Financial Benefits to a University of Hawaii Education

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EXECUTIVE SUMMARY

Each year in the State of Hawaii, over 11,000 graduating seniors must decide whether to attend college or join the workforce. This report estimates the potential rate of return for associate's degrees, bachelor's degrees, and post-graduate degrees from the University of Hawaii (UH) system using a standard approach. Adjusting for inflation and considering a typical senior graduating high school in 2016 that continues to reside in Hawaii,

- An associate's degree from a UH community college has a rate of return of 10.8% for men due to an expected increase in lifetime earnings of almost $300 thousand. Women see a similar rate of return of 10.7% due to an expected increase in lifetime earnings of nearly $400 thousand.
- A bachelor's degree from UH has a rate of return of 13.5% for men due to an expected increase in lifetime earnings of $1.5 million. Women see a lower rate of return of 10% with an expected increase in lifetime earnings of $640 thousand.
- A post-graduate degree from UH has a rate of return of 13.5% for men due to an expected increase in lifetime earnings of $2.9 million. Women see a lower rate of return of 9.7% with an expected increase in lifetime earnings of $1 million.
- Overall, the rate of return to a UH degree for those who continue to reside in Hawaii is approximately 11%. On average, for each $1 a UH student invests in their associate's degree, they receive $13.84 in increased lifetime earnings. For bachelor's and post-graduate degrees, the effective lifetime returns on each $1 are $11.09 and $8.65, respectively.
- On average, an adult with an associate's degree makes $360,000 more than a high school graduate over a lifetime of living and working in Hawaii. This lifetime earnings gap is $950,000 for an adult with a bachelor's degree and $1,560,000 for an adult with a post-graduate degree.

INTRODUCTION

The State of Hawaii produces around 11,000 high school graduates annually[1]. These graduates have an important decision to make, whether to go to college or to enter the workforce. In the short term, going to college is costly. These costs include tuition, supplies, and foregone wages. In the long term, the investment in college pays off handsomely through a lifetime of higher earnings. College graduates also receive nonpecuniary benefits including work-related fringe benefits, better health, and higher levels of self-reported life satisfaction[2].

This report estimates the financial benefit to a University of Hawaii education[3] and the potential rate of return to associate's, bachelor's, and post-graduate degrees for a typical University of Hawaii student who continues to reside in Hawaii after graduation. The rate of return is calculated using an expected stream of future earnings. Since nonpecuniary benefits are not considered, these estimates should be viewed as lower bounds on the expected returns to attaining a degree from the University of Hawaii system.

DATA

We use data from the Current Population Survey (CPS) administered by the Census Bureau to estimate life-cycle earnings for holders of high school, associate's, bachelor's, and post-graduate degrees. Our sample covers CPS data from 2000-2015. We include individuals in the working population ages 15-75 with positive earnings. All costs and weekly earnings are in real terms deflated by the Bureau of Labor Statistic's US Consumer Price Index (CPI)[4]. We subset the data for different specifications by gender and education level, i.e. high school graduates, associate's degree holders, bachelor's degree holders, and post-graduate degree holders. Table 1 in the appendix provides summary statistics of our sample.

We obtain the data on tuition costs and fees from the University of Hawaii system. We make the assumption that an associate's degree student will take three years to complete a degree, a bachelor's degree student will take five years to complete a degree, and a post-graduate student will take five undergraduate plus three graduate school years to complete a degree. Bachelor's and post-graduate tuition and fees come from the University of Hawaii at Manoa. Associate's degree tuition and fees

[1] Source: National Center for Education Statistics (http://nces.ed.gov/ccd/tables/2009-10_Dropout_and_completer_data_for_100_LSD_table.asp).
[2] Oreopoulos and Salvanes (2011) provide a survey of the research on the nonpecuniary returns to higher education.
[3] We do not directly observe earnings for UH graduates. Instead, we estimate average returns to education for Hawaii residents and assume these returns are independent of the degree granting institution. Alternatively, the return to a UH education is in the middle of the distribution of returns that are dependent on the quality and reputation of the institution.
[4] Over this sample our use of the national CPI simplifies our estimation procedure at the cost of over-estimating real earnings for HI relative to estimates using the metro/regional CPIs.

come from Kapiolani Community College. We use currently published tuition and fees through 2019. For 2020 and beyond, we assume a 2% nominal growth rate to calculate estimated future tuition, while fees are kept the same. Future CPI estimates come from the Congressional Budget Office's quarterly inflation projections for August 2016. We average quarterly estimates to obtain a yearly value. Table 2 in the appendix presents the tuition and fees projections.

