

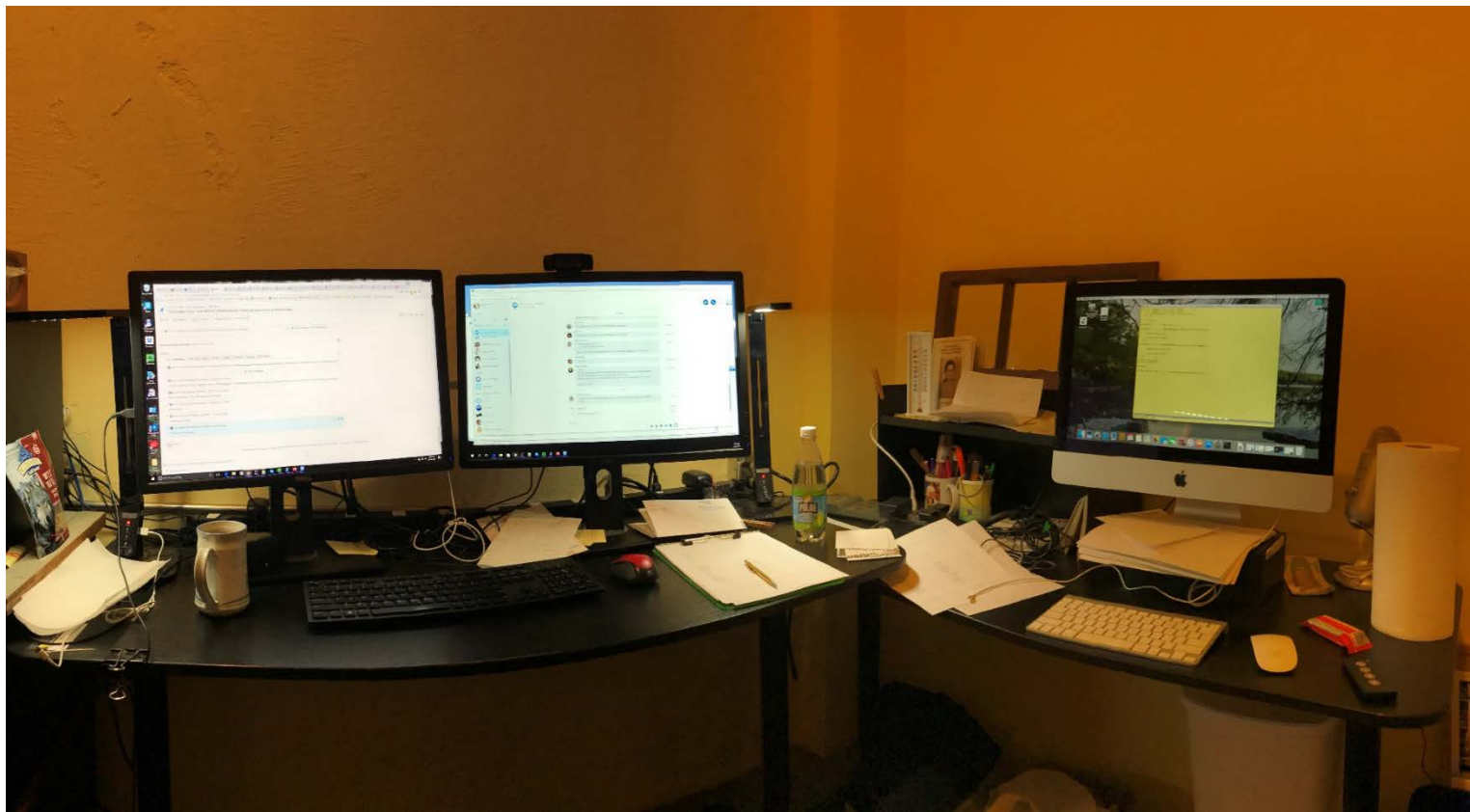


The Changing World of Work

WISE Spring 2017 D12

Course outline

| Date | Topic | Notes |
|------------------------|---|--|
| 3/22 | Introduction | |
| 3/29 | How our institutions are responding: Government and Politics | Guest: Dr. Smriti Rao, Assumption College |
| 4/5 | How our institutions are responding: Education | |
| Note: no class on 4/12 | | |
| 4/19 | How our institutions are responding: Business | Guest: Asima Silva, Master Inventor, IBM |
| 4/25 | What will we do when robots take all of the jobs? | |



About yours truly

Email: kh@queenlake.com

Phone: 508 829 5825

Readings and presentations are available at

<http://queenlake.com/wise/wise-spring-2017/the-changing-world-of-work/>

| | Most Recent | Trough | Pre-Recession Peak |
|-----------------------------------|--------------------|--------------------|--------------------|
| Official Unemployment Rate | 3.2% (Jan 2017) | 8.8% (Jan 2010) | 4.6% (Dec 2007) |
| U-5 Unemployment Rate | 5.0% (Q4 2016) | 10.0% (Q2 2010) | 5.3% (Q1 2008) |
| U-6 Unemployment Rate | 8.1% (Q4 2016) | 15.3% (Q2 2010) | 7.3% (Q4 2007) |
| Total Nonfarm Employment | 3.599M (Jan 2017) | 3.190M (Oct 2009) | 3.332M (Apr 2008) |
| Labor Force Participation Rate | 64.9% (Jan 2017) | 64.6% (Dec 2016) | 67.1% (Sept 2006) |
| Average Weekly Wage (\$2016) | \$1,277 (Q3 2016) | \$1,560 (Q3 2007) | \$1,280 (Q4 2006) |
| Real Gross State Product (\$2009) | \$443.9B (Q3 2016) | \$385.1B (Q3 2009) | \$398.0B (Q1 2008) |

Mass Benchmarks report

The Massachusetts Economy Continues to Perform Well with Several Economic Indicators Outperforming Pre-Recession Highs



Donald J. Trump ✓

@realDonaldTrump

LinkedIn Workforce Report:
January and February were
the strongest consecutive
months for hiring since
August and September 2015

7:11am - 8 Mar 2017 - Twitter for Android

LinkedIn Workforce Report | United States | March
2017



World War Two Rosies celebrated on U.S. day of recognition



'Fearless Girl' statue stares down bronze Wall Street bull



What was your first job?

