Education and Synthetic Work-Life Earnings Estimates

American Community Survey Reports

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INTRODUCTION

The relationship between education and earnings is a long-analyzed topic of study. Generally, there is a strong belief that achievement of higher levels of education is a well established path to better jobs and better earnings.[1] This report provides one view of the economic value of educational attainment by producing an estimate of the amount of money a person might earn over the course of their working life, given their level of education. These estimates are "synthetic," that is, they are not the actual dollars people earned over the complete working life of the person (which would require us to have retrospective earnings data for the 40 years of their work-life). Instead, they are estimated using data from a one point-in-time cross-sectional survey. Median annual earnings estimates are computed for the point in time of the survey for all ages (5-year age groups are used), education, gender, and race/ethnicity groups. The age group-specific medians are then summed across the category of interest (say, Black females with a Master's degree) to construct expected lifetime earnings of that group if all earnings patterns observed in the cross section were to remain unchanged.

In this report, the Synthetic Work-life Earnings (SWE) estimates are first used to explore the basic relationship between education and earnings. The report then delves deeper into differences between race and gender groups with regard to

this relationship. We also consider other factors that might influence earnings, such as citizenship, English-speaking ability, and geographic location.

The data for this research comes from the Multiyear American Community Survey (ACS) data file for the period 2006 to 2008. The ACS represents a part of the U.S. Census Bureau's revised approach in how it conducts the federally-mandated decennial census of the population of the United States. The ACS is a large, monthly, national survey of the U.S. population that is sent to about a quarter million households each month in order to provide nationally-representative data on the equivalent of the full long-form content on a yearly basis (instead of once every 10 years). In order to provide estimates for very small pieces of geography and subpopulations, the Census Bureau takes sequential yearly files and combines and weights them to produce multiyear files with much larger samples. This analysis uses the multi-year file for the 2006 to 2008 period in order to provide sufficient characteristic detail for the analysis. We include residents from all 50 states plus the District of Columbia. All estimates are presented in 2008 dollars and represent the amount of money that might be expected to be earned over the course of a work-life from ages 25 to 64 for different gender and race/ethnicity groups.

An earlier Census Bureau report on this topic used data taken from the Current

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[1] Card, David. 1998. "The Causal Effect of Education on Earnings" in: O. Ashenfelter & D. Card (Ed.), *Handbook of Labor Economics*, pp. 67–86.

Population Survey (CPS).[2] The methodology of that report was similar to that used in this report. However, because the 3-year dataset from the CPS is about one-tenth the size of the 3-year ACS dataset, this report allows detailed analysis of gender cross-classified by race/ethnicity groups. Additionally, this report uses more exact 5-year age intervals for all groups, whereas the CPS report relied on less exact 10-year age cohorts for race and gender estimates. Finally, the ACS data, because of its content scope allows for the investigation of factors such as language ability, which is not a part of the CPS data collection.

EDUCATION, EMPLOYMENT, AGE, AND EARNINGS IN THE UNITED STATES

The level of education has risen steadily in America over the last 70 years (see Figure 1). In the 1940 Census, 24.5 percent of people aged 25 and over had at least a high school diploma. In 2008, 85 percent of this group had at least a high school diploma, and 27.7 percent had a bachelor's degree or higher. In addition, 10.2 percent of people aged 25 and over had advanced degrees.

Table 1 shows the median annual earnings for 9 distinct levels of education. With the exception of professional and doctorate degrees, annual earnings increase with each successive degree. Annual earnings ranged from around $11,000 a

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[2] Day, Jennifer Cheeseman and Eric C. Newburger. 2002. "The Big Payoff: Educational Attainment and Synthetic Estimates of Work-Life Earnings." U.S. Census Bureau, *Current Population Reports*, P23–210. U.S. Census Bureau, Washington, DC.

Figure 1.
Educational Attainment of the Population 25 Years and Over: 1940 to 2008
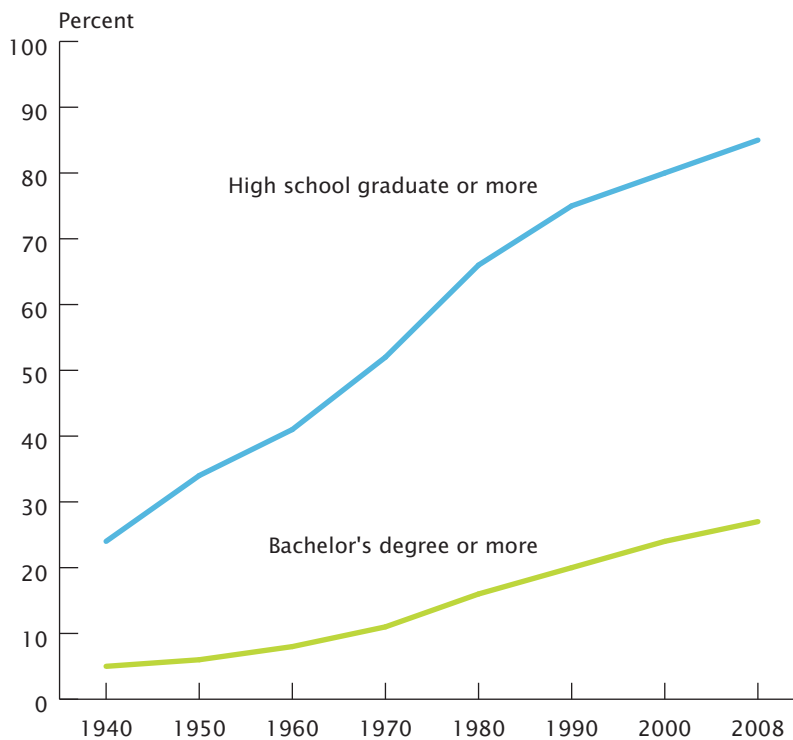
Source: U.S. Census Bureau, Decennial Census of Population, 1940–2000, and the American Community Survey, 2006–2008.

year for less than full-time, year-round workers without a high school degree to around $100,000 for full-time, year-round workers with a professional degree.[3] This demonstrates there is a strong relationship between education and earnings.

Occupation is often the mechanism by which education is related to earnings. Higher levels of education allow people access to more specialized jobs that are often

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[3] None through eighth grade earned $11,237 and ninth through twelfth grade earned $11,274. They are not significantly different from each other.

associated with high pay. Degrees in many occupations are treated as job training that may be required for a position or earn the employee more pay within that position. While this report does not focus on the specific occupations individuals hold, it does consider the degree of labor force involvement. Another possible factor is the field of training in which a degree is received. Beginning with the 2009 data collection of the ACS, the field of bachelor's degree is being collected. Future reports may be able to examine the effect of this variable on work-life earnings as well.

