

**The Impact of Higher Education  
on the Expected Work-Life Earnings  
of Louisville Area Workers**

**a research report for  
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**by**

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## The Impact of Higher Education on the Expected Work-Life Earnings of Louisville Area Workers

Higher education can have significant long-term effects on a student's earnings potential. Workers with more education on average tend to have higher earnings than those with less education. But it costs time and money to attend a college, university, or vocational school. Students generally decide to extend their education beyond high school if they believe the long-term returns to education are greater than the shorter term costs of the schooling. Since the costs to the students occur over a fairly short two to eight year time period (for most people) while the returns accrue over a lifetime, expenditures on higher education can be analyzed as an investment in human capital.

In this study we illustrate the economic value of higher education, and examine the added value of attending school beyond high school, from just a single year to the attainment of a PhD degree, for people currently living in Jefferson County and fourteen surrounding counties in Kentucky.

The main findings of the study are:

- Completing at least some higher education increases the present value of one's work-life earnings over what it would have been had one ended one's education with high school graduation. This holds for every classification of worker except black females who attended less than a year of college. The net present value of the work-life earnings of an Associate degree holder is estimated to be between \$185,000 (white female) and \$295,000 (white males) greater than for a high school graduate. For a Bachelor's degree holder the difference is estimated to be between \$223,000 (white females) and \$566,000 (white males). For a Master's degree holder the difference is estimated to be between \$379,000 (black males) and \$528,000 (white males). For a professional or PhD degree holder the difference is estimated to be between \$408,000 (black females) and \$1,160,000 (white males).
- Compared to a prior study using 1990 Census data for Jefferson County, the present value of work-life earnings for males who have had some higher education has remained about the same, but has dropped 7 to 10 percent for those with only a high school degree. On the other hand, the present value of work-life earnings for females has increased

dramatically over the last decade for all education attainment levels, especially for Bachelor's degree holders.

- Work-life earnings profiles for males have greater initial predicted earnings and peak at higher values than for females. While the predicted earnings of black males lag those for white males at each level of education, black females have greater predicted earnings than white females for Associate, Bachelor's, and Master's degrees, and are nearly equal for the other levels of education.
- In general each step up in educational attainment is rewarded by increased predicted earnings. The exception is that for males there is virtually no difference in earnings whether one has had less than one year of college, more than a year but didn't graduate, or earned an Associate degree. On the other hand, for females there is a definite step up in earnings at each succeeding level.
- There is a marked gender difference in the impact of education on the distribution of occupations among our sample. It is most pronounced at the Associate degree level. For males, there is a movement out of service jobs and into management, business, and finance, and science, legal, and healthcare occupations as educational level increases from less than a year of college to an Associate degree, but 41% of jobs remain in the two blue collar sectors (agriculture, construction, extraction and maintenance jobs and production, transportation, and material moving jobs). For females, however, there is an extreme shift from sales and office and service occupations to science, legal, and healthcare occupations.

### *General Methodology*

It is, of course, impossible to precisely predict an individual's future earnings, but economists have developed a methodology to measure the average financial benefits to investments in education. These estimates of work-life earnings are expected average amounts based on current cross-sectional earnings data on workers of all ages, races, educational attainment, vocation, and other such characteristics. A linear regression model is statisti-

cally estimated, resulting in a model containing coefficients which give a prediction of the effects of education and other demographic variables on a worker's future earnings.

We use data from the 2000 decennial Census in this study. Specifically, the 1% PUMS data for Jefferson County and fourteen surrounding counties in Kentucky. The other counties are all part of the Louisville Economic Area, an entity defined by the U.S. Bureau of Economic Analysis as part of its program to divide the nation into mutually exclusive regionally integrated economies. Thus, all the counties are part of one regional economy. Data from Indiana counties that are part of this regional economy were not yet available during the analysis, but may be added at a later date. The Census 1% PUMS files contain individual records of the characteristics for a 1 percent sample of people and housing units.

### *Estimation*

We use data from the 2000 Census PUMS 5% file to estimate an earnings equation for fifteen Kentucky counties in the Louisville Economic Area. Following standard practice in the literature, we fit a regression where the dependent variable is the logarithm of a worker's average earnings and the explanatory variables include a worker's experience, gender, race, and level of education. We also include explanatory variables for a worker's field of occupation since the monetary benefit from more schooling may vary considerably depending upon one's vocation. We ran the regression for all high school graduates in our database who worked at some point in 1999. Thus, we make no distinction between year-round or part-year employment or between full-time or part-time employment. Factors determining such employment status, such as layoffs, illness, family matters, etc., generally are independent of a worker's prior educational attainment. The goal is to create a lifetime earnings profile for the average 2003 high school graduate under various possible scenarios of future educational attainment.

We use six dummy variables for level of education beyond high school. LESS1YR equals one for workers who attended some college, but less than one year; NODEGREE equals one for those who attended more than a year of college but who failed to earn a degree; AADEGREE equals one for those whose highest degree is an associate degree; BADEGREE equals one for those whose highest degree is a bachelor's degree; MADEGREE equals one for those whose highest de-

gree is a master's degree; and PROFPHD equals one for those whose highest degree is either a professional degree or a PhD. Since the omitted category is high school graduate, the dummy variables measure the difference in earnings compared with workers who finished their schooling with high school graduation.

