



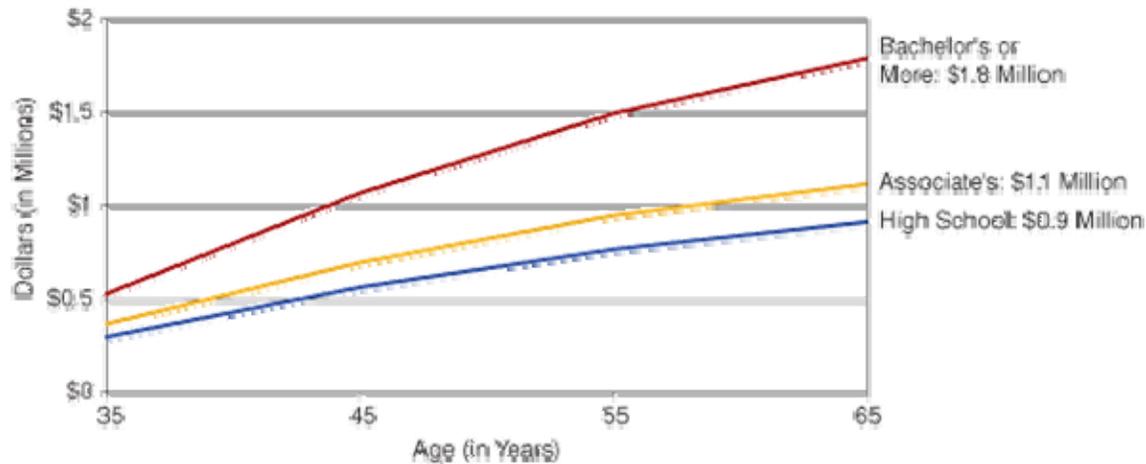
## Earnings of a Lifetime: Comparing Women and Graduate Degrees

While women are now more likely to complete four-year college degrees than men,<sup>1</sup> it is less clear if this education will translate into closing the wage gap. Using synthetic lifetime earnings calculations, we find that men still earn considerably more than women at all levels of education. We also see that men who complete degrees in fields that are associated with relatively low lifetime earnings (such as education) earn substantially higher incomes than women with similar educational backgrounds.

To meet the challenge of calculating lifetime earnings, this study follows a similar synthetic earnings approach as the Bureau<sup>2</sup> but with one important difference—future earnings are discounted at a rate of 3 percent of money. More details are available in the methodology section at the end of this report.

### All Degrees

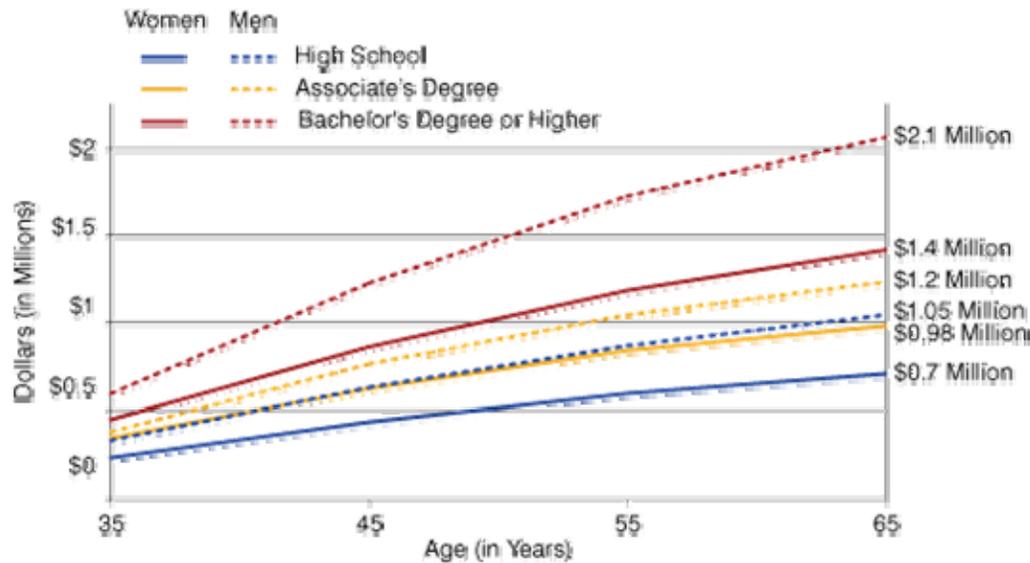
Overall, bachelor's, master's, professional and doctoral degrees allow graduates the opportunity to realize their earning potential beyond what they might have earned with merely an associate's degree or high school diploma. **Figure 1** provides a rough illustration of the differences in the cumulative lifetime earnings across different terminal degree levels, assuming a 40-year career from age 25 through 64. We see that men with a bachelor's degree expect to earn a total of \$361,000 or about 22 percent more than high school graduates between the ages of 25 and 64. Decades later, we expect that associate's degree graduates would now have earned a total of \$361,000 or about 22 percent more than high school graduates—still roughly a 22 percent increment.