The American Century

- A hard work and a good job brought you into the middle class.
- College will lead your kids to a better job.
- You are better off than your parents.
- Your kids will be better off than you were.

“My father had one job in his lifetime. I will have six jobs in my lifetime, and my children will have six jobs at the same time.”

- Robin Chase, cofounder of Zipcar

To Save The American Dream, We Have To
Change How We Think About Work
– Fast Company 3/17/2017



The power of asymmetrical events



What did this guy break and how?

Craig Newark, creator of Craigslist, pretty much wiped out the newspaper industry's most profitable product – classified advertising.

Founded in 1995, Revenue: 381 million USD (2015) Number of employees: 30



Who is this guy and what did he do?

Sir Tim Berners-Lee, inventor of the World Wide Web

What business did these guys break?



Inventor of email, Ray Tomlinson

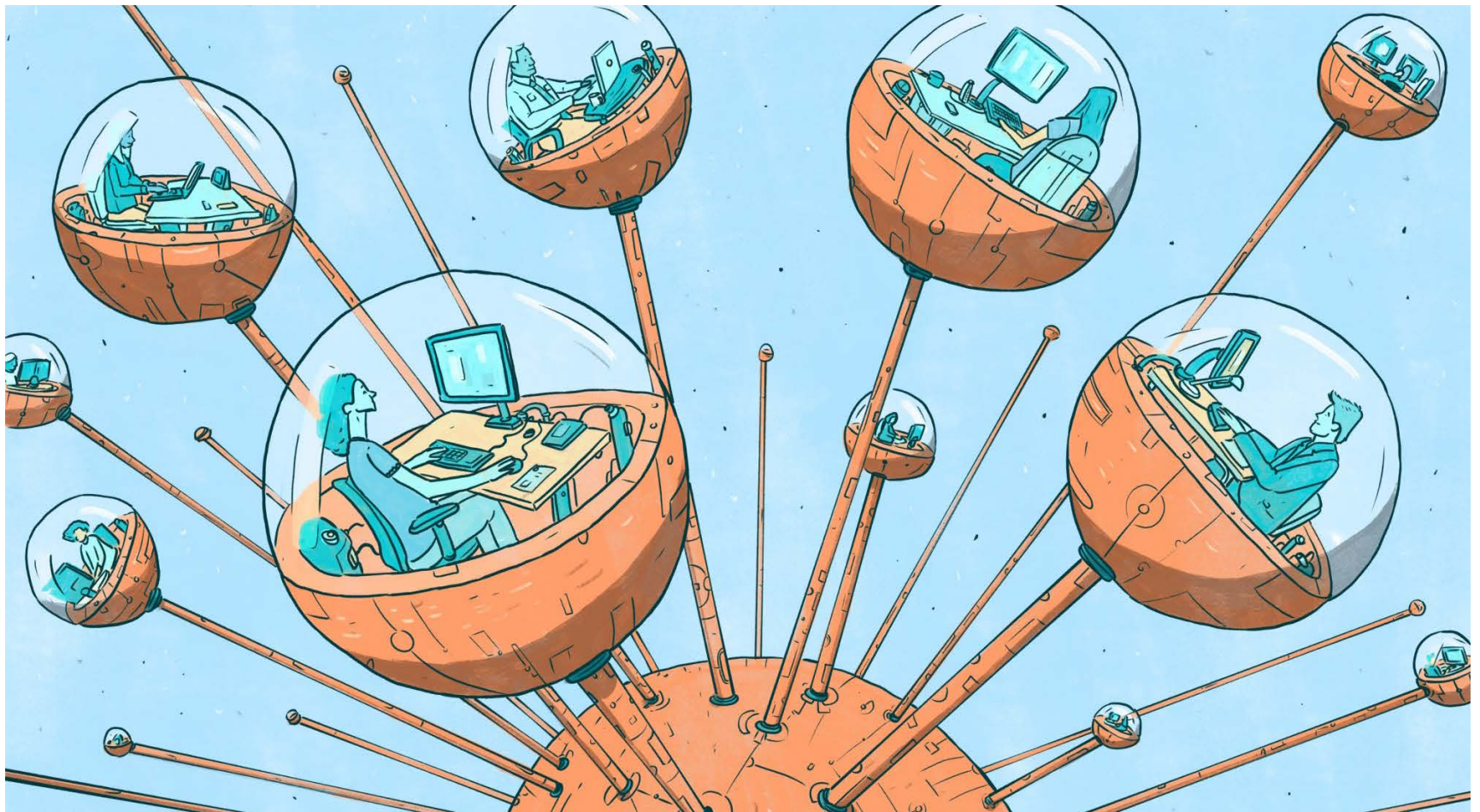


Shiva Ayyadurai says that he invented email

Themes

- ▶ The “sharing economy” leads to increased geographic mobility and entrepreneurial spirit among young workers.
- ▶ Code Camps and STEM education will help to future-proof young people by providing them with needed and salable skills.
- ▶ Wage pressure, including a higher minimum wage, leads to a corresponding increase in outsourcing and robotics.