RESULTS

To estimate the returns to education we consider the case of a hypothetical 18-year-old Hawaii resident in 2016. We project their earnings over their working life for alternative levels of educational attainment. The details of our methodology are described in the appendix.

The benefits of investing in education beyond high school come in the form of higher earnings, while the costs include tuition, fees, and forgone earnings while in school. These costs explain why the life-cycle earnings for individuals that choose higher education is initially lower (see figure A).

In figure B we plot the benefits of higher education, increased lifetime earnings relative to the high school level, and the costs, tuition, fees, and forgone earnings. Across all levels of higher educational attainment, the lifetime benefits vastly outweigh the costs

In table 1 we calculate the internal rate of return (IRR) for the series of net benefits at each education level. The typical rate of return is approximately 11%. For men investment in an associate's

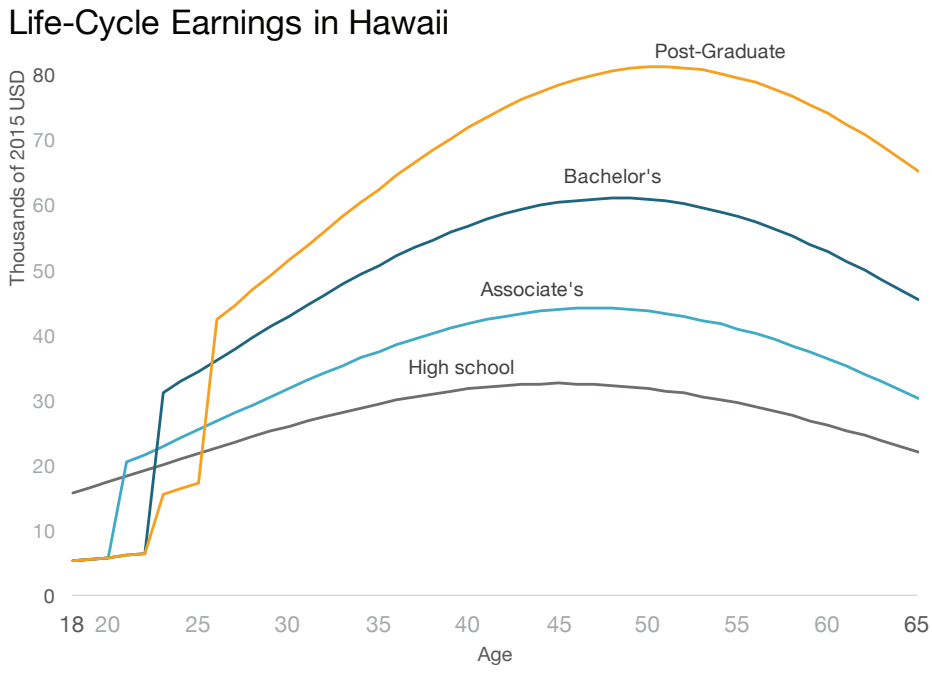

FIGURE A: PROJECTED WAGES BY DEGREE EARNED

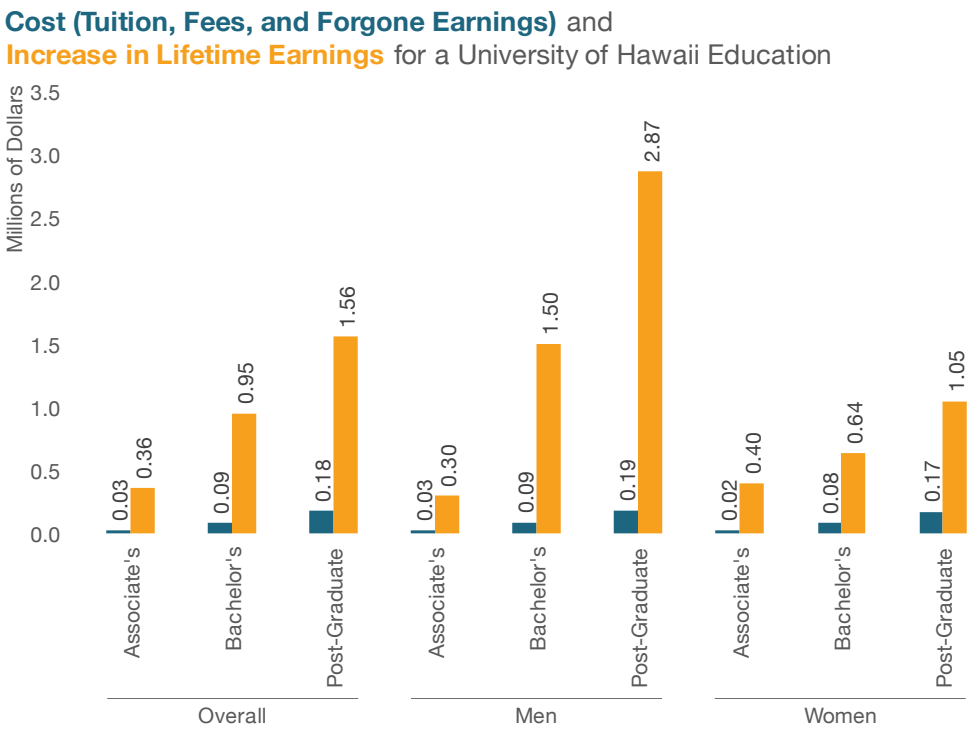

FIGURE B: TRADEOFFS FOR MEN AND WOMEN BY DEGREE EARNED

TABLE 1: POTENTIAL INTERNAL RATE OF RETURN FOR DEGREE EARNED BY GENDER

	Overall	Female	Male
Associates	10.6%	10.8%	10.7%
Bachelor's	11.2%	13.5%	10.0%
Post-Graduate	10.8%	13.5%	9.7%

degree has a return of 10.8% while both bachelor's and post-graduate degrees have returns of roughly 13.5%. For women investment in an associate's degree has a return of 10.7% with slightly lower returns of 10% and 9.7% for bachelor's and post-graduate degrees respectively. Despite differences between men and women, our results suggest that the return on investment for all levels of higher education for Hawaii residents are likely to be very high.