**Figure 1: Estimated Cumulative Lifetime Earnings by Sex in the United States**

Note: This chart uses census data based on the average wages of 10-year cohorts by degree level. Figures use 2006 dollars and future earnings have been discounted at 3 percent.  
 Source: IBRC, using U.S. Census Bureau income data

However, when comparing graduates with a bachelor's degree or higher to associate's degree graduates, there is a significant advantage in cumulative earnings by age 35—\$524,000 compared to \$361,000—and this gap widens over the life course. By retirement, graduates with bachelor's and advanced degrees can expect a total of \$1.8 million while associate's degree graduates only reach \$1.1 million—a 61 percent

The increased lifetime earnings by degree level are remarkably different for women compared to men. For women, higher education levels are likely to earn more over their careers (\$1.4 million) than men with a high school diploma. For men, the gap is smaller: 48 percent more at the high school level and 45 percent more among those with a bachelor's degree or more.

**Figure 2: Estimated Cumulative Lifetime Earnings by Sex and Degree Level in t**

Note: This chart uses census data based on the average wages of 10-year cohorts by degree level. Figures use 2006 dollars and future earnings have been discounted at 3 percent.  
Source: IBRC, using U.S. Census Bureau income data

### Bachelor's Degrees by Field

**Table 1** shows the estimated lifetime earnings associated with the 10 most popular degree fields for women, the most popular degree fields are in education, business, arts and humanities, and account for 57 percent of all bachelor's degrees received by women at these institutions. While sciences are also popular fields among men, the most popular field by far is business, which graduates. Most notably, education is only the fifth most popular field for men while engineering is the top 10 fields for women—ranks third.

**Table 1: Estimated Lifetime Earnings for Popular Bachelor's Degrees of Women at Indiana's Public Universities, 2002 to 2007**

Women				Men			
Field of Study		Average Annual Graduates	Lifetime Earnings (in Thousands)	Field of Study		Average Annual Graduates	Lifetime Earnings (in Thousands)
1	Education (except Administration)	2,381	\$964	1	Business Administration, Sales and Marketing	2,483	
2	Business Administration, Sales and Marketing	1,824	\$1,355	2	Arts and Humanities (except Music, etc.)	1,271	

3	Arts and Humanities (except Music, Visual and Performing Arts)	1,617	\$1,303	3	Visual and Performing Arts)		
				3	Engineering		1,073
4	Social Sciences	1,578	\$1,216	4	Social Sciences		1,016
5	Communications and Journalism	972	\$1,425	5	Education (except Administration)		852
6	Nursing	667	\$1,368	6	Technology/ Technical Fields (Includes Computer Programming)		825
7	Allied Health Fields (except Nursing)	660	\$1,370	7	Computer and Information Science (not programming)		626
8	Biological, Agricultural and Environmental Sciences	626	\$1,253	8	Communications and Journalism		552
9	Music/Fine, Visual and Performing Arts	601	\$1,210	9	Biological, Agricultural and Environmental Sciences		547
10	Social Work	544	\$979	10	Music / Fine, Visual and Performing Arts		355

Note: There were 64,731 female graduates and 55,782 male graduates over this five-year period for an average Data for 772 graduates over this period did not indicate gender. Lifetime earnings are synthetic estimates base age cohort, degree level and field. Figures have been adjusted to 2006 dollars and future earnings have been di Source: IBRC, using data from the Indiana Commission for Higher Education and the National Survey of Colle