The EXPERIENCE variable measures the number of years a person could have been working after the completion of high school. However, we have no way of controlling for intermittent employment activity, but must assume that a person worked in each year after their schooling ended. For high school graduates we use the worker's age minus 18; for those who attended less than a year of college we use their age minus 19; for those who attended more than a year of college but didn't get a degree and for those who have an associate degree we use their age minus 20; for those who have a bachelor's degree we use their age minus 22; for those who have a master's degree we use their age minus 24; and for those who have either a professional degree or a PhD we use their age minus 26. We also utilize the variable EXPERIENCE2 for the potential number of years of experience squared in order to check if the work-life earnings profiles have the expected concave shape which shows earnings initially growing with each year of added experience, reaching a peak and then declining.

The model includes one dummy variable, SEX, equal to one for female workers and zero for males. Their are two race dummy variables; BLACKALONE equals one for workers who identified as being just one race, black; and OTHERRACE equals one for other non-white workers (including those identifying as two or more races). These dummies measure the difference in earnings compared with males and whites, respectively.

We also created seven dummy variables to capture differences among workers' occupations. The Census Bureau utilized a classification system for occupations with a few hundred occupational fields that were grouped into twenty-three major segments. We further aggregated that to seven occupation classes so that there would be a minimum of six hundred people in the database in each job class. MAN\_BUS\_FIN equals one for those workers whose jobs are in management, business, or finance; SCI\_LEGAL\_HEALTH equals one for those whose jobs are in professional science, the legal profession, or as healthcare practitioners or technicians; SS\_EDUC\_ART\_MEDIA\_MIL equals one for those whose jobs are in social services, education, the arts, media, or the military; SERVICES equals one for those whose jobs involve personal service; SALES\_OFFICE

equals one for those whose jobs are in sales or office functions; AG\_CONSTR\_EXTRACT\_MAINT equals one for those whose jobs are in agriculture, construction, extraction, and maintenance; and PROD\_TRANSP\_MATMOVE equals one for those whose jobs are in production, transportation, material moving. Since the seven job categories are exhaustive and mutually exclusive, we needed to eliminate one of them from the regression equations. We chose to omit the SALES\_OFFICE variable since more workers (27%) had those sorts of jobs than any of the other classifications. Thus, the other occupation dummies measure the difference in earnings compared to workers in the sales and office professions.

The model also includes interaction terms among all of the variables. This allows us to check to see, for instance, if earnings change with experience differently depending upon one's educational attainment or race or gender or occupation, or if earnings profiles for a particular race or gender differ by occupation.

The fitted regression equations allowed us to chart the predicted experience-earnings profiles for various combinations of educational attainment, gender, race, and occupation. In turn, the predicted earnings for each level of education, gender, and race allow for the calculation of the present value of work-life earnings. The present values are based on the probability of working at each age, the probability of surviving to each age, and the ratio of the growth in wages to interest rates. Net present values, or the total returns to education, also take into account the costs of additional schooling. The factors utilized in the present value calculations were derived as follows:

**Work probabilities.** Since people do not always work, we use the Census data to calculate the percentage of people in the fifteen counties who were working in 1999 for each education level and by gender for five year age ranges. These work probabilities adjust the earnings estimates downward to reflect the possibility that a person may not work at a particular age. Why a person may not be working is irrelevant to this study as the many possible reasons are largely independent of the decision to extend one's schooling after high school and we are interested in the average economic impact of higher education. Because of small sample sizes we combined education level categories above the high school graduate level. We merged the data for those who attended college but failed to get a degree (LESS1YR and NODEGREE); those with associate and bachelor's degrees, and those

with master's, professional, or PhD degrees. See Table 1 for this data.

**Table 1**  
**Work Probabilities by Age and Gender**

| Male   |         |                  |       |             |  |
|--------|---------|------------------|-------|-------------|--|
| Age    | HS grad | less1yr+nodegree | AA+BA | MA+Prof+PhD |  |
| 18-24  | 0.892   | 0.895            | 0.939 | 1.000       |  |
| 25-29  | 0.921   | 0.919            | 0.990 | 1.000       |  |
| 30-34  | 0.935   | 0.922            | 0.983 | 0.960       |  |
| 35-39  | 0.930   | 0.971            | 0.982 | 1.000       |  |
| 40-44  | 0.893   | 0.915            | 0.991 | 0.977       |  |
| 45-49  | 0.892   | 0.882            | 0.964 | 0.957       |  |
| 50-54  | 0.866   | 0.871            | 0.944 | 1.000       |  |
| 55-59  | 0.804   | 0.894            | 0.809 | 0.952       |  |
| 60-64  | 0.658   | 0.794            | 0.833 | 0.769       |  |
| 65-69  | 0.347   | 0.273            | 0.500 | 0.524       |  |
| 70-74  | 0.286   | 0.348            | 0.474 | 0.500       |  |
| 75+    | 0.098   | 0.056            | 0.500 | 0.250       |  |
| Female |         |                  |       |             |  |
| Age    | HS grad | less1yr+nodegree | AA+BA | MA+Prof+PhD |  |
| 18-24  | 0.851   | 0.863            | 0.920 | 1.000       |  |
| 25-29  | 0.778   | 0.824            | 0.918 | 0.964       |  |
| 30-34  | 0.797   | 0.841            | 0.904 | 0.868       |  |
| 35-39  | 0.776   | 0.821            | 0.795 | 0.829       |  |
| 40-44  | 0.892   | 0.865            | 0.855 | 0.852       |  |
| 45-49  | 0.884   | 0.840            | 0.814 | 0.969       |  |
| 50-54  | 0.715   | 0.861            | 0.805 | 0.901       |  |
| 55-59  | 0.634   | 0.642            | 0.675 | 0.867       |  |
| 60-64  | 0.463   | 0.630            | 0.625 | 0.706       |  |
| 65-69  | 0.280   | 0.147            | 0.368 | 0.545       |  |
| 70-74  | 0.171   | 0.212            | 0.063 | 0.400       |  |
| 75+    | 0.089   | 0.020            | 0.063 | 0.167       |  |