Table 1.
Annual Earnings by Level of Education and Work Status

Characteristic	Population aged 25–64	All people		Full-time, year-round workers		Less than full-time, year-round workers		Did not work	
		Median earnings	Standard error	Median earnings	Percent of persons	Median earnings	Percent of persons	Median earnings	Percent of persons
Total	**159,814,440**	**$27,455**	**$22**	**$42,850**	**55**	**$16,786**	**26**	**$0**	**19**
Education									
None–8th grade.	7,815,325	$10,271	$73	$23,277	38	$11,237	24	$0	37
9th–12th grade	12,972,423	$10,996	$53	$27,470	38	$11,274	28	$0	35
High school graduate.	45,408,258	$21,569	$22	$34,197	53	$13,790	25	$0	22
Some college.	33,450,090	$27,361	$25	$40,556	56	$15,604	27	$0	17
Associate's degree	13,299,842	$32,602	$60	$44,086	60	$18,957	26	$0	14
Bachelor's degree	30,138,179	$42,783	$42	$57,026	62	$25,074	26	$0	12
Master's degree.	11,825,602	$53,716	$55	$69,958	60	$38,962	30	$0	11
Professional degree.	3,152,004	$79,977	$345	$103,411	67	$49,187	25	$0	8
Doctorate degree.	1,752,717	$73,575	$263	$88,867	68	$50,275	25	$0	7
Gender									
Male.	79,365,902	$36,422	$40	$48,387	65	$20,905	22	$0	13
Female.	80,448,538	$20,050	$23	$36,904	45	$14,665	30	$0	25
Race/Ethnicity									
Hispanic.	22,222,265	$19,934	$42	$30,609	54	$13,870	26	$0	20
White alone, not Hispanic . . .	107,892,275	$31,461	$23	$46,941	56	$18,206	26	$0	18
Black alone, not Hispanic . . .	18,663,853	$21,239	$45	$35,658	50	$13,979	26	$0	24
Asian alone, not Hispanic . . .	7,671,544	$30,265	$73	$49,164	55	$20,099	26	$0	19
Other, not Hispanic	3,364,503	$21,699	$105	$38,985	48	$14,631	29	$0	23
Age									
25–29 years.	20,684,074	$22,885	$61	$33,202	53	$13,857	33	$0	14
30–34 years.	19,441,898	$27,759	$67	$39,740	57	$16,255	28	$0	15
35–39 years.	21,055,841	$31,140	$45	$44,098	59	$17,442	26	$0	15
40–44 years.	22,084,838	$31,589	$44	$45,287	60	$17,502	26	$0	15
45–49 years.	22,860,068	$32,041	$39	$46,677	60	$18,252	25	$0	16
50–54 years.	21,005,699	$31,558	$40	$47,411	58	$19,385	24	$0	18
55–59 years.	18,210,745	$26,411	$40	$47,310	50	$18,949	24	$0	25
60–64 years.	14,471,277	$9,272	$82	$44,922	35	$14,952	24	$0	42

Note: Median earnings shown for the population aged 25–64, not the total population.

Source: U.S. Census Bureau, American Community Survey, 2006–2008.

Figure 2 shows that, in addition to higher earnings, people with higher levels of education are more likely to be employed full-time, year-round, that is, they held a job for the entire year and worked in a full-time capacity. In fact, 68 percent of people with a doctorate are employed full-time, year-round compared with 38 percent of people with less than a high school diploma.[4] Conversely,

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[4] Thirty-eight percent of none through eighth grade and 38 percent of ninth through twelfth grade (no diploma).

Table 1 shows that many people with very low levels of education had no work (and therefore no earnings) in the previous year, while this was much less likely for people with professional or doctorate degrees. At every level of education, people working less than full-time, year-round have earnings that are lower than those who have full-time, year-round employment. These data help to better understand the interaction between education, employment, and earnings—higher earnings are

both the result of higher likelihoods of full-time employment and the higher levels of education required for that employment.

As with employment status, education and earnings are also played out through time in one's working life. Years of experience play a role in earnings levels, but without this explicit variable measured, we can use age as a proxy. Figure 3 shows the median annual earnings for various levels of education taken across the age categories used in

Figure 2.
Education, Work Status, and Median Annual Earnings

2008 inflation adjusted dollars
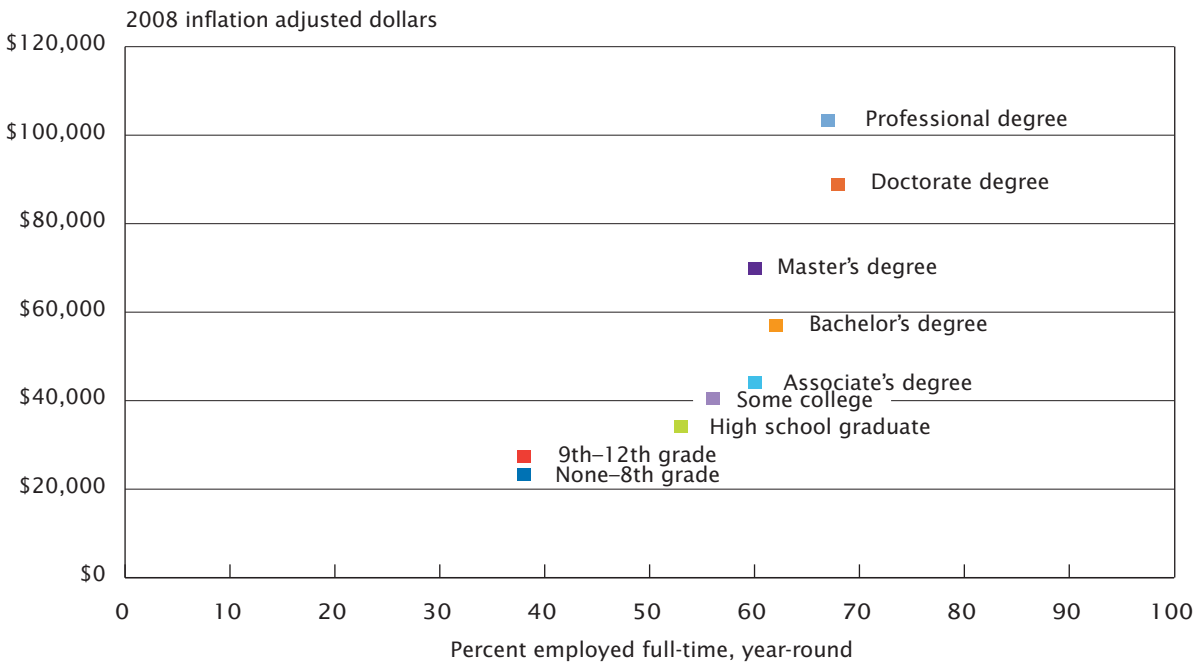
Source: U.S. Census Bureau, American Community Survey, 2006–2008.

this report. As the figure demonstrates, there are different trajectories of earnings across the 40-year work-life period. Educational levels certainly vary, but even the trajectories themselves take different shapes. Thus, measuring earnings at various points in the working life is important for better overall synthetic estimates.

