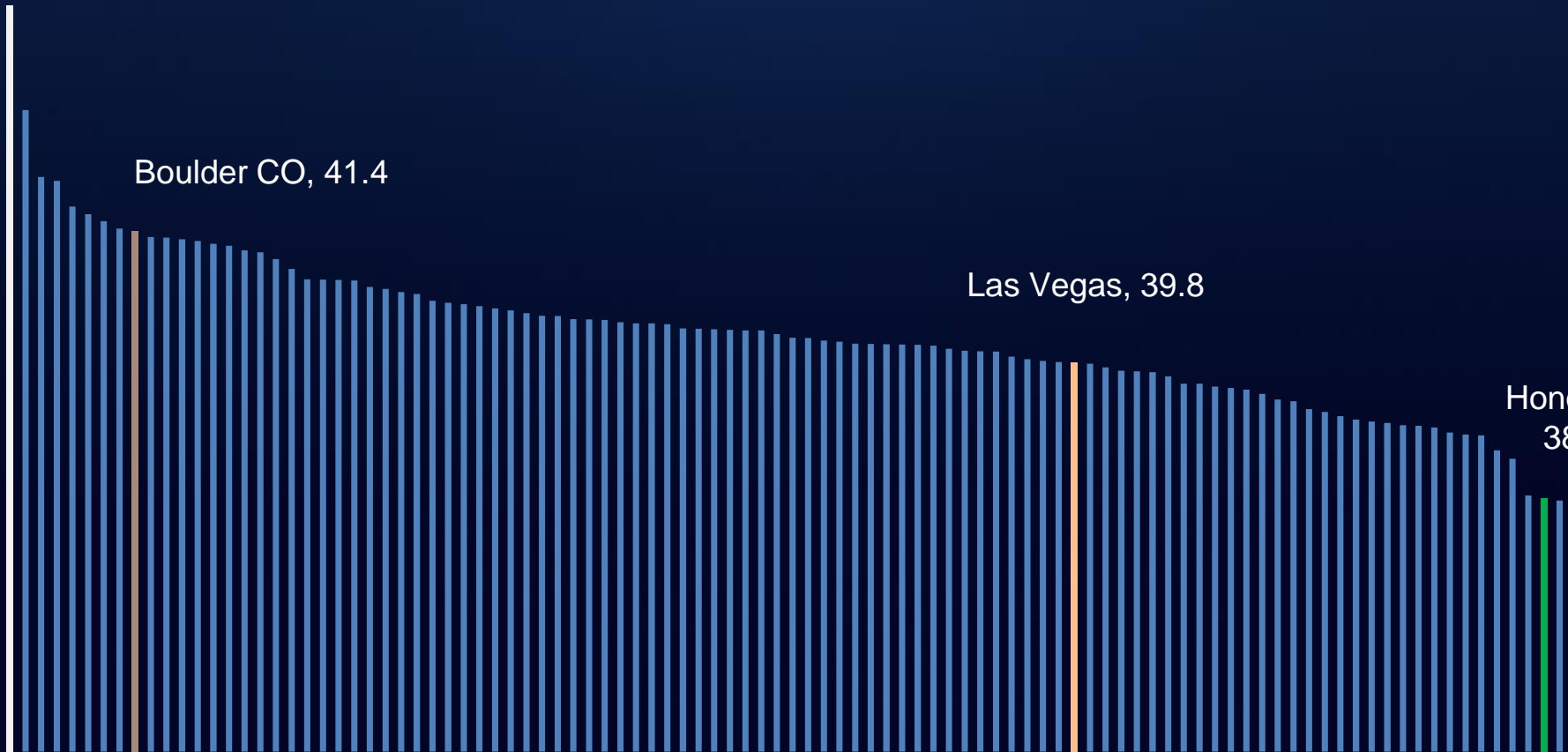
(Source: Brookings analysis of Burning Glass data)