The estimates presented in the current report are lower than previous estimates for Hawaii (UHERO, 2000). The previous estimates relied on lifetime earnings estimated by extrapolating the economic expansion that occurred from 1992 to 1999. The current report uses a larger set of observations from 2000 through 2015, and includes the Great Recession. Autor (2014) shows that the median earnings gap between college and high school degree holders grew more over the period from 1992 to 1999 than for the period from 2000 through 2012. The more rapidly expanding earnings gap during the sample period of the previous report explains their higher estimated returns.

Our estimates of potential internal rates of return (IRR) between 10% and 14% are consistent with previous findings in the US and abroad. Using the 1990 Decennial Census, Heckman et al. (2006) found an IRR for a bachelor's degree of 14%. Using a comparable methodology, Bhuller et al. (2014) estimate the IRR for higher education in Norway is 7%. Using alternative model specifications, they find larger IRR estimates between 10% and 14%.

NONPECUNIARY RETURNS

Beyond simply increasing wages, education affects social opportunity and, for many, the selection of a marriage partner. Bruze (2015) suggests that 30 percent of the returns to schooling in middle age are acquired through marriage. His results are predicated on the assumption that marriage generates a surplus, which is a standard assumption for marriage matching models.

Oreopoulos and Salvanes (2011) survey the growing literature on nonpecuniary returns to schooling. These returns include life satisfaction, voting participation, and whether one's oldest child is behind grade level. Their conclusion is that post-secondary schooling has a significant effect across a wide variety of non-pecuniary benefits. As a result, studies focused on pecuniary returns, such as the current report, understate the full economic benefits to post-secondary schooling.