Where and when you work doesn't matter

How Digital Nomads Went From Niche to Normal

What do these schools have in common?

University of California, Irvine (USA)

- They offer scholarships to play esports, aka video games.
-

- Out Of Bounds: Competitive Video Gaming And Scholarships

Worcester Institute for Senior Education (USA)

Plan to Work Longer and Retire Later

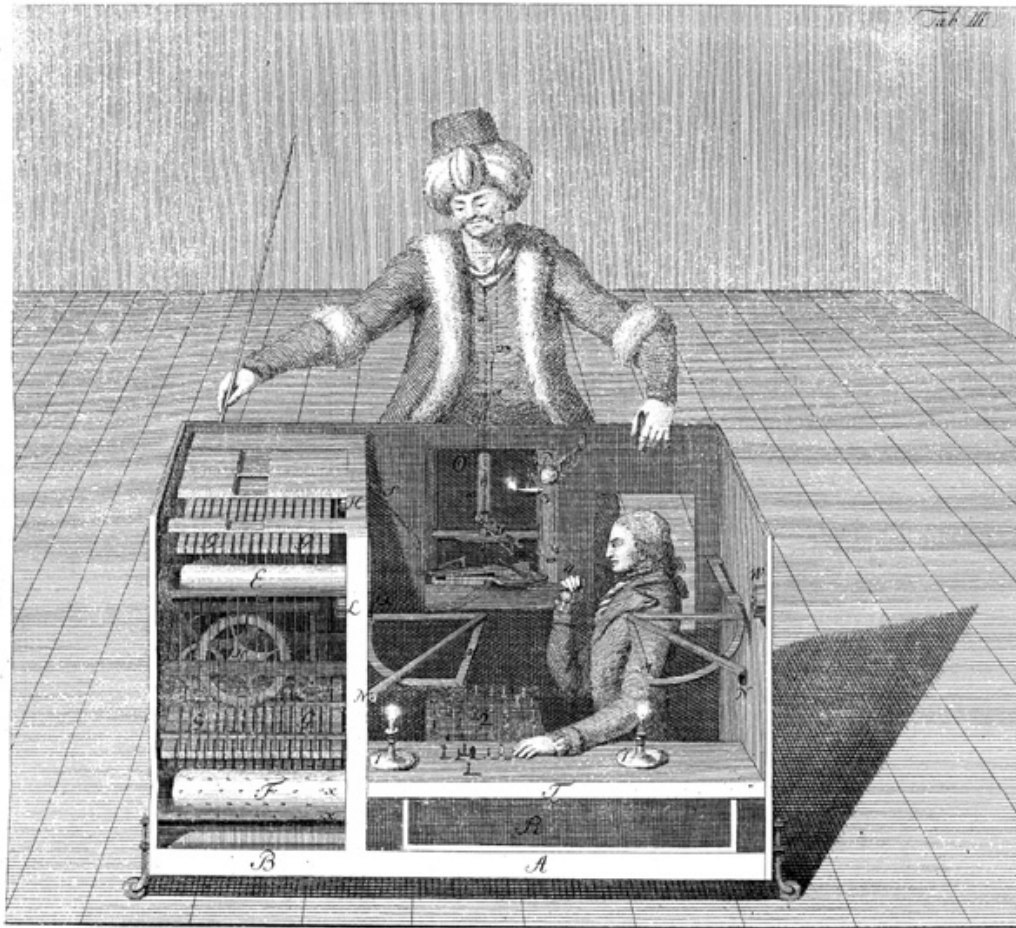
Many workers believe that if they don't have sufficient retirement savings, they can just work longer, earn more money, and retire later. More than one-third (37 percent) of workers expect to retire after age 65, compared to 11 percent in 1991.²⁰ More than half of workers age 40+ plan to work into their 70s because they won't have enough retirement savings to live comfortably.²¹

Fortunately, the Gig Economy offers retirees more opportunities to work. Granny might not be able to hold a full-time corporate job into her 70s, but now there are many other options for her to work part time, at home, and on her own schedule. She can dog sit on [Rover.com](#), host dinners for paying diners through Feastly or EatWith, or rent a room of her house on Airbnb. She can work remotely on administrative or other small tasks on Upwork or as an Amazon Mechanical Turk. She can drive for Uber a few hours a week or babysit through [Care.com](#). In the Gig Economy, retirees looking to supplement Social Security or an underfunded IRA can more easily than ever find flexible (and even home-based) work to generate incremental income.

The Gig Economy is not just for Millennials

[The Gig Economy](#): The Complete Guide to Getting Better Work, Taking More Time Off, and Financing the Life You

by Diane Mulcahy



Amazon's Mechanical Turk

Google's AI outperforms human radiologists in detecting tumors.

"At 8 false positives per image, we detect 92.4% of the tumors, relative to 82.7% by the previous best automated approach. For comparison, a human pathologist attempting exhaustive search achieved 73.2% sensitivity."

"Detecting Cancer Metastases in Gigapixel Pathology Images"

[S]ociety ... makes it possible for me to do one thing today and another tomorrow, to hunt in the morning, fish in the afternoon, rear cattle in the evening, criticise after dinner, just as I have a mind, without ever becoming hunter, fisherman, herdsman or critic.
-- Karl Marx

The German Ideology. 1845



The changing, changing world of work

IBM, once the pioneer of remote work, calls the kids back to the office.