SYNTHETIC WORK-LIFE EARNINGS ESTIMATES

Computing the SWE estimates relies on the construction of a large table of annual median earnings for every combination of age, gender, race/ethnicity, and education. In this report we use:
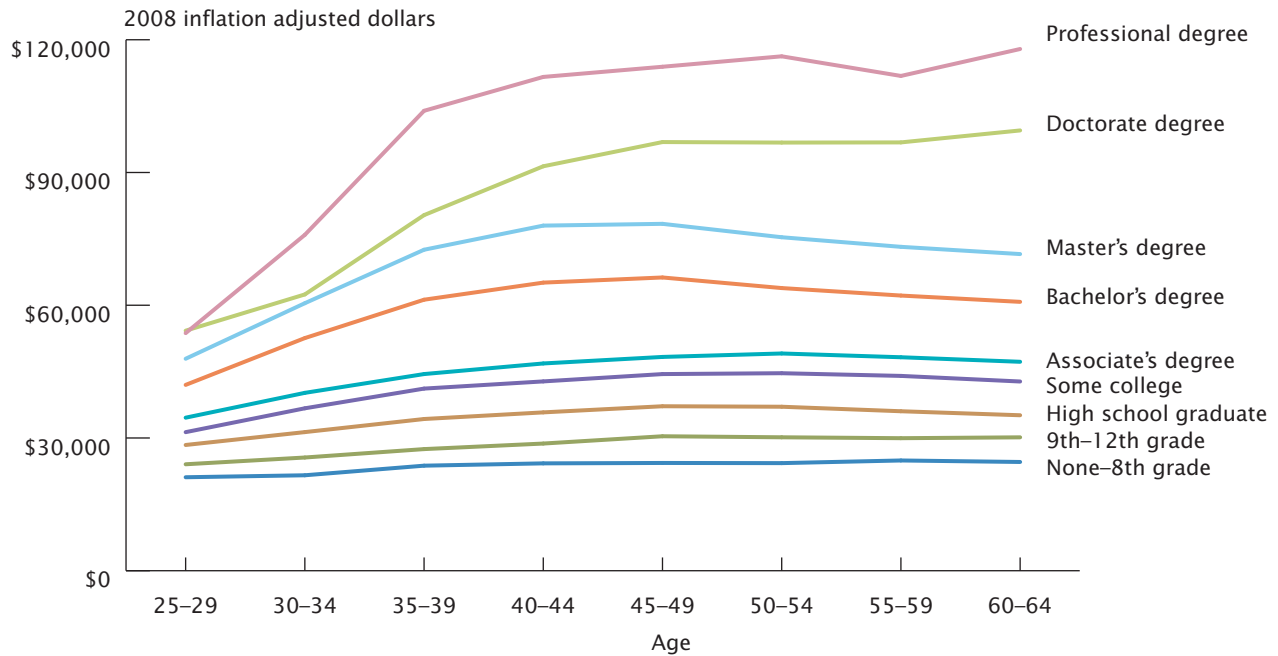
- Eight 5-year age groups: 25 to 29, 30 to 34, 35 to 39, 40 to 44, 45 to 49, 50 to 54, 55 to 59, and 60 to 64.

- Two gender groups: male and female.

- Nine education levels: none through eighth grade, ninth through twelfth grade (no degree), high school graduate, some college, associate's degree, bachelor's degree, master's degree, professional degree, and doctorate degree.

- Five, nonoverlapping race/ethnicity groups: Hispanic; White alone, not Hispanic; Black alone, not Hispanic; Asian alone,

not Hispanic; and Other, not Hispanic.[5]

- This table is created for each of the three employment status groups—full-time, year-round workers; all workers with earnings; and all persons. This yields

[5] This report will refer to the White alone, not Hispanic population as White; the Black alone, not Hispanic population as Black; the Asian alone, not Hispanic population as Asian; and the Some Other Race alone, not Hispanic and the Two or More Races, not Hispanic population as Other. Use of the single-race population does not imply that it is the preferred method of presenting or analyzing data. The Census Bureau uses a variety of approaches. In this report, the term Hispanic refers to people who are Hispanic of any race. These groups have been chosen to provide complete and unduplicated coverage of the total population. The "Other, not Hispanic" group covers a wide range of small and distinct race groups, including American Indian and Alaska Native groups, as well as all persons reporting multiple races. We have chosen to consolidate this overall small proportionate group rather than exclude it from the analysis.

Figure 3.
Median Annual Earnings by Age and Educational Attainment
(Full-time, year-round workers)

2008 inflation adjusted dollars

[Line chart showing median annual earnings by age group (25–29 through 60–64) for different levels of educational attainment: Professional degree, Doctorate degree, Master's degree, Bachelor's degree, Associate's degree, Some college, High school graduate, 9th–12th grade, and None–8th grade. Y-axis from $0 to $120,000; X-axis showing age groups.]

Source: U.S. Census Bureau, American Community Survey, 2006–2008.

three, 720-cell tables. For any gender-race/ethnicity-education combination within a given work status, simply sum across the eight age categories (each multiplied by 5) to yield the SWE for that group.[6]

$$(Earnings_{25-29} \times 5) + (Earnings_{30-34} \times 5) +$$
$$(Earnings_{35-39} \times 5) + (Earnings_{40-44} \times 5) +$$
$$(Earnings_{45-49} \times 5) + (Earnings_{50-54} \times 5) +$$
$$(Earnings_{55-59} \times 5) + (Earnings_{60-64} \times 5)$$

Table 1 shows the median earnings for all full-time, year-round workers in each age group. We can calculate the SWE estimate for all full-time, year-round workers using these numbers, as demonstrated in the following.