San Jose, 44.2

Boulder CO, 41.4

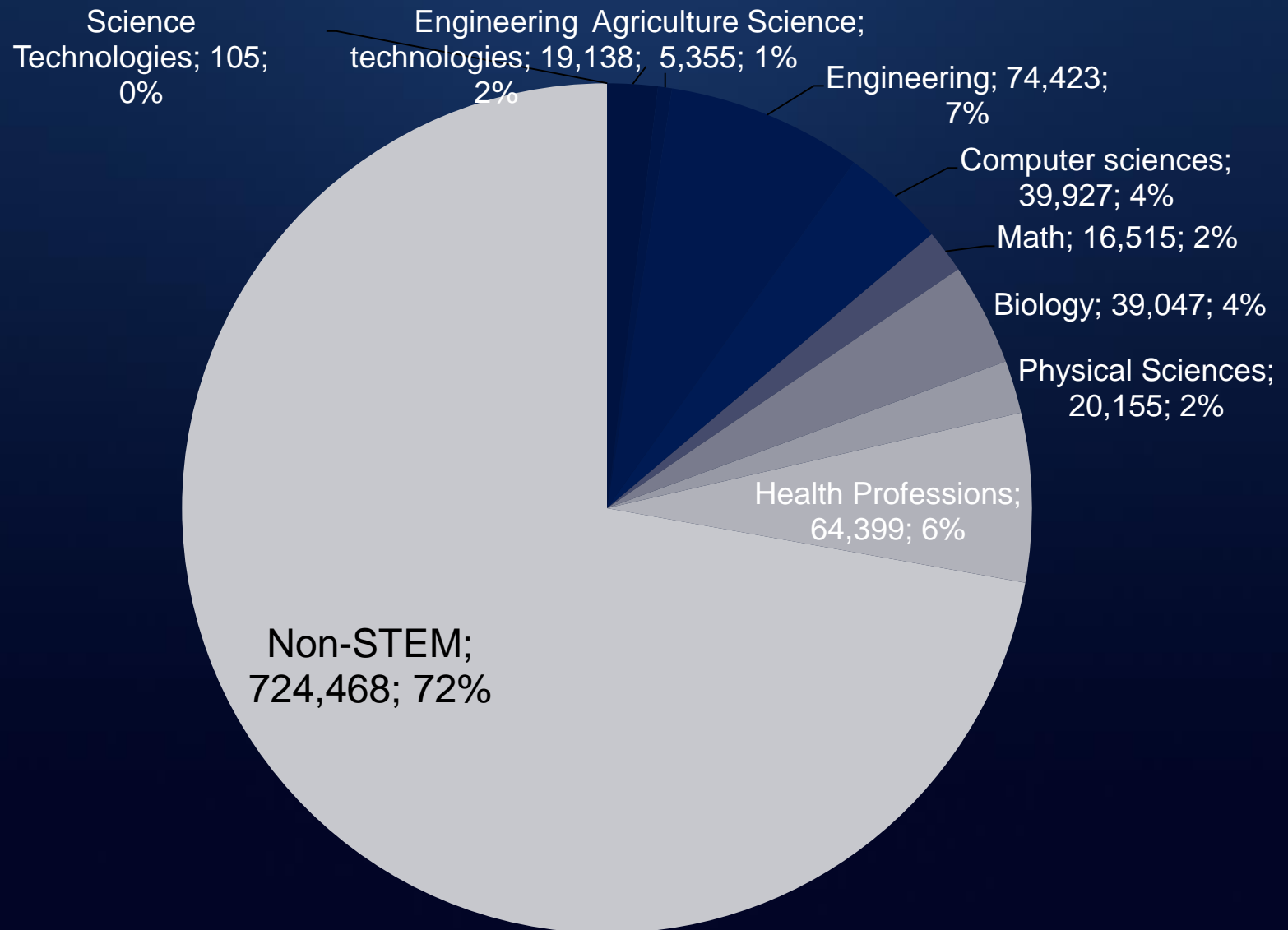
Las Vegas, 39.8

Honolulu, 38.1