**Survival rates.** The return to investment in higher education is greater the longer one lives due to an extended work-life. We adjust the estimated earnings at each age by the probability that an individual reaches that particular age. The survival rates estimates use data from the U.S. National Center for Health Statistics publication *National Vital Statistics Reports, Vol. 51, No. 3, December 19, 2002*. See Table 2 for an abbreviated version of this data.

**Growth in wages and interest rates.** As a proxy for the future growth in wages we use the average growth in the average hourly earnings of production workers from 1965 to 2002. This data comes from the U.S. Bureau of Labor Statistics. The average growth rate in production wages was 4.97%. The interest rate we use is the average rate on new 3-month Treasury Bill issues from 1965-2002. This comes from the U.S. Treasury Department's historical data on daily yield curve rates for its T-bill issues. The average interest rate was 6.25%. Because this period includes a wide range of economic conditions these averages should be good proxies for the long-term average over the next several decades.

**Table 2**  
**Survival Probabilities by Age, Gender, and Race**  
**(for selected ages)**

| Age | Males | White males | Black males | Females | White females | Black |
|-----|-------|-------------|-------------|---------|---------------|-------|
| 18  | 1.000 | 1.000       | 1.000       | 1.000   | 1.000         | 1.000 |
| 20  | 0.998 | 0.998       | 0.997       | 0.999   | 0.999         | 0.999 |
| 25  | 0.991 | 0.992       | 0.985       | 0.997   | 0.997         | 0.997 |
| 30  | 0.984 | 0.985       | 0.972       | 0.994   | 0.994         | 0.994 |
| 35  | 0.976 | 0.978       | 0.958       | 0.990   | 0.991         | 0.991 |
| 40  | 0.966 | 0.969       | 0.941       | 0.984   | 0.986         | 0.986 |
| 45  | 0.951 | 0.956       | 0.915       | 0.976   | 0.979         | 0.979 |
| 50  | 0.929 | 0.936       | 0.876       | 0.964   | 0.968         | 0.968 |
| 55  | 0.899 | 0.908       | 0.820       | 0.945   | 0.951         | 0.951 |
| 60  | 0.854 | 0.866       | 0.747       | 0.916   | 0.924         | 0.924 |
| 65  | 0.790 | 0.804       | 0.656       | 0.872   | 0.881         | 0.881 |
| 70  | 0.700 | 0.715       | 0.554       | 0.808   | 0.819         | 0.819 |
| 75  | 0.581 | 0.596       | 0.431       | 0.717   | 0.729         | 0.729 |
| 78  | 0.498 | 0.511       | 0.353       | 0.646   | 0.658         | 0.658 |

**Real 2003 dollars.** The Consumer Price Index is used to adjust the present value estimates from 1999 to 2003 dollars. The CPI for 1999 was 166.6 while the May 2003 CPI was 183.5.

**Tuition and fees.** To calculate the total return to education we need to calculate the annual cost of higher education from tuition, fees, books and other supplies and then calculate the present value of these costs for each year of schooling. We assume that those who attend college for less than one year incur a full year of costs; that those who attend more than a year but don't get a degree and those who receive an Associate degree incur two years of costs; that those who receive a Bachelor's degree incur four years of costs; that those who receive a Master's degree incur six years of costs; and that those who receive either a professional or PhD degree incur eight years of costs. We further assume that all these costs are incurred in the years immediately succeeding high school graduation.

We use tuition, fee, book and supply cost information from the University of Louisville. Annual undergraduate tuition and fees are \$4,450. Graduate school tuition at the University of Louisville is \$4,842; MBA tuition is \$5,568; Law school tuition is \$8,012; Medical school tuition is \$14,544; and Dental school tuition is \$12,524. For the two additional years of schooling needed to earn a Master's degree we assume that 24% of students will be enrolled in the MBA program. This is the percentage of Master's degree holders in the fifteen counties whose occupation is in management, business, or finance. For the four years of additional schooling required to earn a professional or PhD degree we assume that 56% of students will be enrolled in either the Law, Medical, or Dental school. This is based upon the per-

centage of professional and PhD degree holders in the fifteen counties whose occupation is in science, law, or healthcare and the relative enrollments of the Speed Scientific, Law, Medical, and Dental schools. In all cases we assume that books and other supplies cost \$700 per year. Table 3 shows these present values of tuition, fees, books and other supplies.