Even though graduates of any field can choose a wide variety of occupations, we see substan graduates who work full-time. Among popular women's fields, graduates of business, comm all earn over \$1.3 million while graduates of education and social work earn less than \$1 mil earn an estimated \$2 million over the course of their careers whereas education majors are €

However, the difference in lifetime earnings between men and women cannot be simply attributed to certain degree fields since men receive higher earnings in every field. For example, while male graduates are relatively well paid among both sexes, men earn an estimated \$1.9 million compared to about 41 percent more. Even male graduates in fields associated with relatively low earnings comparable to the highest earnings of female graduates. Take men who complete bachelor's degrees in the arts field: they earn roughly \$1.4 million—the same as women earning degrees in business.

### Master's Degrees by Field

The most popular master's degree fields for women and men at Indiana's public institutions are shown in Table 2. The most popular field for women is education (30 percent of all graduates) followed by business administration (16 percent). A third of all men's master's degrees are in business, followed by education (16 percent). Engineering is the most popular field among men (13 percent of all graduates) but only the 11th most popular field among women. Nursing is popular among female master's degree graduates but does not rank among the top 20.

**Table 2: Estimated Lifetime Earnings for Popular Master's Degrees of Women and Men at Indiana's Public Universities, 2002-2007**

Women				Men			
Field of Study		Average Annual Graduates	Lifetime Earnings (in Thousands)	Field of Study		Average Annual Graduates	Lifetime Earnings (in Thousands)
1	Education (except Administration)	1,124	\$1,245	1	Business Administration, Sales and Marketing	1,110	\$2,110
2	Business Administration, Sales and Marketing	489	\$1,853	2	Education (except Administration)	531	\$1,531
3	Public and Educational Administration and Management	282	\$1,388	3	Engineering	413	\$2,413
4	Allied Health Fields (except Nursing)	267	\$1,588	4	Public and Educational Administration and Management	140	\$1,140
5	Social Sciences	222	\$1,303	5	Biological, Agricultural	139	\$1,139

6	Nursing	187	\$1,626	6	and Environmental Sciences		
				6	Social Sciences	134	\$1
7	Arts and Humanities (except Music, Visual and Performing Arts)	182	\$1,201	7	Music/Fine, Visual and Performing Arts	118	\$1
8	Library Science	175	\$1,150	8	Mathematics and Physical Sciences	118	\$1
9	Music/Fine, Visual and Performing Arts	147	\$1,084	9	Arts and Humanities (except Music, Visual and Performing Arts)	118	\$1
10	Biological, Agricultural and Environmental Sciences	144	\$1,304	10	Computer and Information Science (not programming)	94	\$2

Note: There were 18,422 female graduates and 16,303 male graduates over this five-year period for an average of 626 graduates over this period did not indicate gender. Lifetime earnings are synthetic estimates based on a cohort, degree level and field. Figures have been adjusted to 2006 dollars and future earnings have been discounted. Source: IBRC, using data from the Indiana Commission for Higher Education and the National Survey of College Graduates.

We would expect that the more specialized skills of master's degree graduates make them more successful in their fields. It is, therefore, no surprise that women with master's degrees in business and education over their careers—\$1.8 million and \$1.6 million, respectively. Men with business degrees and engineering majors are expected to earn \$2.1 million.

Again, men with master's degrees have far larger earning potentials than their female counterparts with one notable exception among graduates in the arts and humanities field. Overall, while engineering fields among men allow their graduates over \$1.4 million in lifetime earnings, only female graduates in the arts and humanities fields reach this amount or more. Interestingly, men with master's degrees in arts and humanities have earned only marginally more (\$63,000 or 5 percent) than their female counterparts—the smallest e

## Professional and Doctoral Degrees by Field

There are similar numbers of female and male graduates of professional degree programs,<sup>3</sup> and these graduates are among the highest paid in the U.S. labor market. **Table 3** shows that both genders earn around \$2.5 million or higher as graduates with popular professional degrees though in particular, men with medical, dental, optometry and veterinary degrees have massive earnings of over \$3 million, while their female counterparts earn roughly \$2.8 million (21 percent less).