What's wrong with this picture?

| Table 1.6 Occupations with the largest job declines, 2014 and projected 2024 (Numbers in thousands) | | | | | | |
|--|---------|------------|-----------|-----------------|---------|---|
| 2014 National Employment Matrix title and code | | Employment | | Change, 2014-24 | | Median annual wage, 2015 ⁽¹⁾ |
| | | 2014 | 2024 | Number | Percent | |
| Total, all occupations | 00-0000 | 150,539.9 | 160,328.8 | 9,788.9 | 6.5 | \$36,200 |
| Bookkeeping, accounting, and auditing clerks | 43-3031 | 1,760.3 | 1,611.5 | -148.7 | -8.4 | \$37,250 |
| Cooks, fast food | 35-2011 | 524.4 | 444.0 | -80.4 | -15.3 | \$19,080 |
| Postal service mail carriers | 43-5052 | 297.4 | 219.4 | -78.1 | -26.2 | \$58,280 |
| Executive secretaries and executive administrative assistants | 43-6011 | 776.6 | 732.0 | -44.6 | -5.7 | \$53,370 |
| Farmworkers and laborers, crop, nursery, and greenhouse | 45-2092 | 470.2 | 427.3 | -42.9 | -9.1 | \$19,770 |
| Sewing machine operators | 51-6031 | 153.9 | 112.2 | -41.7 | -27.1 | \$22,550 |
| Tellers | 43-3071 | 520.5 | 480.5 | -40.0 | -7.7 | \$26,410 |
| Postal service mail sorters, processors, and processing machine operators | 43-5053 | 117.6 | 78.0 | -39.7 | -33.7 | \$56,740 |
| Cutting, punching, and press machine setters, operators, and tenders, metal and plastic | 51-4031 | 192.2 | 152.7 | -39.5 | -20.6 | \$31,280 |
| Switchboard operators, including answering service | 43-2011 | 112.4 | 75.4 | -37.0 | -32.9 | \$27,440 |
| Molding, coremaking, and casting machine setters, operators, and tenders, metal and plastic | 51-4072 | 129.5 | 97.2 | -32.3 | -25.0 | \$29,340 |
| Computer programmers | 15-1131 | 328.6 | 302.2 | -26.5 | -8.0 | \$79,500 |
| Printing press operators | 51-5112 | 173.0 | 151.4 | -21.6 | -12.5 | \$35,240 |
| Mail clerks and mail machine operators, except postal service | 43-9051 | 104.9 | 85.1 | -19.8 | -18.8 | \$28,570 |
| Bill and account collectors | 43-3011 | 350.4 | 330.9 | -19.6 | -5.6 | \$34,440 |
| Dishwashers | 35-9021 | 507.4 | 487.9 | -19.5 | -3.9 | \$19,340 |
| First-line supervisors of production and operating workers | 51-1011 | 606.9 | 588.2 | -18.7 | -3.1 | \$56,340 |

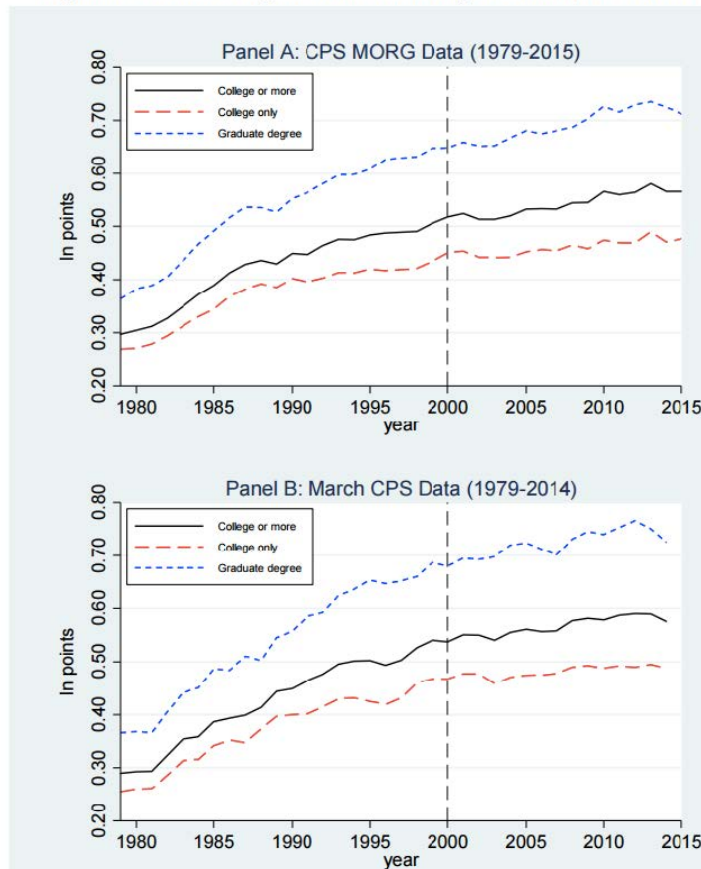
| Table 1.4 Occupations with the most job growth, 2014 and projected 2024 (Numbers in thousands) | | | | | | |
|---|---------|------------|-----------|-----------------|---------|---|
| 2014 National Employment Matrix title and code | | Employment | | Change, 2014-24 | | Median annual wage, 2015 ⁽¹⁾ |
| | | 2014 | 2024 | Number | Percent | |
| Total, all occupations | 00-0000 | 150,539.9 | 160,328.8 | 9,788.9 | 6.5 | \$36,200 |
| Personal care aides | 39-9021 | 1,768.4 | 2,226.5 | 458.1 | 25.9 | \$20,980 |
| Registered nurses | 29-1141 | 2,751.0 | 3,190.3 | 439.3 | 16.0 | \$67,490 |
| Home health aides | 31-1011 | 913.5 | 1,261.9 | 348.4 | 38.1 | \$21,920 |
| Combined food preparation and serving workers, including fast food | 35-3021 | 3,159.7 | 3,503.2 | 343.5 | 10.9 | \$18,910 |
| Retail salespersons | 41-2031 | 4,624.9 | 4,939.1 | 314.2 | 6.8 | \$21,780 |
| Nursing assistants | 31-1014 | 1,492.1 | 1,754.1 | 262.0 | 17.6 | \$25,710 |
| Customer service representatives | 43-4051 | 2,581.8 | 2,834.8 | 252.9 | 9.8 | \$31,720 |
| Cooks, restaurant | 35-2014 | 1,109.7 | 1,268.7 | 158.9 | 14.3 | \$23,100 |
| General and operations managers | 11-1021 | 2,124.1 | 2,275.2 | 151.1 | 7.1 | \$97,730 |
| Construction laborers | 47-2061 | 1,159.1 | 1,306.5 | 147.4 | 12.7 | \$31,910 |
| Accountants and auditors | 13-2011 | 1,332.7 | 1,475.1 | 142.4 | 10.7 | \$67,190 |
| Medical assistants | 31-9092 | 591.3 | 730.2 | 138.9 | 23.5 | \$30,590 |
| Janitors and cleaners, except maids and housekeeping cleaners | 37-2011 | 2,360.6 | 2,496.9 | 136.3 | 5.8 | \$23,440 |
| Software developers, applications | 15-1132 | 718.4 | 853.7 | 135.3 | 18.8 | \$98,260 |
| Laborers, except freight, stock, and material movers, hand | 53-7062 | 2,441.3 | 2,566.4 | 125.1 | 5.1 | \$29,010 |
| First-line supervisors of office and administrative support workers | 43-1011 | 1,466.1 | 1,587.3 | 121.2 | 8.3 | \$52,630 |
| Computer systems analysts | 15-1121 | 567.8 | 686.3 | 118.6 | 20.9 | \$85,800 |
| Licensed practical and licensed vocational nurses | 29-2061 | 719.9 | 837.2 | 117.3 | 16.3 | \$43,170 |
| Maids and housekeeping cleaners | 37-2012 | 1,457.7 | 1,569.4 | 111.7 | 7.7 | \$20,740 |
| Medical secretaries | 43-6013 | 527.6 | 635.8 | 108.2 | 20.5 | \$33,040 |
| Management analysts | 13-1111 | 758.0 | 861.4 | 103.4 | 13.6 | \$81,320 |
| Heavy and tractor-trailer truck drivers | 53-3032 | 1,797.7 | 1,896.4 | 98.8 | 5.5 | \$40,260 |
| Receptionists and information clerks | 43-4171 | 1,028.6 | 1,126.3 | 97.8 | 9.5 | \$27,300 |
| Office clerks, general | 43-9061 | 3,062.5 | 3,158.2 | 95.8 | 3.1 | \$29,580 |
| Sales representatives, wholesale and manufacturing, | | | | | | |