There are also opportunity costs to obtaining a higher education. A college student is foregoing the income that could have been made had he or she been working since high school graduation. Since we assume

that no income is earned until a person's schooling is finished, when we calculate the difference between a high school graduate's present value of work-life earnings and that of someone with more education the opportunity costs are accounted for.

**Table 3**  
**Present Values of Tuition, Fees, Books, and Supplies**

| Educational Attainment                 | Present Value |
|--|---------------|
| Less than 1 year of college            | \$5,088       |
| More than 1 year of college, no degree | \$10,114      |
| Associate degree                       | \$10,114      |
| Bachelor's degree                      | \$19,986      |
| Master's degree                        | \$30,680      |
| Professional or PhD degree             | \$54,713      |

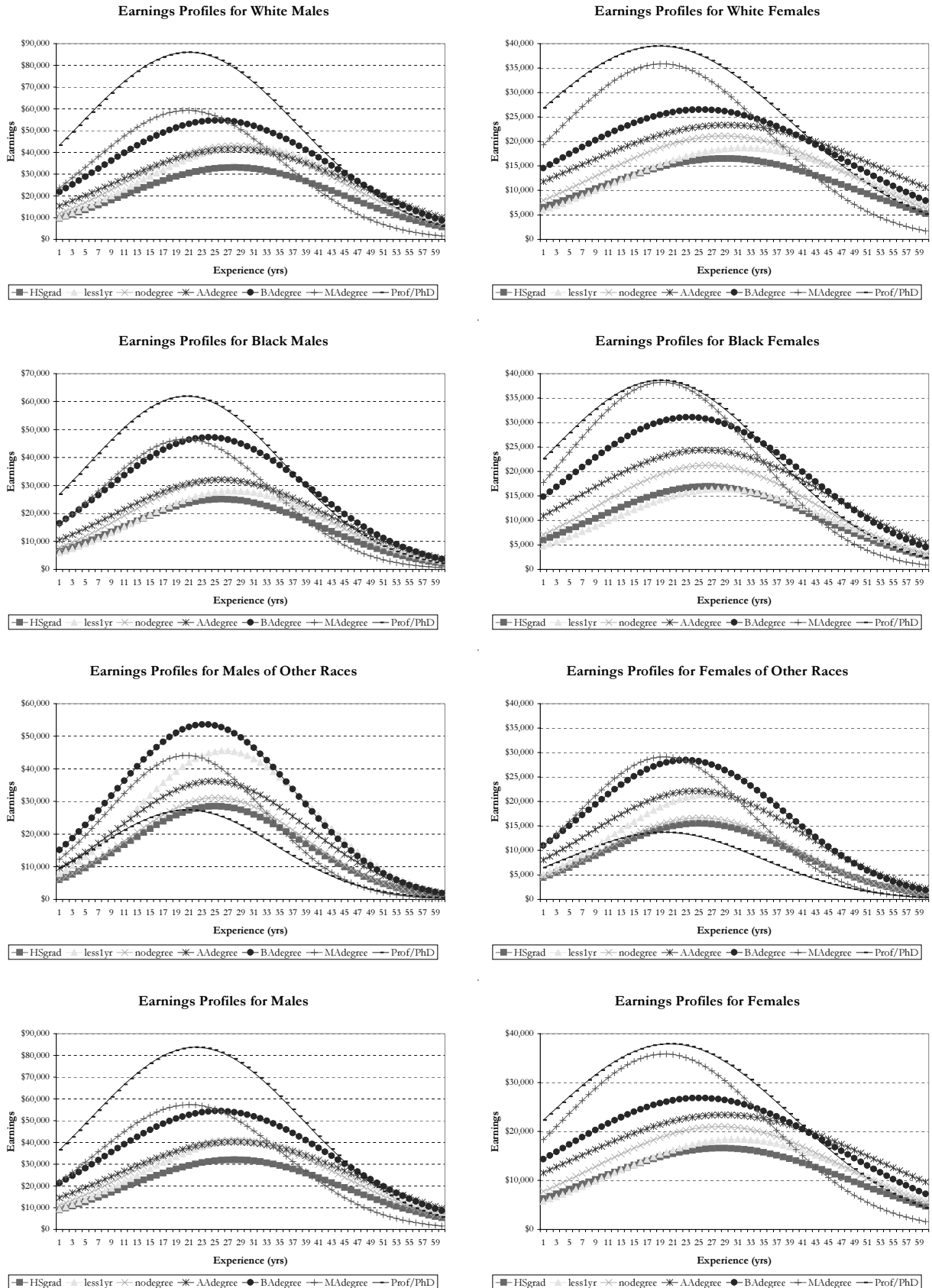
## **Results**

**Predicted earnings.** To examine the shape of the experience-earnings profiles, we have graphed the predicted experience-earnings profile for each level of educational attainment by gender and race. All of the profiles have the expected concave shape. (See Figure 1. All of the profiles are shown in 1999 dollars.)