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[6] Additional details about the computation of these estimates are available in Kominski and Julian. 2010. "Developing Synthetic Worklife Earnings Estimates." <www.census.gov/hhes /socdemo/education/data/acs/index.html>.

$$(\$33,202 \times 5) + (\$39,740 \times 5) +$$
$$(\$44,098 \times 5) + (\$45,287 \times 5) +$$
$$(\$46,677 \times 5) + (\$47,411 \times 5) +$$
$$(\$47,310 \times 5) + (\$44,922 \times 5) =$$
$$\$1,743,235$$

Tables 2-A, 2-B, and 2-C give the result of these calculations for each combination of race/ethnicity, gender, and work status category.

As Table 2-A shows, there is substantial variability in SWE estimates across the 90 gender-race/ethnicity-education groups. For full-time, year-round workers, the median SWE ranges from a low of $704,005 for Hispanic females with education of none through eighth grade, to a high of $4,754,930 for White males with a professional degree (not statistically different from Asian males with a professional degree). Tables

2-B and 2-C show similar patterns of variability.[7]

DEMOGRAPHIC VARIATION IN SYNTHETIC WORK-LIFE EARNINGS ESTIMATES

The panels of Tables 2-A, 2-B, and 2-C demonstrate broad differences in the SWE estimates by demographic characteristics such as gender and race. Figure 4 graphically shows the education/SWE relationship for the ten different gender and race/ethnicity combinations from Table 2-A for full-time, year-round workers. While the form of the education and earnings relationship is quite similar across groups, the overall levels of SWE vary between groups.

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[7] Detailed, 720-cell tables available by request.

Table 2-A.
Median Synthetic Work-Life Earnings by Education, Race/Ethnicity, and Gender: Full-Time, Year-Round Workers

Characteristic	Male		Female	
	Synthetic work-life earnings	Standard error	Synthetic work-life earnings	Standard error
Hispanic				
None–8th grade.	$976,727	$3,152	$704,005	$3,573
9th–12th grade	$1,136,694	$5,576	$811,885	$4,993
High school graduate.	$1,306,747	$6,144	$1,021,242	$4,202
Some college.	$1,679,364	$7,618	$1,301,068	$7,222
Associate's degree	$1,837,607	$14,849	$1,446,134	$11,693
Bachelor's degree	$2,080,558	$14,046	$1,701,767	$11,850
Master's degree.	$2,791,370	$31,625	$2,255,883	$22,522
Professional degree.	$3,120,466	$107,267	$2,334,295	$67,399
Doctorate degree.	$3,109,666	$121,372	$2,624,329	$94,510
White Alone, Not Hispanic				
None–8th grade.	$1,351,121	$9,733	$932,641	$11,554
9th–12th grade	$1,443,984	$4,354	$947,568	$4,205
High school graduate.	$1,690,285	$1,993	$1,183,917	$1,304
Some college.	$1,985,967	$2,080	$1,406,249	$1,940
Associate's degree	$2,086,488	$4,038	$1,607,609	$3,052
Bachelor's degree	$2,847,953	$3,827	$2,028,096	$2,958
Master's degree.	$3,318,658	$6,793	$2,366,374	$4,053
Professional degree.	$4,754,930	$24,973	$3,200,311	$18,546
Doctorate degree.	$3,692,684	$19,536	$2,967,826	$18,805
Black Alone, Not Hispanic				
None–8th grade.	$1,045,580	$19,926	$863,231	$16,216
9th–12th grade	$1,124,778	$9,985	$861,353	$5,715
High school graduate.	$1,340,407	$5,031	$1,070,827	$3,720
Some college.	$1,601,729	$7,010	$1,308,183	$4,590
Associate's degree	$1,724,599	$12,357	$1,463,652	$9,495
Bachelor's degree	$2,107,728	$12,238	$1,859,380	$8,642
Master's degree.	$2,530,574	$25,295	$2,310,171	$12,090
Professional degree.	$3,521,784	$77,518	$2,847,709	$53,871
Doctorate degree.	$2,912,750	$69,795	$2,881,587	$67,031
Asian Alone, Not Hispanic				
None–8th grade.	$1,003,783	$19,132	$864,579	$16,235
9th–12th grade	$1,159,638	$16,524	$942,418	$14,461
High school graduate.	$1,292,822	$10,420	$1,059,678	$7,315
Some college.	$1,678,196	$14,528	$1,394,305	$11,002
Associate's degree	$1,843,014	$18,282	$1,600,797	$17,984
Bachelor's degree	$2,437,516	$15,225	$2,061,186	$11,656
Master's degree.	$3,454,087	$18,621	$2,735,465	$26,871
Professional degree.	$4,700,782	$91,225	$3,680,543	$106,135
Doctorate degree.	$3,601,577	$40,889	$3,134,482	$87,894
Other, Not Hispanic				
None–8th grade.	$1,228,762	$32,412	$848,544	$28,385
9th–12th grade	$1,320,118	$27,908	$902,420	$19,700
High school graduate.	$1,478,622	$12,851	$1,135,015	$10,849
Some college.	$1,757,852	$21,149	$1,321,789	$10,330
Associate's degree	$1,857,056	$26,447	$1,513,536	$18,165
Bachelor's degree	$2,381,770	$25,746	$1,866,935	$20,691
Master's degree.	$2,954,449	$53,872	$2,217,916	$49,229
Professional degree.	$4,086,575	$246,403	$2,889,210	$160,628
Doctorate degree.	$3,318,995	$160,809	$2,678,873	$151,809

Note: Synthetic work-life earnings represent expected earnings over a 40-year time period for the population aged 25–64 based on annual earnings from a single (cross-sectional) point in time. The estimate was calculated by adding median earnings for eight 5-year age groups, multiplied by five.

Source: U.S. Census Bureau, American Community Survey, 2006–2008.