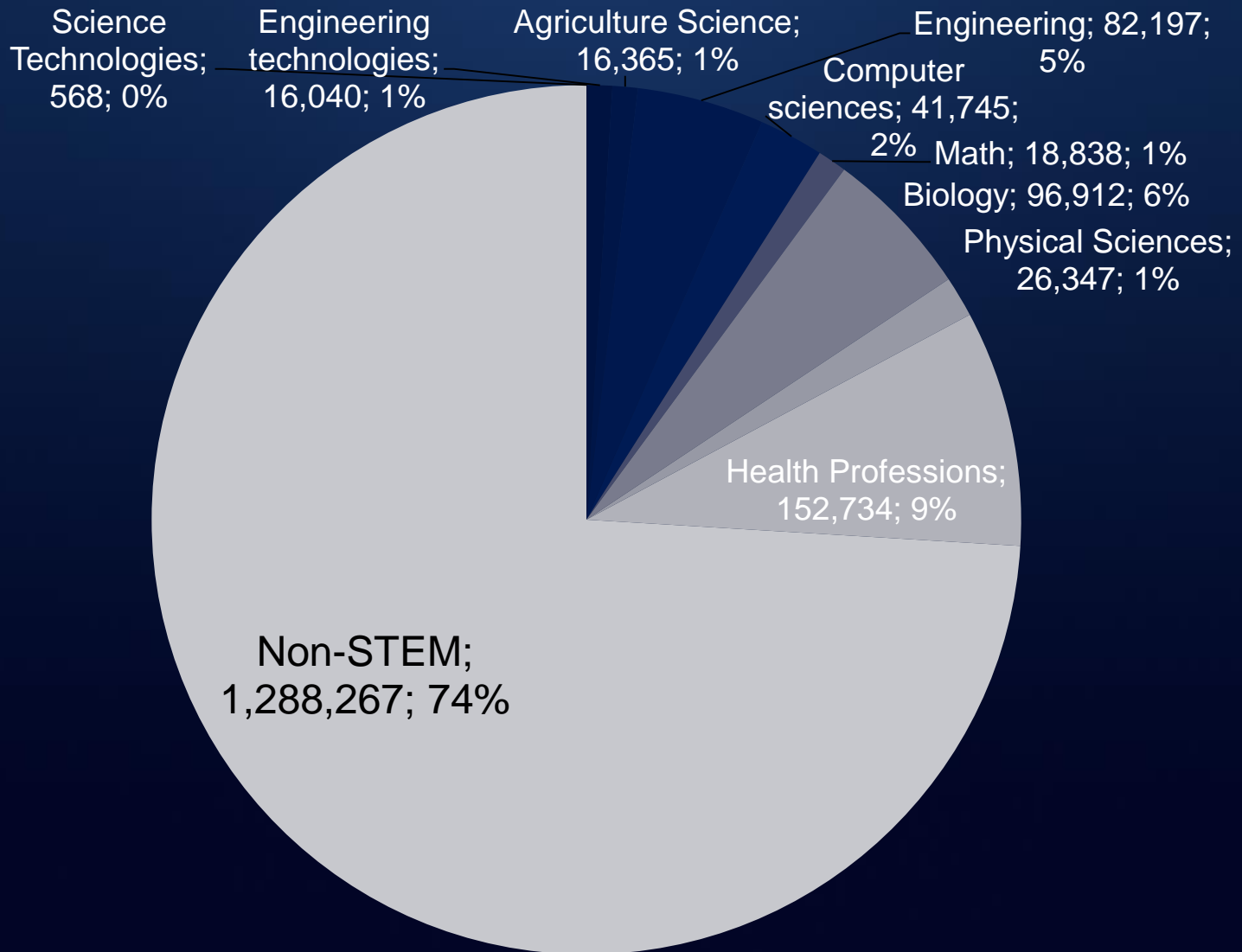


The Supply Problem

1987: Majors by field for STEM and non-STEM (Source: NSF)