The profiles for males have greater initial predicted earnings and peak at higher values. While the predicted earnings of black males lag those for white males at each level of education, black females have greater predicted earnings than white females for Associate, Bachelor's, and Master's degrees, and are nearly equal for the other levels of education. Profiles for males and females of other races are included in Figure 1, but due to small sample size there are some oddities in the curves, such as males of other races with less than one year of college outper-



**Figure 1**  
**Predicted Experience-Earnings Profiles for Each Level of Educational Attainment by Gender and Race**  
**(1999 dollars)**



forming holders of Master's degrees, and the low predicted earnings of professional and PhD degree holders.

In general each step up in educational attainment is rewarded by increased predicted earnings. The exception is that for males there is virtually no difference in earnings whether one has had less than one year of college, more than a year but didn't graduate, or earned an Associate degree. On the other hand, for females there is a definite step up in earnings at each succeeding level. This may be largely an artifact of the distribution of occupations among our sample. For males, there is a movement out of service jobs and into management, business, and finance, and science, legal, and healthcare occupations as educational level increases from less than a year of college to an Associate degree, but 41% of jobs remain in the two blue collar sectors. For females, however, there is an extreme shift from sales and office and service occupations to science, legal, and healthcare occupations. The latter class of jobs tends to have higher pay than the first two job types. In fact, the predicted earnings for a worker in the science, legal, and healthcare occupations are much higher at all levels of education than they are for workers in either the services or sales and office occupations.

We can also see in the graphs that predicted earnings for a worker with a Master's degree peak early (along

with professional and PhD holders) but decline much more rapidly than any other level of educational attainment. This may be partially due to a changing mix of degree fields between older generations of workers and newer. Specifically, the MBA degree is much more prevalent now than it was just a couple decades ago. Workers with MBA degrees may be on a higher salary path than previous Master's degree holders who were probably specializing more in social service, education, and the humanities.

In general, no matter what the occupation of the worker additional education pays off in increased earnings over one's work-life. However, there is considerable difference in the earnings trajectories among the different occupational classes, especially in regard to the height of peak earnings. We have included the experience-earnings profile graphs for each of the seven classes of occupation, broken down by gender, as an appendix.

**Present values.** The present value of earnings for each degree is the sum over each year of age of the earnings adjusted for work probability and survival probability, and discounted by the ratio of the growth in wages to the interest rate. During the years in school, the earnings for a particular degree are equal to zero. Table 4 shows the estimated present values of earnings through age 78 for each education level and by race and gender.

**Table 4**  
**Present Value of Earnings by Gender, Race, and**

| <b>Education Level</b>                 | <b>Male</b> | <b>White Male</b> | <b>Black Ma</b> |
|--|-------------|-------------------|-----------------|
| <b>Present value of earnings</b>       |             |                   |                 |
| High School                            | \$762,096   | \$798,136         | \$555,1         |
| Less than 1 year of college            | \$939,352   | \$990,733         | \$597,4         |
| More than 1 year of college, no degr   | \$942,783   | \$997,730         | \$678,4         |
| Associate degree                       | \$1,057,514 | \$1,102,878       | \$770,5         |
| Bachelor's degree                      | \$1,361,265 | \$1,383,865       | \$1,074,4       |
| Master's degree                        | \$1,296,721 | \$1,356,640       | \$965,1         |
| Professional or PhD degree             | \$1,897,704 | \$2,012,651       | \$1,298,9       |
| <b>Difference from High School</b>     |             |                   |                 |
| Less than 1 year of college            | \$177,256   | \$192,597         | \$42,2          |
| More than 1 year of college, no degr   | \$180,687   | \$199,594         | \$123,2         |
| Associate degree                       | \$295,418   | \$304,742         | \$215,3         |
| Bachelor's degree                      | \$599,169   | \$585,729         | \$519,3         |
| Master's degree                        | \$534,624   | \$558,504         | \$409,9         |
| Professional or PhD degree             | \$1,135,607 | \$1,214,514       | \$743,8         |
| <b>Total return to extra education</b> |             |                   |                 |
| Less than 1 year of college            | \$172,168   | \$187,509         | \$37,2          |
| More than 1 year of college, no degr   | \$170,573   | \$189,479         | \$113,1         |
| Associate degree                       | \$285,303   | \$294,628         | \$205,2         |
| Bachelor's degree                      | \$579,183   | \$565,743         | \$499,3         |
| Master's degree                        | \$503,944   | \$527,824         | \$379,2         |
| Professional or PhD degree             | \$1,080,894 | \$1,159,801       | \$689,1         |

In general, the present value of earnings for women is about half of that for men. This is the result of the particular mix of occupations of men and women, differences in the number of full-time versus part-time workers, and other life choices. Also, present values for white and black females are nearly equal, while the present values for black males are about 60 to 70 percent that for white males. For black males they are closest to white males for workers with a Bachelor's degree.

For those whose education ends with high school graduation the present value of earnings ranges from about \$373,000 for black females to nearly \$800,000 for white males. For white males, adding just a year of higher education increases the present value of earnings 24 percent to \$990,000. But that is not the case for any other race-gender combination. However, further years of higher education without a degree do not increase the present value of earnings for white males but does increase the present value of earnings for the other race-gender combinations to the extent that the increase above high school is roughly the same for each race-gender combination at this level of educational attainment.