Table 8: Estimated Undergraduate Enrollment at Four-Year Institutions
by Classification of Instructional Program Family

| CIP Family Code | CIP Family Title | FALL 2016 | | FALL 2015 |
|-----------------|---|------------|--------------------------|------------|
| | | Enrollment | % Change from Prior Year | Enrollment |
| 52 | Business, Management, Marketing, and Related Support | 1,639,373 | 4.2% | 1,659,647 |
| 24 | Liberal Arts and Sciences, General Studies and Humanities, (includes undeclared) | 1,289,296 | 4.7% | 1,231,558 |
| 51 | Health Professions and Related Programs | 1,142,636 | 0.0% | 1,149,576 |
| 26 | Biological and Biomedical Sciences | 601,572 | 1.6% | 592,175 |
| 14 | Engineering | 601,119 | 4.0% | 578,127 |
| 13 | Education | 481,740 | -3.2% | 497,775 |
| 42 | Psychology | 438,391 | -3.2% | 452,941 |
| 45 | Social Sciences | 427,572 | -1.8% | 434,159 |
| 11 | Computer and Information Sciences and Support Services | 406,889 | -0.2% | 407,834 |
| 50 | Visual and Performing Arts | 384,247 | 0.5% | 410,464 |
| 09 | Communication, Journalism, and Related Programs | 325,973 | -2.9% | 335,815 |
| 43 | Homeland Security, Law Enforcement, Firefighting, and Related Protective Services | 300,666 | -6.0% | 319,872 |
| 30 | Multi/Interdisciplinary Studies | 245,247 | -3.0% | 252,876 |
| 31 | Parks, Recreation, Leisure and Fitness Studies | 234,763 | -0.6% | 236,219 |
| 40 | Physical Sciences | 153,082 | -1.6% | 155,605 |
| 23 | English Language and Literature/Letters | 146,898 | -3.9% | 152,822 |
| 44 | Public Administration and Social Service Professions | 144,546 | 0.8% | 145,750 |
| 15 | Engineering Technologies and Engineering-Related Fields | 108,420 | -14.5% | 126,768 |
| 19 | Family and Consumer Sciences/Human Services | 108,552 | 7.0% | 108,103 |
| 01 | Agriculture, Agriculture Operations, and Related Sciences | 93,442 | 1.2% | 92,358 |
| 27 | Mathematics and Statistics | 87,164 | 1.4% | 85,958 |
| 54 | History | 85,302 | -3.3% | 88,243 |

And this ...