SUMMARY

The returns to higher education we estimate suggest a college degree is an excellent investment. Receiving a college degree provides a lifetime of higher earnings. For a typical Hawaii resident, the rate of return for an associate's degree is 10.8% ($300 thousand in lifetime earnings) for men and 10.7% ($400 thousand) for women. The rate of return is 13.5% ($1.5 million) for a bachelor's degree and 13.5% ($2.9 million) for a post-graduate degree. For women the rate of return is 10.0% ($640 thousand) for a bachelor's degree and 9.7% ($1 million) for a post-graduate degree. Since completing a college degree provides a wealth of nonpecuniary benefits, these estimates should be viewed as conservative.

REFERENCES

Ashenfelter, Orley, and David Card. 2010. *Handbook Of Labor Economics*, Vol. 4A. Vol. 4. Elsevier.

Autor, D. H. "Skills, Education, and the Rise of Earnings Inequality Among the 'Other 99 Percent.'" *Science* 344, no. 6186 (May 22, 2014): 843–851.

Bhuller, M., Mogstad, M., & Salvanes, K. G. (2014). "Life Cycle Earnings, Education Premiums and Internal Rates of Return" (Working Paper No. 20250). National Bureau of Economic Research.

Bruze, Gustaf. 2015. "Male and Female Marriage Returns to Schooling." *International Economic Review* 56 (1). Wiley-Blackwell: 207–34. doi:10.1111/iere.12100.

Cellini, S. R., and Chaudhary, L. (2014). "The labor market returns to a for-profit college education." *Economics of Education Review*, 43, 125 – 140.

Heckman, J. J., Lochner, L. J., & Todd, P. E. (2006). Chapter 7 Earnings Functions, Rates of Return and Treatment Effects: The Mincer Equation and Beyond. In E. Hanushek & F. Welch (Eds.) (Vol. 1, pp. 307 – 458). Elsevier.

Jepsen, C., Troske, K., & Coomes, P. (2014). The Labor-market returns to community college degrees, diplomas, and certificates. *Journal of Labor Economics*, 32(1), 95–121.

Mincer, Jacob A. 1974. "Schooling and Earnings." *Schooling, Experience, and Earnings*. NBER, 41–63.

Oreopoulos, Philip, and Kjell G Salvanes. 2011. "Priceless: The Nonpecuniary Benefits of Schooling." *Journal of Economic Perspectives* 25 (1). American Economic Association: 159–84. doi:10.1257/jep.25.1.159.

University of Hawaii Economic Research Organization (UHERO). 2000. "Economic Impact of the University of Hawai'i System." Technical Report.

TECHNICAL APPENDIX

DATA

We use data from the Current Population Survey (CPS) administered by the Census Bureau. The CPS samples approximately 60,000 occupied households in the US on the calendar week that contains the 19th day of the month, where questions refer to the previous week that includes the 12th day of the month. A household is sampled for 4 consecutive months, leaves the sample for 8 months, and then returns for 4 more months before permanently exiting the sample. All 50 states and the District of Columbia are sampled. The survey itself is computerized with additional questions conducted through telephone interviews. Eligible participants must be 15 years old or over, not serving in the Armed Forces or in an institution. There is no upper age limit and full-time students are counted the same as non-students. The "reference person" is the eligible member of the household who answers questions on behalf of everyone in the household. The "reference" individual will usually own or rent the housing location. Questions from the survey include topics about work activity, income, and school enrollment among others.

Table 2 presents descriptive statistics covering the CPS sample used in this report. Average weekly earnings are in constant 2015 USD. Table 3 provides the annual projections we estimated for tuition costs and fees.

TABLE 2: CPS SAMPLE SUMMARY

		Age		Weekly Earnings		Observations	
		US	HI	US	HI	US	HI
High School	Male	40	39	$707.10	$670.40	418505	6526
	Female	43	42	$489.10	$515.40	369966	5481
Associate's	Male	42	43	$900.90	$869.60	122315	2156
	Female	43	44	$632.20	$723.80	153557	2369
Bachelor's	Male	41	44	$1211.00	$1114.00	272893	3871
	Female	40	42	$851.10	$841.30	288104	4583
Post-Graduate	Male	46	50	$1583.00	$1412.00	144680	1572
	Female	44	45	$1136.00	$1100.00	145643	1978