Making the added investment to an Associate degree adds 10 to 13 percent to the present values of earnings for males and 21 to 25 percent for females. Thirty-five percent of the female Associate degree holders in our sample were working in the relatively high paying science, legal, or healthcare professions.

For all but white females, a Bachelor's degree adds between 20 percent (black females) and 40 percent (black males) to the present value of earnings above what is estimated for an Associate degree. Present values for white females are only 8 percent greater for a Bachelor's degree holder. A higher percentage of these degree holders work in the social service, education, art, media, or military occupations.

Adding a Master's degree actually reduces the present value of work-life earnings compared to a Bachelor's degree for all males. This could be because nearly 28 percent of male Master's degree holders work in the social service, education, art, media, or military occupations, while only 7 percent of male Bachelor's degree holders did. However, since an overwhelming 53 percent of female Master's degree holders work in this occupational sector and their present values increase 30 percent and 18 percent for white and black women, respectively, there must be a significant difference in the types of jobs males and females hold within this class of jobs. The Master's degree is also the educational level at which gender differences are least.

A professional or PhD degree adds considerably to the present value of earnings for all race-gender combinations. Since schooling for a professional or PhD degree is generally along a different track than schooling for a terminal Master's degree we compare these present values to those estimated for Bachelor's degree holders. In terms of the increase in present values over a Bachelor's degree we find no gender difference, but a pronounced race difference. Whites are expected to have a present value of work-life earnings that is 45 to 48 percent greater than for a Bachelor's degree, while blacks are expected to have a present value just 21 to 22 percent greater. As with the entire table, some of the difference between whites and blacks is due to the lower survival rates of the latter compared to the former. However, it may be that more educated blacks have survival rates that are closer to those of the generally more affluent white population. In that case, the race differences may be overstated.

**Total returns to higher education.** To calculate the total return to education, we subtract the present value of the cost of tuition, fees, books, and other supplies from the difference in the present value of earnings for the particular degree from the present value of earnings for a high school graduate. The total returns are also in Table 4. Except for black females who attend less than a year of college, higher education is a good deal, reaping long-term rewards much greater than the short-term monetary outlay.

**Comparison to 1990 results for Jefferson County.** Paul Coomes and Stephan Gohmann of the University of Louisville conducted a similar analysis of the returns to education in 1994 using data for Jefferson County residents from the 1990 Census. We expressed their results in terms of 2003 dollars and compared them to our analysis. The percentage difference from the 1990 data for the four levels of degree attainment is presented in Table 5. Two things stand out in the table. First, that the present value of earnings for males who end their educations with high school graduation is estimated to be 7 to 10 percent less now than they were a decade ago. Furthermore, at higher degree levels males haven't seen their fortunes increase very much, if at all.

Second, at all levels of educational attainment, but especially at the level of Bachelor's degree, females have seen the present value of their work-life earnings increase greatly over the last decade. More women are working full-time in more lucrative occupations and fewer are interrupting their careers for extended periods of time.



**Table 5**  
**Comparison of Present Value Results: 1990 ve**

|                            | Percent difference from 1990 data (Coomes and C |            |          |
|----------------------------|---|------------|----------|
|                            | Male  | White Male | Black Ma |
| High School                | -8.3%   | -7.4%      | -9.0     |
| Associate degree           | 3.2%  | 3.7%       | 2.1      |
| Bachelor's degree          | -1.4%   | -3.4%      | 5.0      |
| Master's degree            | -5.4%   | -4.6%      | -5.0     |
| Professional or PhD degree | 3.0%  | 5.4%       | -5.8     |

### **Caveats**

These results are based on cross-sectional data that give a picture of the earnings of workers in a given year. This analysis therefore assumes that as today's younger workers age their earnings will resemble the current earnings of older workers. But the earnings of older workers today may not be reflective of the earnings of workers of the same age in the future. For example, as the economy shifts away from skilled manufacturing jobs we may find that the difference in earnings between a high school graduate and those who attend college keeps widening

The mix of occupations in the Louisville area economy may change in the future (or be different for younger and older workers today), and since the experience-earnings profiles differ substantially for some of the occupational classes our estimates may not hold true.

The present value estimates for blacks and women likely underestimate the total return to education since past discrimination and changing lifestyle choices are probably reflected in lower earnings for today's older blacks and women relative to older whites and men.

Different values of the interest rate and the growth in earnings will lead to different estimated results, though they will affect all groups and educational levels equally. However, the returns to higher education will decrease if the interest rate increases relative to the growth in earnings.

Survival probabilities may vary depending on factors that correlate with educational attainment. For instance, smoking may decrease and exercise may increase with education, resulting in higher survival probabilities for college graduates than for high school graduates. If this is the case, then our present values underestimate the returns to education (though in this case, part of the return is due to a factor independent of the actual education).

The estimates are based upon the regression coefficients, which have a degree of statistical error. The estimated coefficients are the best linear unbiased coefficients, however, meaning that they are the best that we can do with the data at hand.