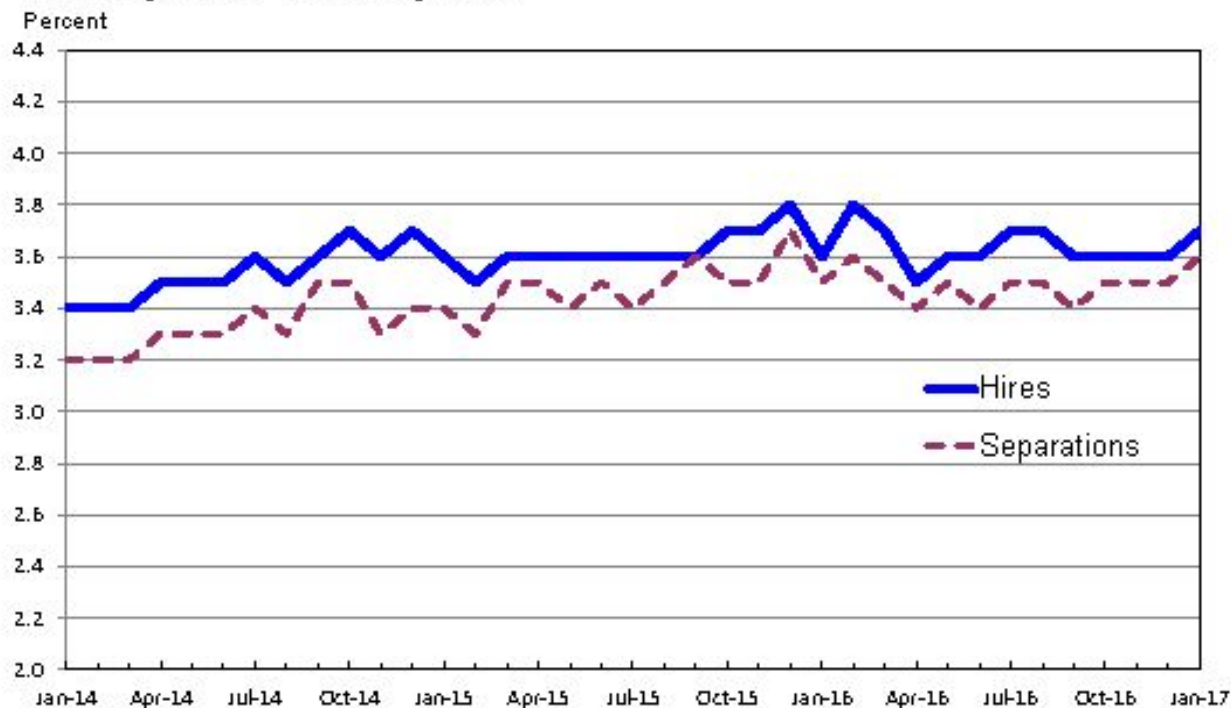
Figure 1: Estimated Higher Education Wage Premium, 1979-2015



And this ...

Future Trends in Technology and Education - February 2017

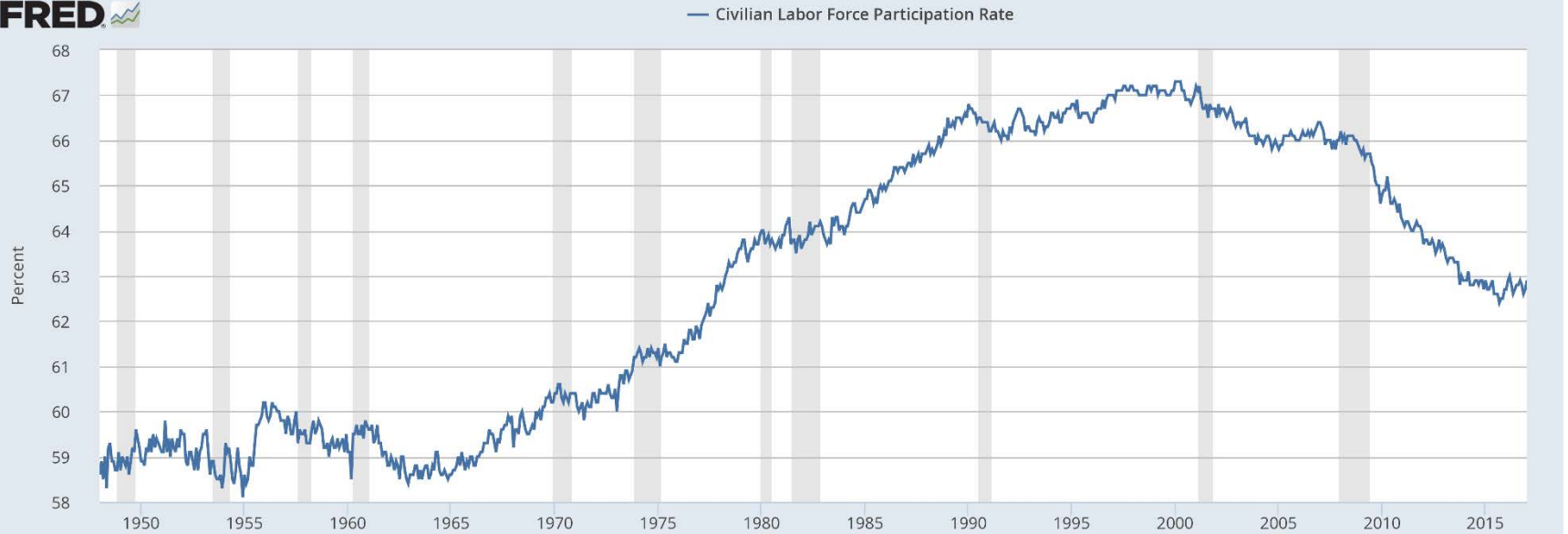
Chart 2. Hires and total separations rates, seasonally adjusted, January 2014 - January 2017



Job Openings and Labor Turnover– January 2017

"The annual number of hires at 62.7 million in 2016 was essentially the same as in 2015. The annual number of quits at 36.1 million **increased** in 2016 while the annual number of layoffs and discharges at 19.9 million declined."