Table 2-B.
Median Synthetic Work-Life Earnings by Education, Race/Ethnicity, and Gender: All Workers

Characteristic	Male		Female	
	Synthetic work-life earnings	Standard error	Synthetic work-life earnings	Standard error
Hispanic				
None–8th grade...............	$870,275	$3,330	$540,148	$2,653
9th–12th grade	$1,008,029	$4,079	$620,212	$3,703
High school graduate...........	$1,165,432	$4,648	$798,769	$3,491
Some college.................	$1,494,563	$6,582	$1,033,088	$5,381
Associate's degree	$1,654,826	$13,782	$1,174,274	$8,814
Bachelor's degree	$1,878,411	$12,405	$1,442,172	$11,418
Master's degree...............	$2,500,793	$30,265	$2,021,623	$17,882
Professional degree............	$2,687,056	$77,031	$1,831,512	$59,076
Doctorate degree..............	$2,777,200	$65,619	$2,296,287	$72,378
White Alone, Not Hispanic				
None–8th grade...............	$1,056,523	$7,959	$574,928	$6,880
9th–12th grade	$1,186,229	$3,675	$639,647	$3,088
High school graduate...........	$1,510,442	$1,748	$911,031	$1,432
Some college.................	$1,790,985	$2,292	$1,090,437	$1,617
Associate's degree	$1,916,932	$3,453	$1,303,304	$2,608
Bachelor's degree	$2,587,591	$4,130	$1,612,414	$2,359
Master's degree...............	$2,957,361	$5,815	$2,006,950	$3,198
Professional degree............	$4,449,503	$22,669	$2,576,982	$12,187
Doctorate degree..............	$3,403,123	$14,212	$2,547,199	$14,236
Black Alone, Not Hispanic				
None–8th grade...............	$765,997	$18,279	$590,014	$11,581
9th–12th grade	$821,293	$7,235	$610,917	$4,536
High school graduate...........	$1,138,313	$3,882	$868,305	$3,263
Some college.................	$1,383,964	$7,215	$1,088,714	$4,217
Associate's degree	$1,544,448	$10,388	$1,249,944	$7,123
Bachelor's degree	$1,913,538	$10,720	$1,660,787	$7,342
Master's degree...............	$2,325,767	$19,805	$2,108,617	$11,885
Professional degree............	$3,114,131	$75,505	$2,515,271	$53,365
Doctorate degree..............	$2,589,390	$61,045	$2,629,772	$52,547
Asian Alone, Not Hispanic				
None–8th grade...............	$837,888	$13,103	$662,282	$9,712
9th–12th grade	$999,866	$11,915	$735,906	$10,703
High school graduate...........	$1,157,460	$8,579	$855,045	$6,214
Some college.................	$1,483,683	$10,867	$1,127,116	$11,556
Associate's degree	$1,632,577	$18,194	$1,306,873	$16,294
Bachelor's degree	$2,179,639	$12,005	$1,677,965	$9,296
Master's degree...............	$3,125,091	$21,828	$2,176,211	$28,256
Professional degree............	$4,420,816	$82,257	$3,092,045	$65,518
Doctorate degree..............	$3,351,721	$25,214	$2,642,467	$59,556
Other, Not Hispanic				
None–8th grade...............	$932,343	$34,659	$613,666	$20,749
9th–12th grade	$949,258	$19,399	$594,242	$12,410
High school graduate...........	$1,222,863	$10,056	$854,512	$8,570
Some college.................	$1,466,827	$12,812	$1,030,573	$10,508
Associate's degree	$1,596,203	$26,626	$1,213,828	$15,519
Bachelor's degree	$2,079,016	$29,050	$1,525,190	$17,299
Master's degree...............	$2,550,093	$50,572	$1,888,242	$28,330
Professional degree............	$3,556,540	$199,271	$2,268,518	$96,249
Doctorate degree..............	$2,935,274	$154,895	$2,411,461	$159,437

Note: Synthetic work-life earnings represent expected earnings over a 40-year time period for the population aged 25–64 based on annual earnings from a single (cross-sectional) point in time. The estimate was calculated by adding median earnings for eight 5-year age groups, multiplied by five.

Source: U.S. Census Bureau, American Community Survey, 2006–2008.

Table 2-C.
Median Synthetic Work-Life Earnings by Education, Race/Ethnicity, and Gender: All Persons

Characteristic	Male		Female	
	Synthetic work-life earnings	Standard error	Synthetic work-life earnings	Standard error
Hispanic				
None–8th grade................	$758,198	$3,306	$148,106	$3,546
9th–12th grade	$810,681	$6,129	$204,586	$5,110
High school graduate...........	$997,242	$5,189	$466,935	$3,351
Some college.................	$1,302,446	$8,733	$724,707	$6,718
Associate's degree	$1,476,446	$14,727	$893,341	$11,441
Bachelor's degree	$1,713,881	$13,141	$1,102,840	$10,320
Master's degree...............	$2,333,141	$26,701	$1,758,151	$26,348
Professional degree............	$2,456,926	$82,629	$1,186,925	$58,880
Doctorate degree..............	$2,566,943	$64,680	$2,019,318	$111,559
White Alone, Not Hispanic				
None–8th grade................	$319,264	$8,414	$76,408	$418
9th–12th grade	$766,007	$4,575	$138,443	$3,302
High school graduate...........	$1,254,473	$1,868	$570,784	$1,613
Some college.................	$1,567,250	$2,569	$774,963	$2,136
Associate's degree	$1,730,550	$4,184	$1,031,254	$3,209
Bachelor's degree	$2,387,048	$3,873	$1,256,771	$2,657
Master's degree...............	$2,760,733	$6,313	$1,738,309	$3,803
Professional degree............	$4,266,106	$19,510	$2,228,909	$12,427
Doctorate degree..............	$3,273,496	$14,916	$2,360,189	$15,318
Black Alone, Not Hispanic				
None–8th grade................	$86,828	$903	$81,243	$889
9th–12th grade	$128,997	$6,770	$123,372	$4,657
High school graduate...........	$725,592	$4,897	$547,531	$3,256
Some college.................	$1,032,421	$8,514	$801,444	$5,850
Associate's degree	$1,254,105	$11,898	$1,022,889	$9,948
Bachelor's degree	$1,688,325	$13,249	$1,431,940	$9,607
Master's degree...............	$2,134,790	$20,916	$1,892,687	$16,661
Professional degree............	$2,827,172	$78,864	$2,226,001	$54,828
Doctorate degree..............	$2,364,483	$64,407	$2,370,166	$62,954
Asian Alone, Not Hispanic				
None–8th grade................	$596,056	$13,211	$228,381	$13,061
9th–12th grade	$799,743	$13,472	$345,055	$12,427
High school graduate...........	$993,799	$7,808	$496,563	$6,700
Some college.................	$1,313,253	$13,024	$747,663	$12,606
Associate's degree	$1,459,483	$18,331	$897,533	$17,887
Bachelor's degree	$1,951,381	$11,866	$1,132,591	$10,724
Master's degree...............	$2,897,024	$22,101	$1,558,365	$26,994
Professional degree............	$4,137,925	$86,176	$2,528,510	$71,279
Doctorate degree..............	$3,227,523	$36,644	$2,283,537	$63,649
Other, Not Hispanic				
None–8th grade................	$371,945	$33,060	$79,947	$1,606
9th–12th grade	$419,778	$23,032	$100,666	$7,263
High school graduate...........	$828,292	$10,467	$440,540	$9,586
Some college.................	$1,120,436	$17,432	$652,351	$10,938
Associate's degree	$1,245,553	$32,332	$877,069	$25,750
Bachelor's degree	$1,824,856	$23,195	$1,197,324	$15,788
Master's degree...............	$2,325,529	$49,460	$1,618,260	$34,519
Professional degree............	$3,235,951	$159,141	$1,834,824	$105,483
Doctorate degree..............	$2,669,137	$160,794	$1,938,912	$126,441