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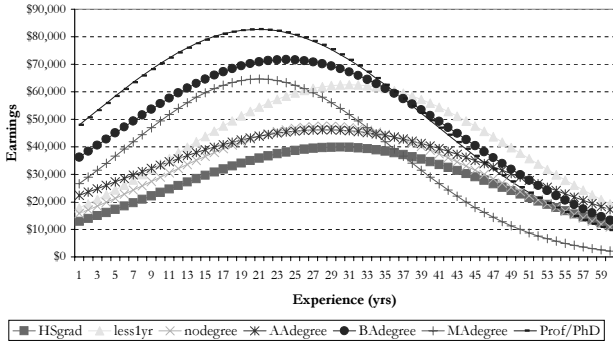
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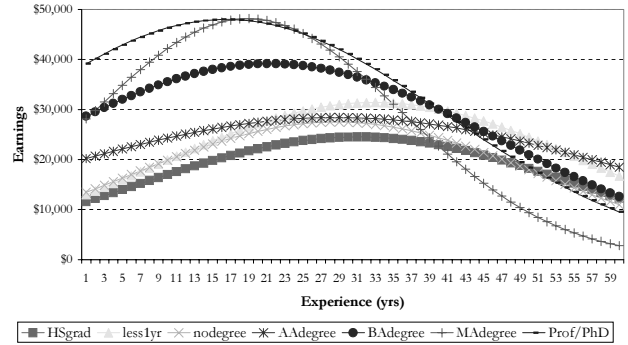
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## Appendix: Estimated Experience-Earnings Profiles by Occupation and Gender

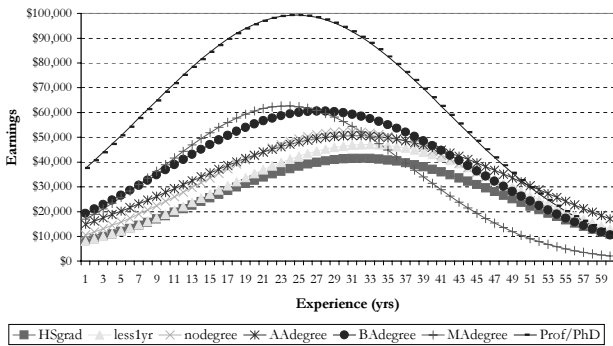
**Earnings Profiles for Males in Management, Business, and Finance Occupations**



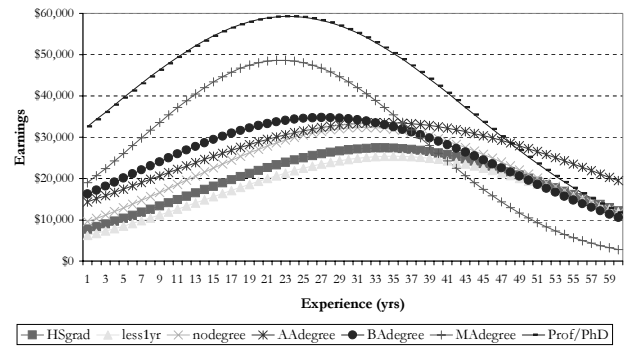
**Earnings Profiles for Females in Management, Business, and Finance Occupations**



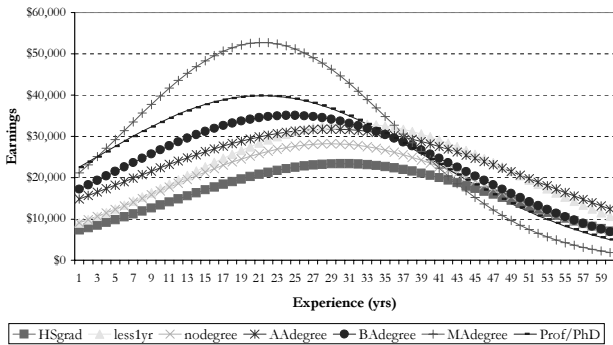
**Earnings Profiles for Males in Science, Legal, and Healthcare Occupations**



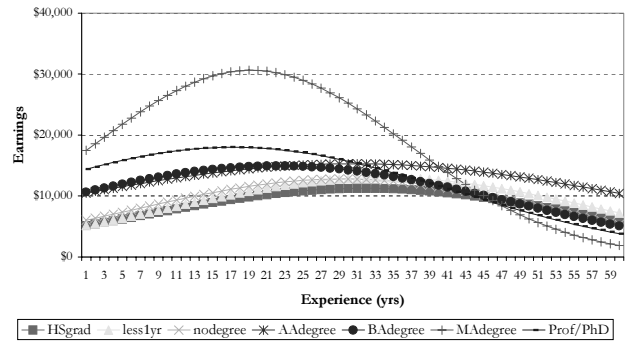
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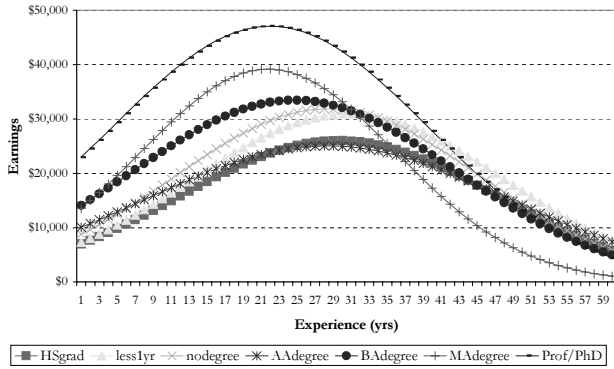
**Earnings Profiles for Males in Social Service, Education, Arts, Media, and Military Occupations**