TABLE 3: TUITION AND FEES PROJECTIONS

	2018-2019	2017-2018	2018-2019	2019-2020	2020-2021	2021-2022	2022-2023	2023-2024
Tuition ($)								
Associate's	1,512	1,512	1,542					
Bachelor's	5,436	5,544	5,652	5,765				
Post-Graduate	5,436	5,436	5,544	5,652	5,765	8,115	8,277	8,443
Fees ($)								
Associate's	60	60	60					
Bachelor's	430	430	430	430	430			
Post-Graduate	430	430	430	430	430	440	440	440

For each level of educational attainment, we calculate a series of net benefits:

$$\hat{b}_t^j = \hat{Earnings}_t^j - \hat{Earnings}_t^{HS} - tuition_t^j, j = AA, BA, POST, t = 18, \ldots, 65$$

where $\hat{Earnings}_t^j$ are the projected earnings at age t for education level j (associate's, bachelor's, or post-graduate degree), $\hat{Earnings}_t^{HS}$ are the projected earnings at age t for the high school education level, and $tuition_t^j$ is the tuition and fees spent for education level j at age t. Initially these net benefits are negative, while in school the individual forgoes a portion of their earnings relative to working full-time and while also paying tuition and fees. However, after graduating their earnings are higher than they would have been with only a high school degree, resulting in positive benefits that accrue over their working life. We calculate the internal rate of return (IRR) of this series of net benefits to measure the returns to education.

To project earnings by education level we separate the CPS data by education level and gender then estimate a variation of Mincer's human capital earnings function (Mincer, 1974; Ashenfelter and Card, 2010):

$$lnEarnings_i = \beta_0 + \beta_1 Age_i + \beta_2 Age_i^2 + \beta_3 HI_i + \beta_4 t + \beta_5 Age_i HI_i + \beta_6 Age_i^2 HI_i + \beta_7 HI_i * t \quad (1)$$

where $lnEarnings_i$ is the natural log of real (inflation-adjusted) weekly earnings for observation i, Age_i, and Age_i^2 are the age and squared age of the respondent, HI_i is a dummy variable equal to 1 if the respondent lives in Hawaii and 0 if they do not, and t is a time trend. The Age and Age^2 terms capture how earnings change over the individual lifecycle and the time trend captures how wages at each education level have evolved over time. By including the Hawaii dummy variable and interacting it with both the age terms and the time trend, we allow for differences between Hawaii and the US overall in both the average wages, the lifecyle path of earnings, and the trend rates in wage growth.