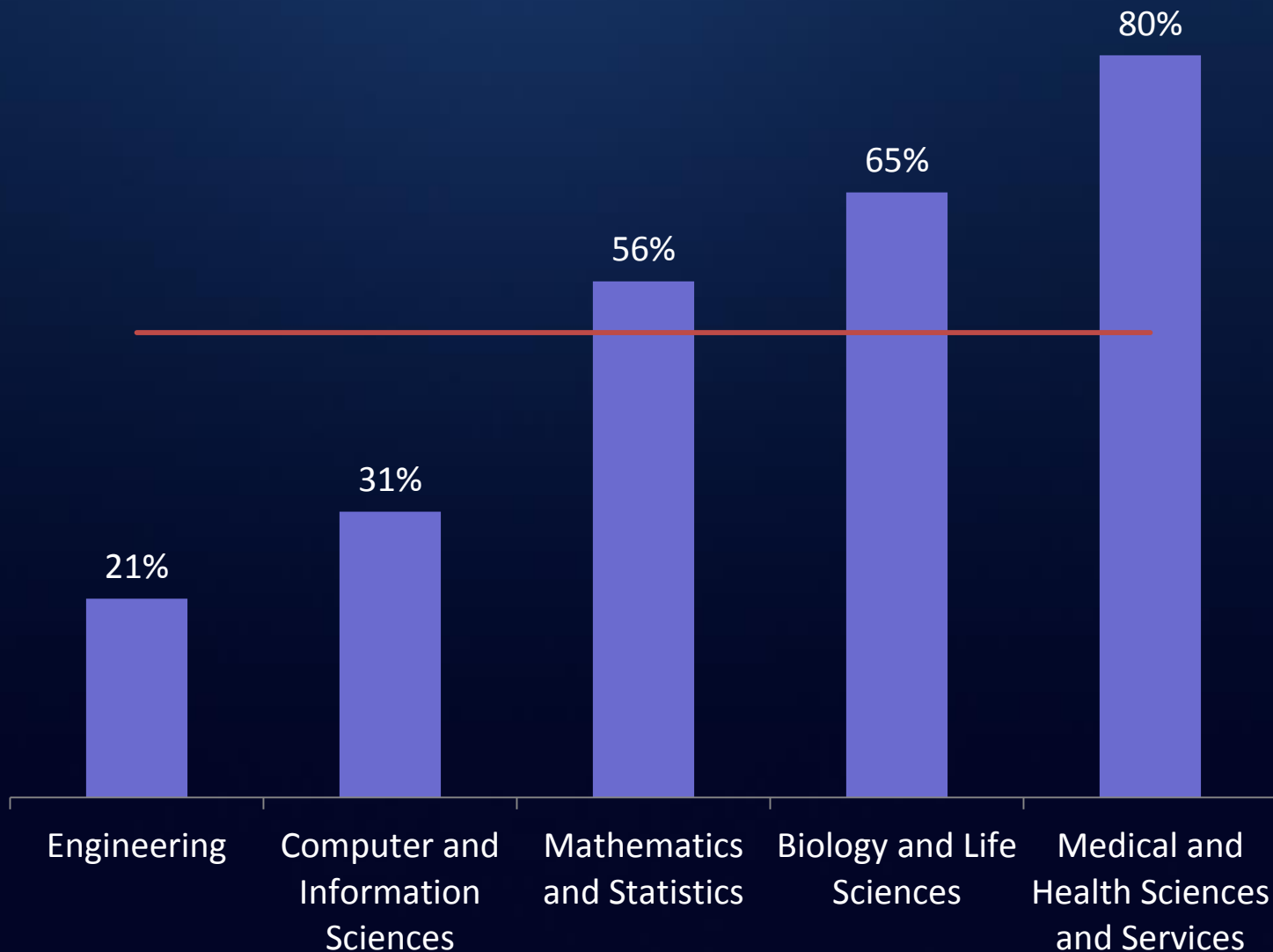
2012: Majors by field for STEM and non-STEM (Source: NSF)



Engaging young women in STEM can help narrow the STEM gap in Nevada

Female share of bachelor's degree holders by STEM field, ages 18 to 30, Nevada, 2010-2012