Note: Synthetic work-life earnings represent expected earnings over a 40-year time period for the population aged 25–64 based on annual earnings from a single (cross-sectional) point in time. The estimate was calculated by adding median earnings for eight 5-year age groups, multiplied by five.

Source: U.S. Census Bureau, American Community Survey, 2006–2008.

Figure 4.
Synthetic Work-Life Earnings for Gender/Race-Ethnicity Groups by Education Level
(Full-time, year-round workers)

Median SWE in millions of dollars
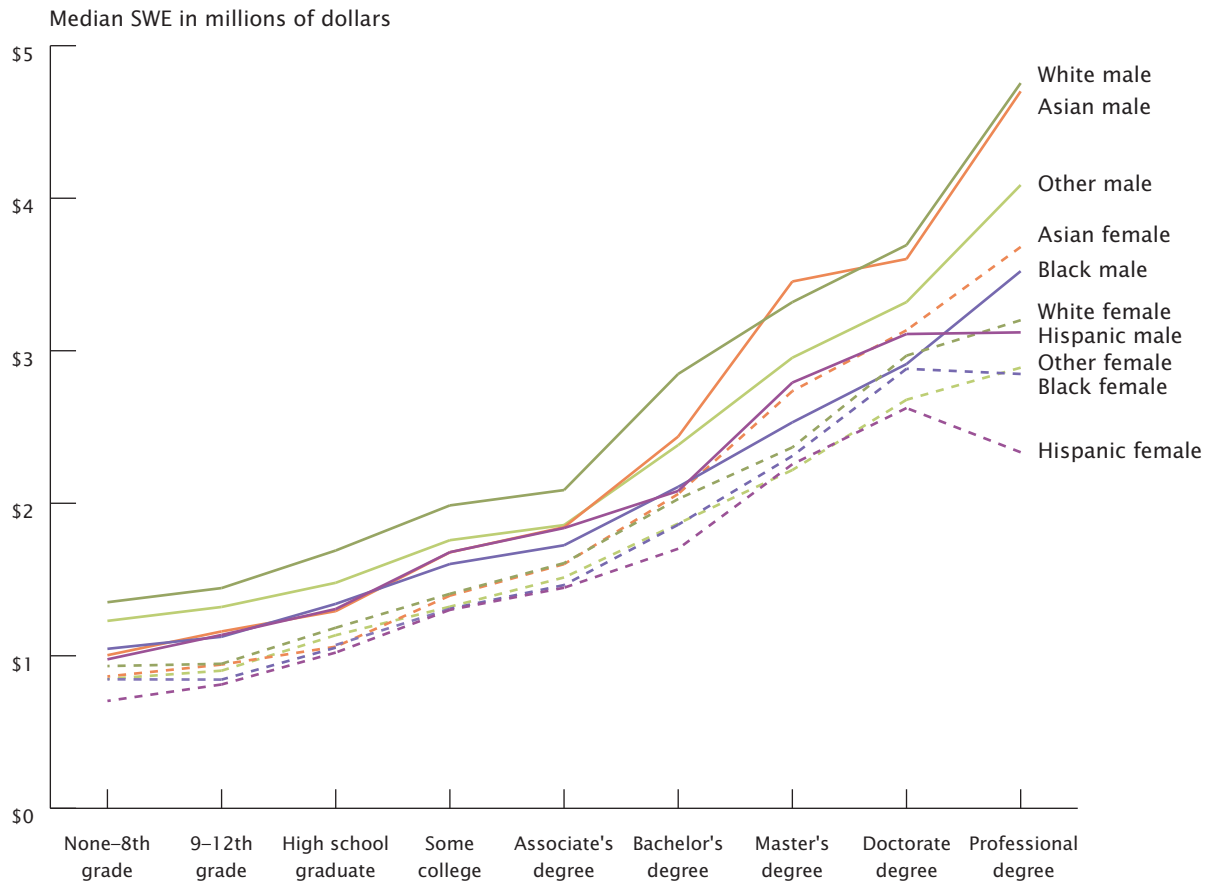
Source: U.S. Census Bureau, American Community Survey, 2006–2008.

In Figure 4, colors represent different race/ethnicity groups while the dotted and solid lines represent females and males, respectively. The general pattern is that the dotted lines are often below the solid lines. What this tells us is that, particularly at lower levels of education, even women in the most advantaged race groups usually earn less than men in the most disadvantaged race groups. Asian women with at least a bachelor's degree are competitive with some male groups, but at no point do women's earnings come close to White or Asian men's earnings at the same education level.

Table 3 shows the ratio of each race/gender group's SWE to that of White males of the same education level for completed degrees. No group has a SWE estimate comparable to that of White men with the exception of Asian men with master's (who earn more) and professional degrees. Generally, Hispanic females have one of the lowest ratios when compared to White men with the same level of education. For those Hispanic females with professional degrees, they make as little as half of what their White male counterparts make.

For those whose highest level of education is a high school diploma, the difference between Black, Hispanic, or Asian work-life earnings is not as large as other education levels. Men in these race groups make between 75 percent and 80 percent, and women make between 60 percent and 65 percent of White men's earnings. However, for higher levels of education this is not the case. Asian men and women with a bachelor's degree or higher seem to find much greater returns to higher education than Black or Hispanic men and women.