**Table 3: Estimated Lifetime Earnings for Popular Professional Degrees of Women at Indiana Universities, 2002 to 2007**

Women			Men		
Field of Study	Average Annual Graduates	Lifetime Earnings (in Thousands)	Field of Study	Average Annual Graduates	Lifetime Earnings (in Thousands)
1 Medicine/ Dentistry/ Optometry/ Veterinary Sciences	244	\$2,759	1 Law/Legal Studies	256	\$2,903
2 Law/Legal Studies	209	\$2,453	2 Medicine/ Dentistry/ Optometry/ Veterinary Sciences	250	\$3,488

Note: Besides the programs listed above, there are also professional degrees available in nursing, pharmacy and education. There were 2,825 female graduates and 2,767 male graduates over this five-year period for an average of 565 and 553 per year respectively. These figures are synthetic estimates based on average wages for graduates by five-year age cohort, degree level and field. Future earnings have been discounted at 3 percent.

Source: IBRC, using data from the Indiana Commission for Higher Education and the National Survey of College Graduates.

While women outnumber men at most degree levels, Indiana's public universities still produce more male than female graduates at the doctoral level—approximately 598 compared to 426 each year (see **Table 4**). The most popular fields of study for women are education (23 percent) followed by the social sciences (14 percent) and arts and humanities (14 percent). For men, engineering (24 percent), mathematics and physical sciences (14 percent), and the biological sciences (12 percent).

**Table 4 : Estimated Lifetime Earnings for Popular Doctoral Degrees of Women at Indiana Universities, 2002 to 2007**

Women	Men
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Field of Study		Average Annual Graduates	Lifetime Earnings (in Thousands)	Field of Study		Average Annual Graduates	Lifetime Earnings (in Thousands)
1	Education (except Administration)	99	\$1,520	1	Engineering	144	\$2,5
2	Social Sciences	61	\$1,657	2	Mathematics and Physical Sciences	83	\$2,3
3	Arts and Humanities (except Music, Visual and Performing Arts)	51	\$1,246	3	Biological, Agricultural and Environmental Sciences	69	\$2,0
4	Biological, Agricultural and Environmental Sciences	46	\$1,719	4	Education (except Administration)	67	\$1,6
5	Mathematics and Physical Sciences	40	\$2,003	5	Arts and Humanities (except Music, Visual and Performing Arts)	57	\$1,5
6	Allied Health Fields (except Nursing)	37	\$1,765	6	Social Sciences	55	\$2,0

Note: There were 2,132 female graduates and 2,988 male graduates over this five-year period for an average of 173 graduates over this period did not indicate gender. Lifetime earnings are synthetic estimates based on average cohort, degree level and field. Figures have been adjusted to 2006 dollars and future earnings have been discounted. Source: IBRC, using data from the Indiana Commission for Higher Education and the National Survey of College Graduates.

There is a wide range of lifetime earnings associated with the six most popular doctoral degree fields. The most popular doctoral degree fields earn an estimated \$2.5 million over the course of their careers—almost 60 percent more than graduates in the arts and humanities field (\$1.6 million). Similarly, female doctoral graduates in the most popular fields (\$2 million) are expected to earn 60 percent more than their counterparts in arts and humanities.

For popular doctoral fields, men again have substantially higher lifetime earnings than women. In the most popular doctoral degree fields for men, graduates who are expected to earn over \$2 million over

only female graduates in the popular mathematics and physical sciences field earn that amount in the education field where female graduates are expected to earn about \$161,000 (or 11 percent of the male wage in that field).

### **Does Higher Learning Equal Higher Earning?**

Overall, both men and women earn more over their careers for obtaining higher levels of education, but the returns remain based on gender and field. Higher levels of education allow women greater earnings than the wages of men. Just because women are now more likely to complete bachelor's degrees does not mean they will necessarily earn higher wages. This is especially true given that graduates of women's majors in the education field earn substantially less than most other fields. Another field that has more female graduates is the education field, and this is one of the rare fields whose graduates may actually earn *less* at higher degree levels. Bachelor's degree holders are more likely to specialize in lower-paying occupations specific to their training. For example, graduates in arts and humanities typically earn an estimated \$1.3 million while master's and doctoral degree holders earn an estimated \$1.2 million. Meanwhile, male arts and humanities graduates make estimates similar to those with bachelor's degrees but those with master's and doctoral degrees make \$1.3 and \$1.5 million, respectively.