FRED



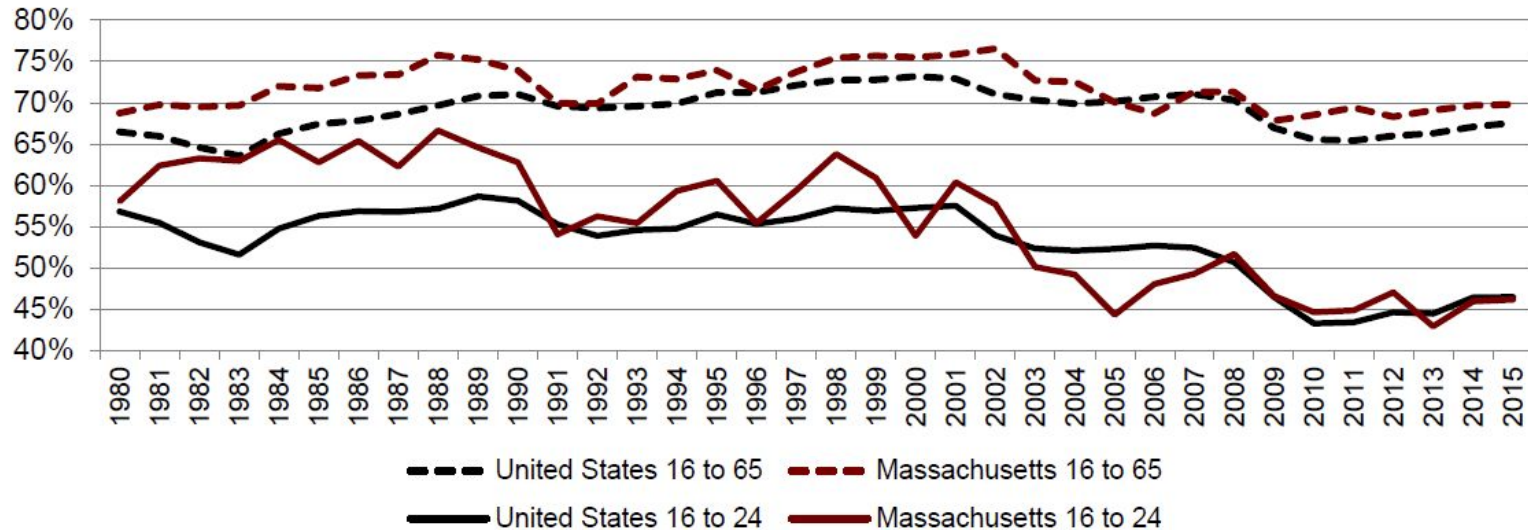
Source: U.S. Bureau of Labor Statistics
fred.stlouisfed.org

myf.red/g/cABh

Labor Force Participation is declining

Federal Reserve Economic Data – Federal Reserve of St. Louis

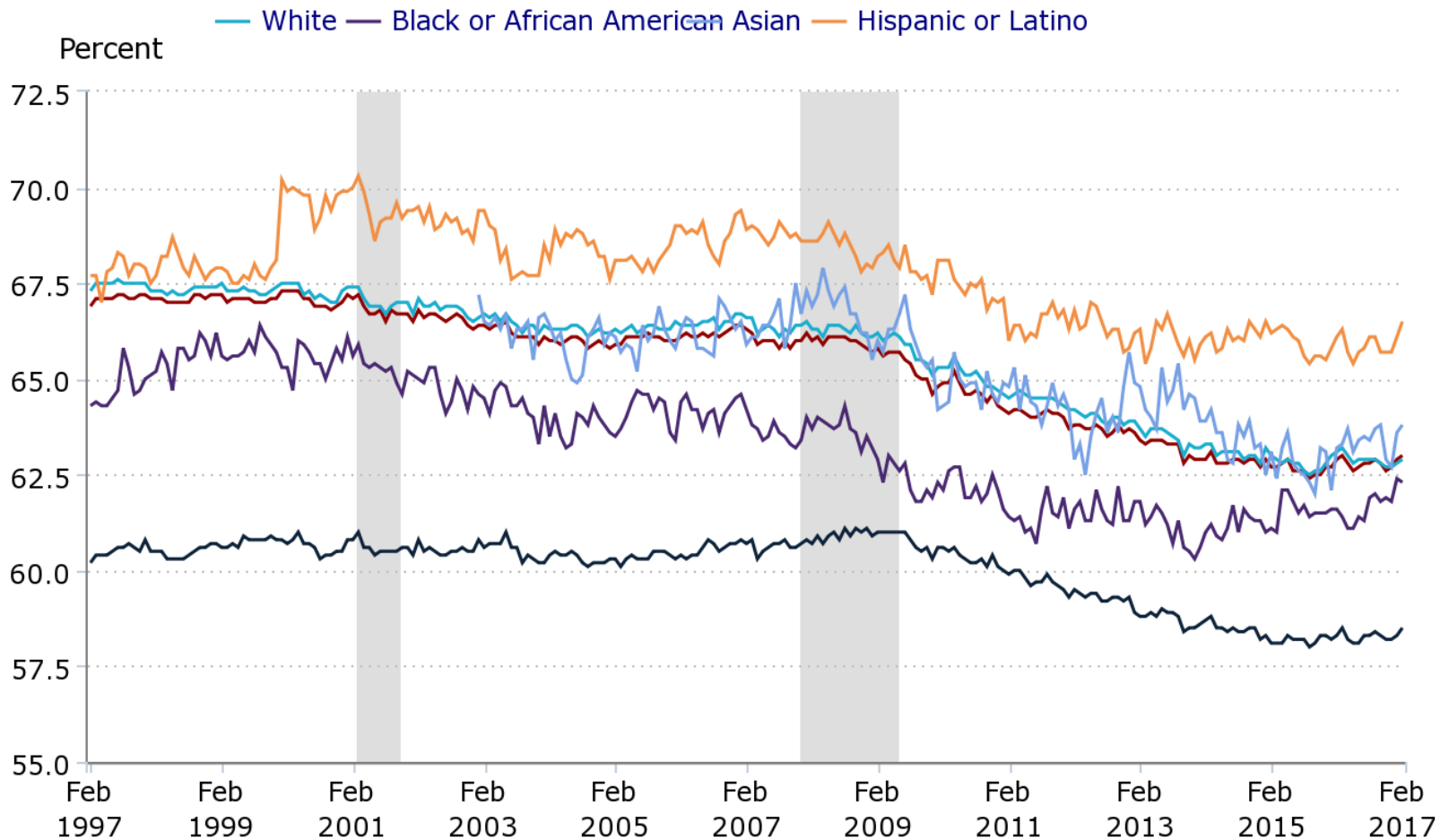
Figure 1. Employment Rate (1980 to 2015)