Table 3.
Ratio of Synthetic Work-Life Earnings to White Males by Level of Education

Characteristic	High school graduate	Bachelor's degree	Master's degree	Professional degree	Doctorate degree
Female					
Hispanic.............................	0.60	0.60	0.68	0.49	0.71
White alone, not Hispanic	0.70	0.71	0.71	0.67	0.80
Black alone, not Hispanic	0.63	0.65	0.70	0.60	0.78
Asian alone, not Hispanic	0.63	0.72	0.82	0.77	0.85
Other, not Hispanic	0.67	0.66	0.67	0.61	0.73
Male					
Hispanic.............................	0.77	0.73	0.84	0.66	0.84
Black alone, not Hispanic	0.79	0.74	0.76	0.74	0.79
Asian alone, not Hispanic	0.76	0.86	1.04	*0.99	0.98
Other, not Hispanic	0.87	0.84	0.89	0.86	0.90

* Group not significantly different from White males of same education level.

Source: U.S. Census Bureau, American Community Survey, 2006–2008.

ESTIMATING THE IMPACT OF OTHER FACTORS ON SYNTHETIC WORK-LIFE EARNINGS ESTIMATES

One of the main questions raised in an analysis such as this is the extent to which factors other than education play a role in the earnings of individuals. The cross-tabulation method employed to compute the SWE estimates requires that in each cell of the large age-by-gender-by-race/ethnicity tabulation, we have sufficient data cases to obtain reasonable estimates. A different approach to estimating the SWE is to develop a regression model to predict earnings, and then use the parameter values from the model to estimate an overall SWE. The regression results help to show the relative level of impact attributable to each of the three demographic factors of gender, race/ethnicity, and age. However, a second value of this approach is that it easily allows us to include other possible factors and assess their overall impact on the SWE estimate as well as the basic demographic factors.

Since the parameter values in the models represent dollars, one simple way to understand the overall impact of a given dimension is to look at the range of variability the categories of a given factor provide in the estimate. Table 4, Model 2 represents the model based on the three demographic factors from the original SWE tabulation. For example, the range of the effect of gender is $12,618 a year, since that is the male effect, holding all else constant. The range for race/ethnicity is somewhat smaller, since the largest single race/ethnicity parameter effect is for Hispanics at –$6,285, holding all else constant.[8] The lowest age group of 25 to 29 has been used as the omitted category in the regressions; the remaining age categories have a range of up to $13,051 (for people 45 to 49 years old). The actual variability in the age categories from 40 to 44 to 60 to 64 is relatively small, with a total range of about $2,000 a year ($13,051 minus $11,078).

Returning to the main relationship of this analysis, however, none of these demographic characteristics demonstrate the kind of variability in range that the education levels demonstrate. The parameters in Model 2 range from a low of –$8,639 (none through eighth grade) to a high of $64,753 (professional degrees), holding all else constant. The range across the education variable is about $72,000—over five times the range exhibited by the demographic factor of gender. Thus, from this simple evaluation of relative impact, it is clear that the demographic factors supplement, but do not displace education as a critical component in understanding variation in earnings.

Apart from the basic education/earnings relationship we have estimated, and the contribution of demographic context factors such as gender, age, and race/ethnicity, there are other additional factors that might mediate the earnings of individuals. In this last section we look at three additional factors for their possible impact on earnings—citizenship status, English language ability, and geographic region of the country. Model 3 of Table 4 shows the results of inclusion of these three additional factors and their relative impact on estimated earnings for the full-time, year-round worker population. These results are graphically depicted in Figure 5, showing both the relative effect of various variables and the changes that result in overall impact, as demographic and other characteristics are added to the basic education/earnings model.

[8] Not statistically different from the Black coefficient of –$6003.

Table 4.

Regression Models of Median Annual Earnings for the Full–Time, Year–Round Population

| Parameter	Model 1[1]	Standard error	Model 2[1]	Standard error	Model 3[1]	Standard error
Intercept	$34,170	$1,125	$19,935	$148	$15,747	$82
Education						
None–8th grade	−$10,873	$197	−$8,639	$79	−$4,494	$78
9th–12th grade	−$6,512	$185	−$5,379	$63	−$4,281	$61
High school graduate	(R)	(R)	(R)	(R)	(R)	(R)
Some college	$6,278	$289	$6,902	$51	$6,261	$39
Associate's degree	$9,845	$163	$10,468	$65	$9,862	$55
Bachelor's degree	$22,861	$820	$23,391	$76	$22,607	$60
Master's degree	$35,679	$745	$35,318	$89	$34,276	$82
Professional degree	$69,213	$832	$64,753	$263	$63,643	$269
Doctorate degree	$54,600	$582	$51,019	$346	$50,313	$303
Gender						
Male	(X)	(X)	$12,618	$34	$12,741	$37
Female	(X)	(X)	(R)	(R)	(R)	(R)
Race/Ethnicity						
Hispanic	(X)	(X)	−$6,285	$142	−$3,415	$68
White alone, not Hispanic	(X)	(X)	(R)	(R)	(R)	(R)
Black alone, not Hispanic	(X)	(X)	−$6,003	$143	−$5,757	$56
Asian alone, not Hispanic	(X)	(X)	−$2,152	$164	−$760	$127
Other, not Hispanic	(X)	(X)	−$3,895	$148	−$4,383	$119
Age						
25–29 years	(X)	(X)	(R)	(R)	(R)	(R)
30–34 years	(X)	(X)	$5,267	$60	$5,337	$62
35–39 years	(X)	(X)	$9,845	$63	$9,782	$63
40–44 years	(X)	(X)	$11,796	$103	$11,687	$57
45–49 years	(X)	(X)	$13,051	$114	$12,808	$63
50–54 years	(X)	(X)	$12,793	$128	$12,499	$66
55–59 years	(X)	(X)	$12,007	$118	$11,691	$66
60–64 years	(X)	(X)	$11,078	$137	$10,625	$77
Citizenship						
Native-born	(X)	(X)	(X)	(X)	(R)	(R)
Naturalized	(X)	(X)	(X)	(X)	$1,210	$77
Not a citizen	(X)	(X)	(X)	(X)	−$2,446	$85
Language						
Speak English only	(X)	(X)	(X)	(X)	(R)	(R)
Speak English "very well"	(X)	(X)	(X)	(X)	−$989	$66
Speak English less than "very well"	(X)	(X)	(X)	(X)	−$8,349	$103
Region						
New England	(X)	(X)	(X)	(X)	$8,503	$102
Middle Atlantic	(X)	(X)	(X)	(X)	$7,495	$82
East North Central	(X)	(X)	(X)	(X)	$4,370	$70
West North Central	(X)	(X)	(X)	(X)	$1,073	$96
South Atlantic	(X)	(X)	(X)	(X)	$4,415	$70
East South Central	(X)	(X)	(X)	(X)	(R)	(R)
West South Central	(X)	(X)	(X)	(X)	$3,435	$77
Mountain	(X)	(X)	(X)	(X)	$4,365	$77
Pacific	(X)	(X)	(X)	(X)	$9,516	$91
Variance explained		0.135		0.181		0.185

(R) Reference group.