Women and men do not gain the same returns in wages through higher education, and comparing the returns is a nagging social problem. For starters, we need to examine whether—for each degree and level of education—women and men have similar compensation. Higher earning potential is not the only reason women choose certain fields of study, but perhaps important occupations related to degrees popular among women—such as education—would become more popular if they were given more value through higher wages.

### **Methodology**

In the most recent National Study of College Graduates (NSCG) survey in 2003, a nationally representative sample of college graduates (bachelor's degree and above) were asked detailed questions about their education along with demographic information (such as sex and age).<sup>4</sup> This information was then used to calculate the real wages (adjusted to 2006 dollars) of each five-year age cohort of graduates (male and female) by degree level (bachelor's, master's, etc.) and field of study of their terminal degree. Data for full-time, year-round work earnings of persons who worked 35 hours or more per week (or were on paid leave) during a

To reflect a typical 40-year career, this research uses eight five-year cohorts: 25–29 through 30–34. The earnings for each cohort was multiplied by five to produce the five-year cumulative real earnings. Earnings for each cohort were used as synthetic “future earnings” by discounting them at an annual rate of 3 percent.<sup>5</sup> After the cumulative real earnings of each five-year period, the earnings were summed to produce the lifetime earnings for each combination of sex, degree level and field.<sup>6</sup> The only exception is that U.S. Census Bureau data were used to compare the synthetic lifetime earnings for high school graduates, associate degree holders, and bachelor's degrees or higher (for **Figure 1** and **Figure 2**).<sup>7</sup>

This study also used data from the Indiana Commission for Higher Education (CHE), to determine the earnings of graduates by programs by field for graduates of Indiana public universities that offer four-year and advanced

during the five academic years starting in 2002 and ending in 2007 were compiled to produce degrees by field for both men and women. In all, calculations were made for 24 fields at four professional and doctoral.

## Notes

1. Rachel Justis, "Higher Education: Women Take Lead." *InContext*, November-December 2008. Available online at: [www.incontext.indiana.edu/2008/nov-dec/1.asp](http://www.incontext.indiana.edu/2008/nov-dec/1.asp).
2. More information is contained within the Census report "The Big Payoff: Educational Attainment and Work-Life Earnings" issued in July 2002. Available online at: [www.census.gov/prod/2002pubs/c2k02-208.pdf](http://www.census.gov/prod/2002pubs/c2k02-208.pdf).
3. Professional degrees include doctoral degrees in medicine, dentistry, law, optometry, and nursing.
4. While the National Survey of College Graduates is administered by the National Science Foundation, the NSCG is designed to collect data on the careers of science and engineering degree graduates, the NSCG is designed to collect data on graduates in all fields. Detailed information is available at: <https://sestat.nsf.gov/flex/>
5. CHE data reveal that almost all of these degrees are granted by all the campuses of the Ball State University, Indiana State University, Indiana University, Purdue University at West Lafayette. Since CHE categorizes majors based on the U.S. Department of Education's Classification of Instructional Programs (CIP) system, these majors were first re-classified into fields that were compatible with the NSCG data used by NSCG data.
6. The formula used is  $1/(1+0.03)^y$ —where  $y$  reflects the number of years between the particular five-year period in the "future."
7. Estimated lifetime earnings =
 
$$\sum_{a=1}^8 (5 * \text{realearn}_a) * \left( \frac{1}{(1+d)^{(5*a)-2.5}} \right)$$
 where  $a$  is the cohort numbered one through eight (representing 25 to 29, 30 to 34, ... annual wage of the cohort in 2006 dollars; and  $d$  is the discount rate (set at 0.03 for the NSCG survey).
8. The NSCG survey only reports the wages of graduates of four-year college degrees or more. The Census Bureau releases historical income tables for a wide range of demographic groups, using the Census of Income for the United States and its Territories. The tables relevant to this research are available at: [www.census.gov/hhes/www/income/data/](http://www.census.gov/hhes/www/income/data/)

**Michael F. Thompson, Economic Research Analyst**

Indiana Business Research Center, Kelley School of Business, Indiana University