Source: Current Population Survey (CPS) 1980-2015, UMass Donahue Institute, Economic Public Policy Research Group

In Mass., young people are leaving the workforce

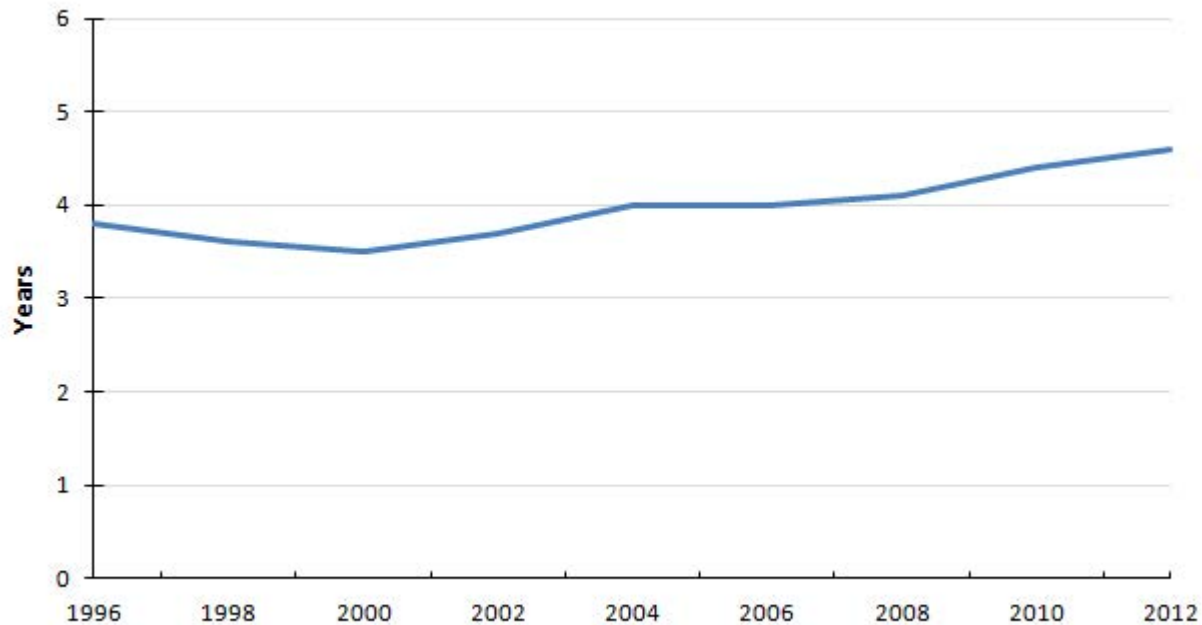
The Young Adult Labor Force in Massachusetts



But may have stopped getting worse

Civilian labor force participation rate

Median years of tenure with current employer for all wage and salary workers, 1996–2012



Source: U.S. Bureau of Labor Statistics.

People are staying in their jobs longer

The evolution of this course

- Then:
 - Remote work has changed work.
 - Kids will leverage their technology skills to make new skills for themselves.
 - It'll be a race against the robots and the lower classes are in trouble.
- Now:
 - Companies want to see people in the office
 - Kids aren't going to college. Those who go aren't finishing. Those who finish aren't read for work. Those who are ready for work are broke.
 - It'll be a race against the robots and everyone is in trouble.
 - People, particularly young men and men of color, are leaving the workforce and we don't know why,

There has always been uncertainty. What's different now?

- Technological advancement may have outstripped our ability to adapt.
 - Schools
 - Government
 - Businesses
 - Culture
- Labor productivity has risen steadily in 1970, but employment started to decline in 1990,
 - ([The Second Machine Age](#) by Erik Brynjolfsson and Andrew McAfee)

At risk for automation

- Low-end, minimum wage
 - Fast-food
 - Hospitality (room-cleaning, maintenance)
- Middle class
 - Truck drivers
 - Construction and manufacturing
- High-end, big bucks
 - Wall Street traders
 - Doctors – primary care, surgeons

The factory of the future will have only two employees, a man and a dog. The man will be there to feed the dog. The dog will be there to keep the man from touching the equipment.

Warren Bennis

MY BRAIN HURTS



Questions?