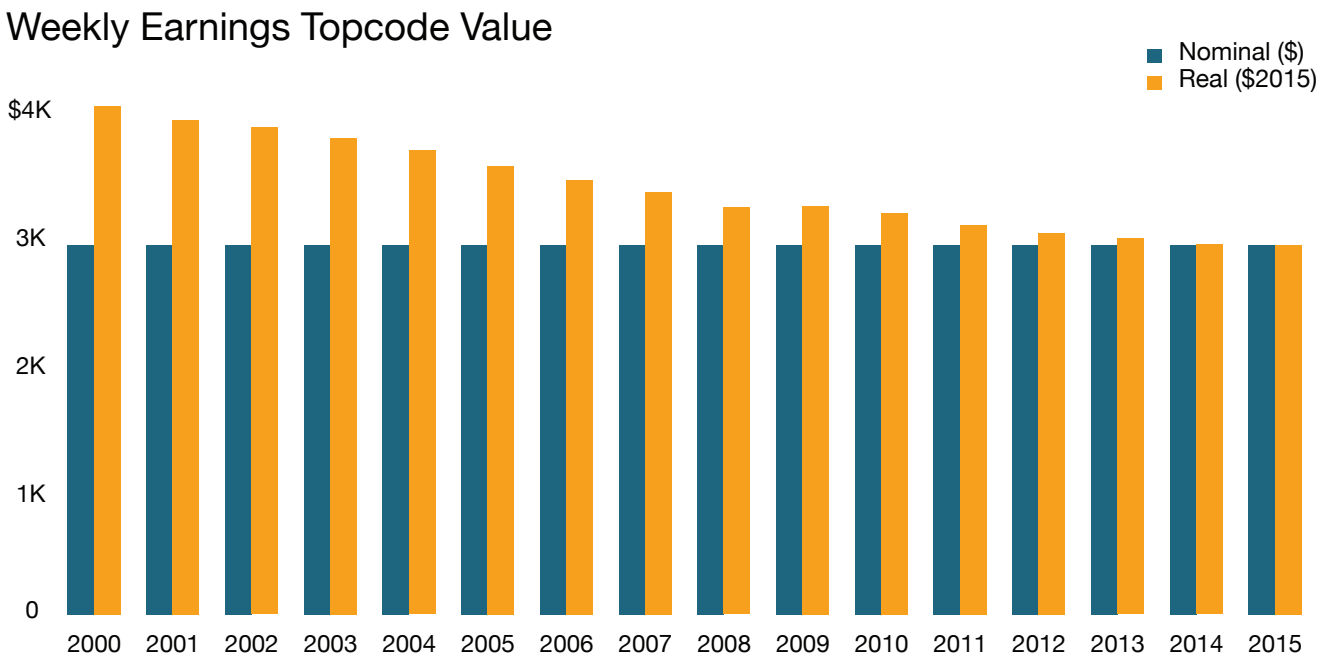

FIGURE C: CENSORING IN REAL WEEKLY EARNINGS DATA OVER TIME

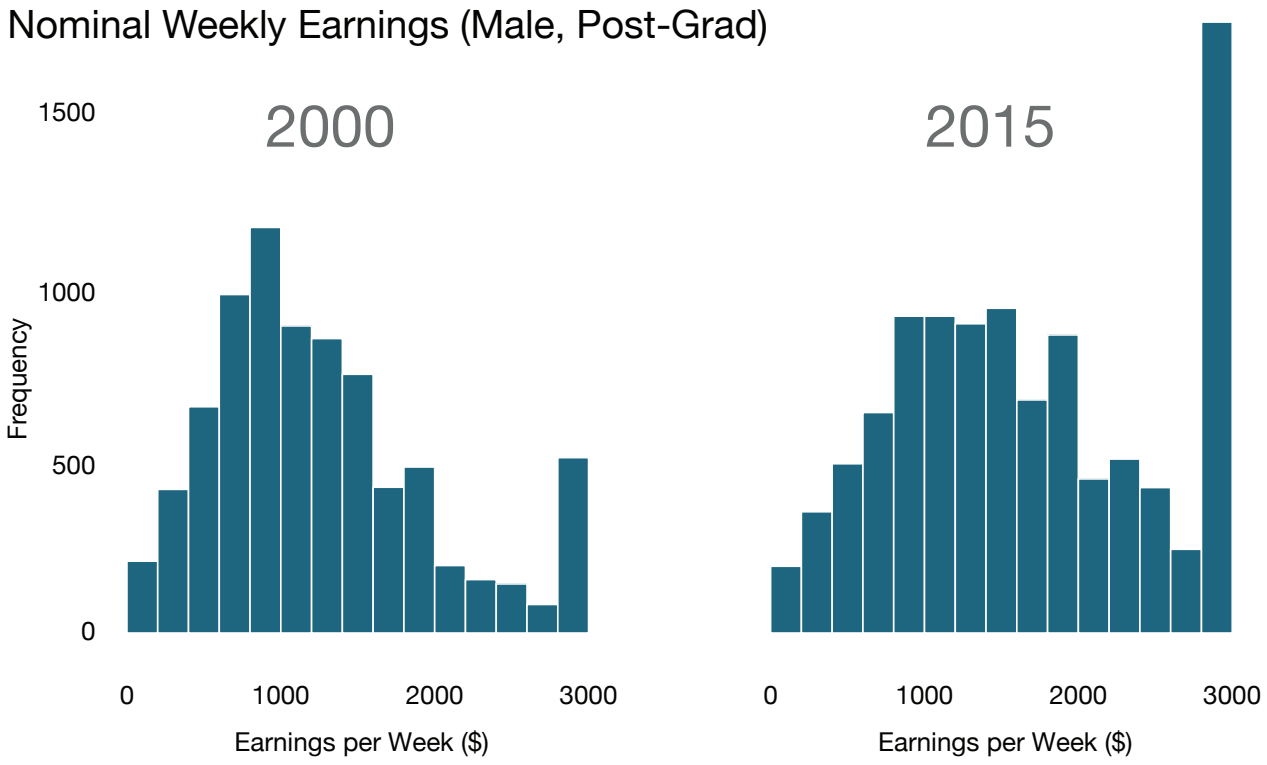

FIGURE D: NOMINAL WEEKLY EARNINGS OF MEN WITH POST-GRADUATE DEGREES (2000 VS 2015)