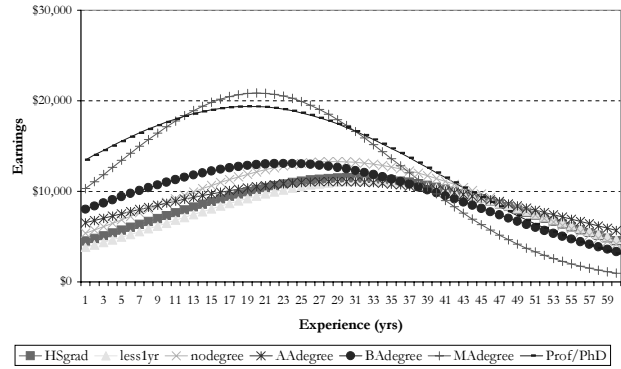
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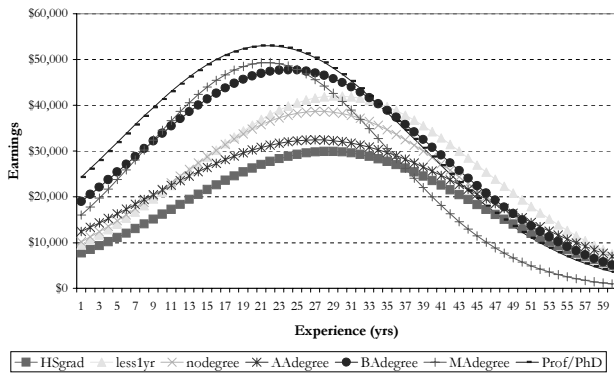
**Earnings Profiles for Males in Service Occupations**



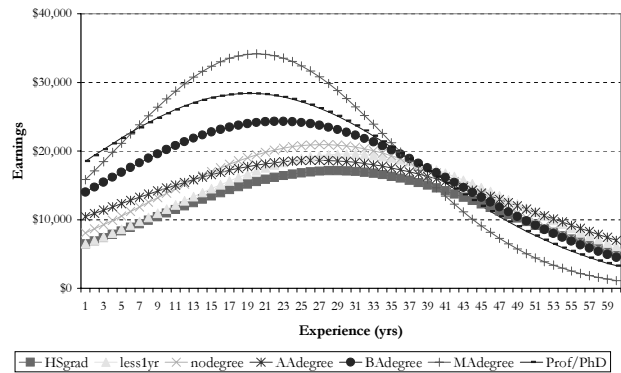
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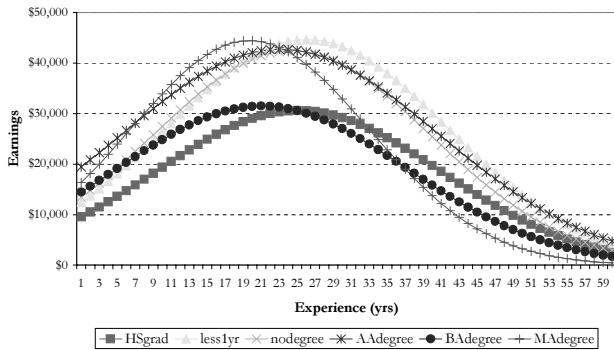
**Earnings Profiles for Males in Sales and Office Occupations**



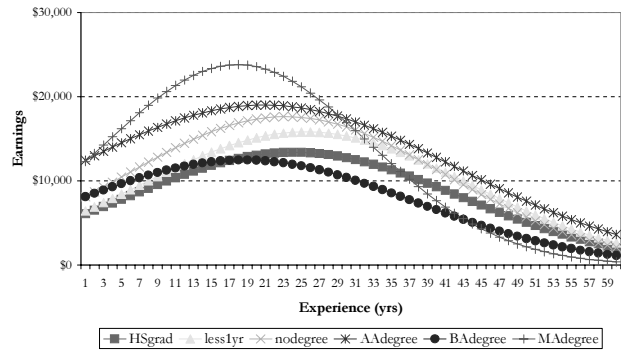
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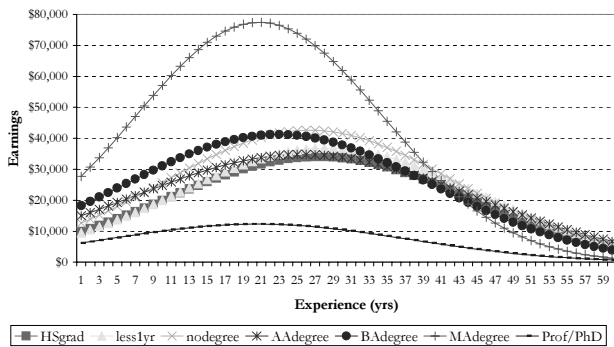
**Earnings Profiles for Males in Agriculture, Construction, Extraction, and Maintenance Occupations**



**Earnings Profiles for Females in Agriculture, Construction, Extraction, and Maintenance Occupations**



**Earnings Profiles for Males in Production, Transportation, and Material Moving Occupations**



**Earnings Profiles for Females in Production, Transportation, and Material Moving Occupations**