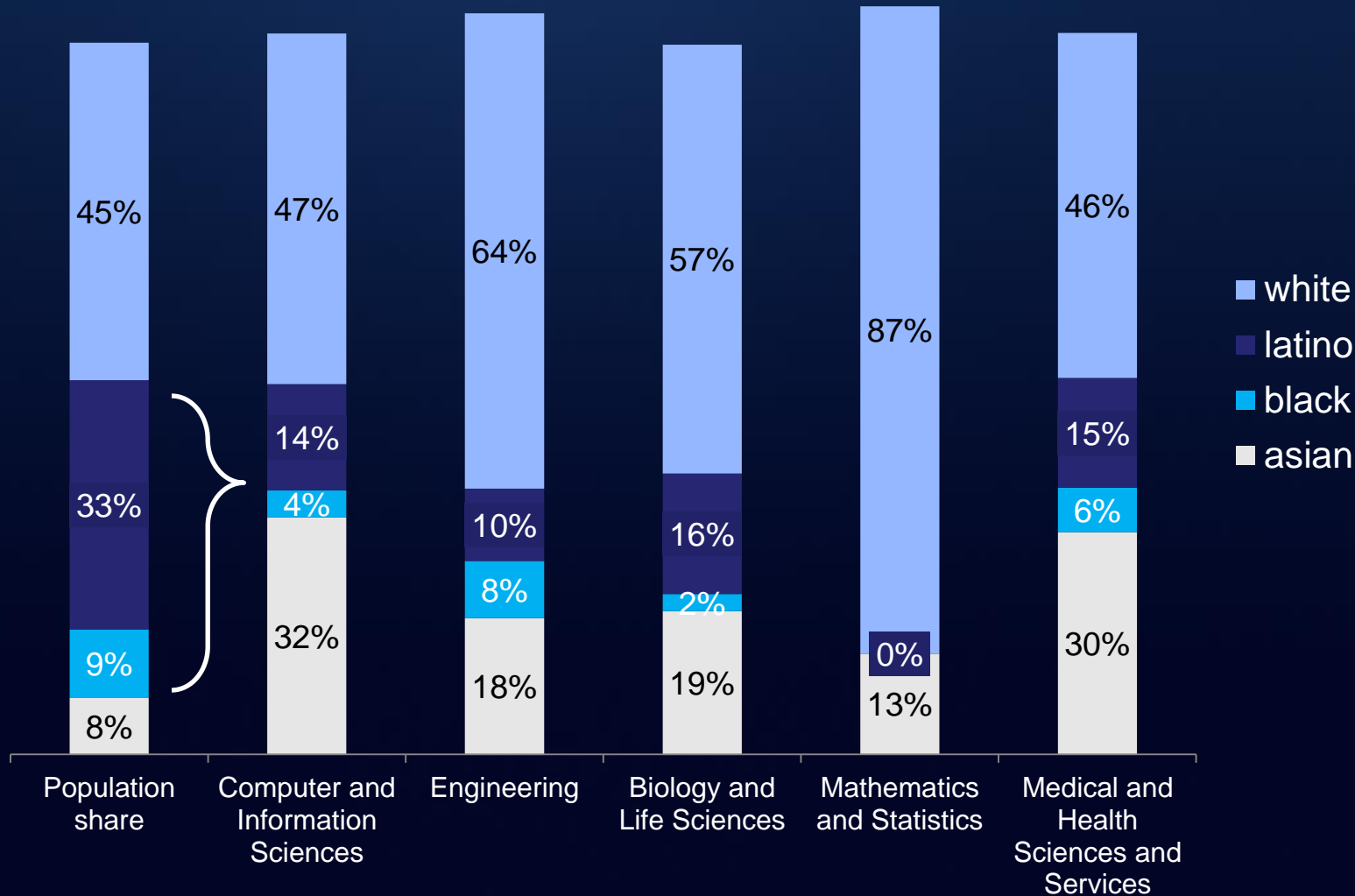
Source: Brookings analysis of 2010-2012 American Community Survey via IPUMS



Closing the STEM opportunity gap will also require elevating STEM completion rates for under-represented young populations, especially African Americans and Latinos

STEM bachelor's degree attainment by field versus population share, by race/ethnicity, 18-30 year-olds, Nevada, 2010-2012

Source: Brookings analysis of 2010-2012 American Community Survey via IPUMS



Why don't more people get STEM training?

1. Success in STEM depends on knowledge acquired as a child. High wage premiums for STEM degree holders don't make parents and teachers better at teaching STEM subjects or children more committed to learning them
2. Switch-out rates are extremely high and correlated with math experience and skill, suggesting inadequate K-12 prep and higher-ed resources
3. Cultural and social barriers prevent many women, blacks, and Latinos from pursuing a STEM degree

How to boost STEM Skills

The to-do list

- 1) Enrich infant/toddler home life
- 2) Improve pre-K to 10th grade quality across the board
- 3) Allow students to take post-secondary level classes during last two years of high school
- 4) Lower cost of college and adopt best practices in retention and completion in higher-education
- 5) Expand access to adult training & improve curriculum alignment with demand

Who Needs to do it

- 1) Non-profits; state & local governments
- 2) Non-profits; state & local governments
- 3) Non-profits; state & local governments
- 4) Governments, non-profits and Higher Ed via innovation, tuition support, tutoring, and mentoring
- 5) Governments; Colleges; Businesses via philanthropic investments, apprenticeships, internships, and on-the-job training

For more information

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www.brookings.edu/metro

Hidden STEM Economy

<http://www.brookings.edu/research/reports/2013/06/10-stem-economy-rothwell>

Still Searching : Job Vacancies and STEM Skills

<http://www.brookings.edu/research/interactives/2014/job-vacancies-and-stem-skills#/M10420>