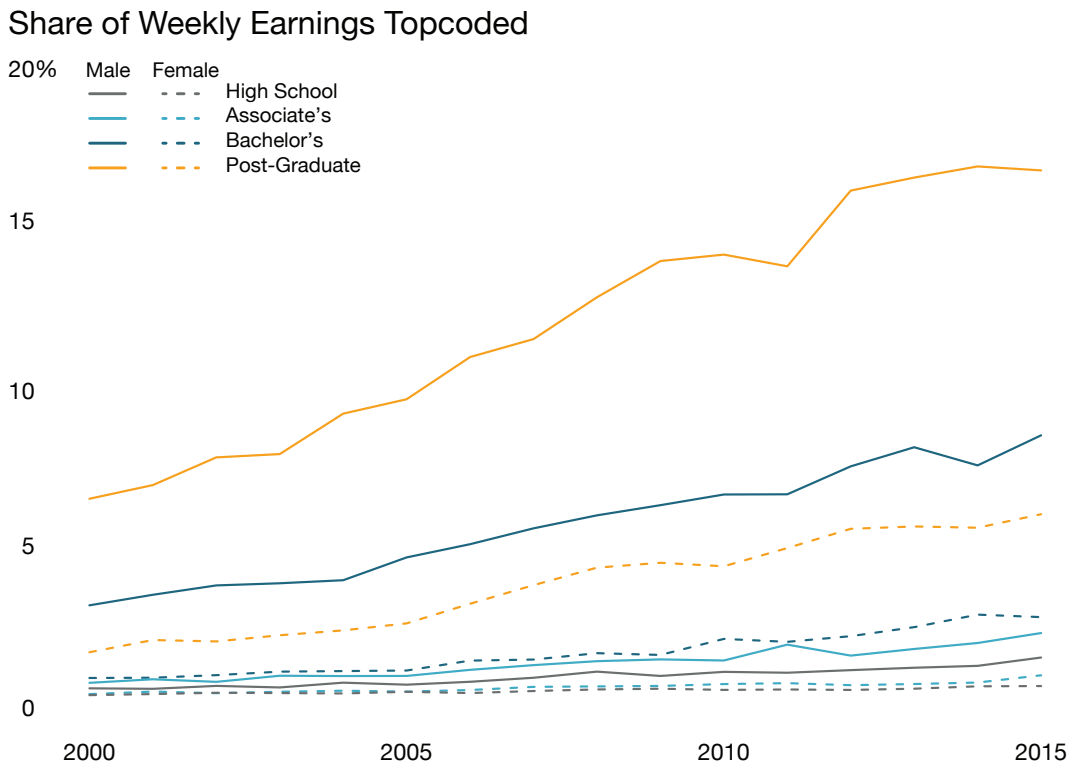

FIGURE E: SHARE OF WEEKLY EARNINGS TOPCODED

We estimate equation 1 using a Tobit regression to account for censoring of the wage data in the CPS. Weekly earnings in the CPS are top-coded at $2884.61; if any respondent reports weekly earnings more than $2884.61, the actual reported value in the data will only be $2884.61. Additionally, the topcoding threshold has remained constant over our entire sample period while the overall price level has increased, meaning that the real (inflation-adjusted) topcoded value has fallen over time. Figure C plots the topcoding threshold in both nominal and real terms over time. As the real topcoding threshold has fallen, we would expect a larger portion of our observations would be censored, especially in high earning groups. In figure D we compare the distribution of weekly earnings for men with post-graduate degrees in 2000 and 2015, we see a substantial shift in the distribution with much more substantial bunching at the threshold.

In figure E we plot the share of our observations that are topcoded by year and education level. Solid lines correspond to males and dashed lines correspond to females. If a large portion of our observations are topcoded, then estimating equation 1 with standard OLS may not fully capture the high wages earned by individuals with high levels of education. The Tobit regression allows us to account for the fact that for some high earners their true earnings are unobserved.

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