(X) Not applicable.

[1] All estimates are significant at the p<.05 level.

Note: Median earnings shown for the population aged 25–64, not the total population.

Source: U.S. Census Bureau, American Community Survey, 2006–2008.

Figure 5.
Relative Dollar Value of Education and Other Factors on Median Annual Earnings
(Full-time, year-round workers)
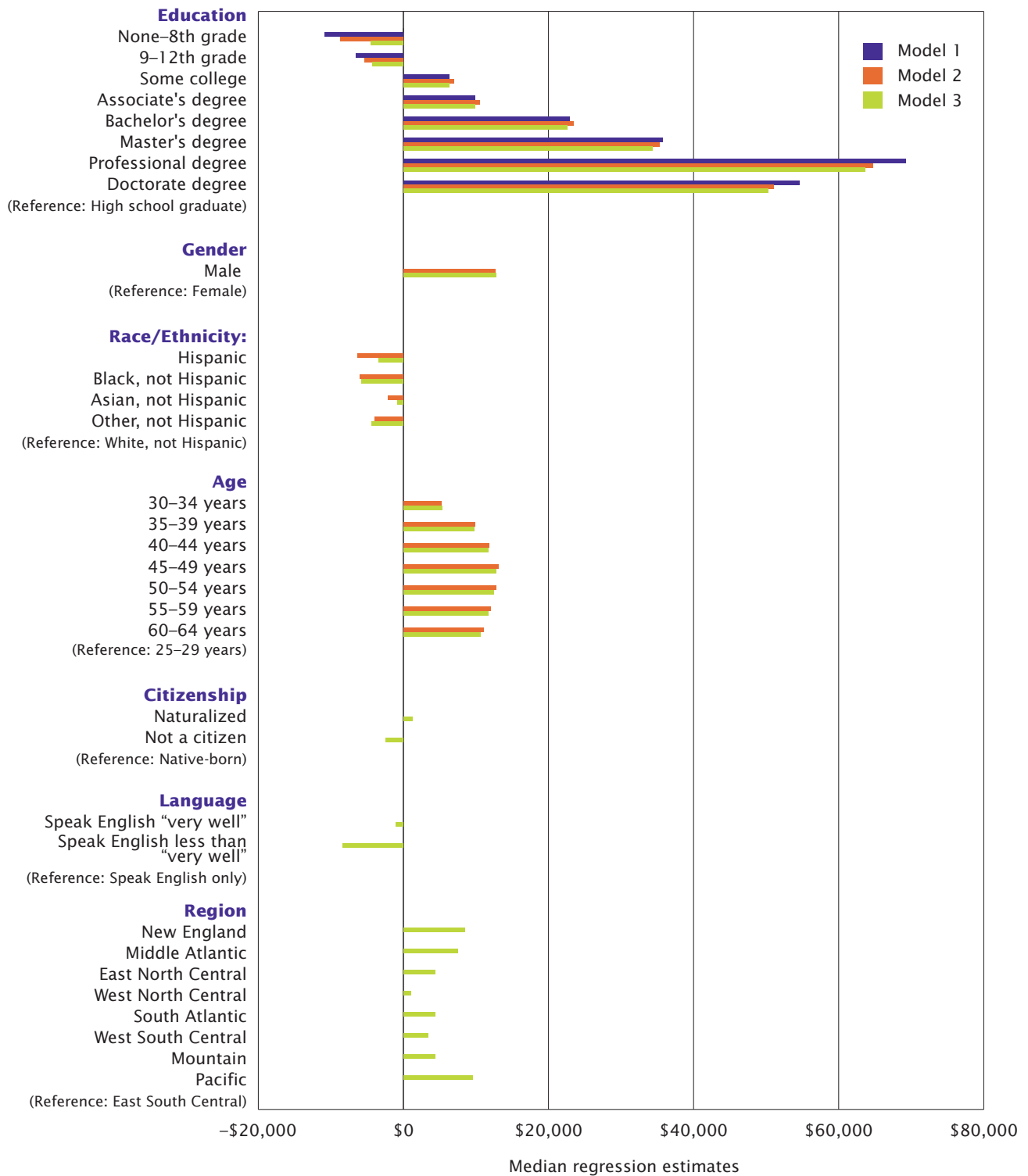
Source: U.S. Census Bureau, American Community Survey, 2006–2008.

While all of these factors are highly significant, they add only a small amount to the explained variance in the model—these results are likely a function of the extremely large sample size of the model. Naturalized citizens see a small yearly increase over native-born persons ($1,210), holding other factors constant, but persons who are not citizens show a negative impact (–$2,446).

The impact of English-speaking ability is sizable. People who speak a language other than English at home show a negative effect. Even those who report speaking another language at home, but who report that they speak English "very well" have a yearly impact of –$989, holding other factors constant. Persons who report English ability below this level show a very large effect, with a yearly loss in earnings of –$8,349, relative to persons who are English-only speakers.

Regional effects are also evident, with a range of $9,516 across the nine census-defined divisions, holding other factors constant. In general, earnings are highest in the Pacific and New England, and lowest in the East South Central, controlling for the other factors in the model.

Taken as a whole, the results in Model 3 show that other factors beyond basic demographics can have a sizable impact on estimated lifetime earnings. However, as Figure 5 graphically shows, even the addition of these various factors dampen the impact of education only marginally. While effects for education levels are relatively small (and some negative) the impact of degrees, beginning with the bachelor's degree level, are substantial with most of them far larger than any of the other social, demographic, and geographic components in the model.

SUMMARY

How much money will any of us earn in our lifetime? The answer to that question is complex and uniquely individual, resting on a vast variety of conditions and factors, some of which may be purely circumstantial or random. The SWE estimates presented in this report do not act as a proscription of what one should come to expect in life. Instead, they constitute a defined analytic explanation and disaggregation of current earnings patterns, based on a large nationally representative sample.

The results of this analysis demonstrate that there is a clear and well-defined relationship between education and earnings, and that this relationship perseveres, even after considering a collection of other personal and geographic characteristics. When synthetically expanded across 40 years of a working life, the implications of varying educational levels can be quite large—literally millions of dollars in variation. While large variations are apparent across ascribed demographic dimensions of gender and race/ethnicity, the attainable dimension of education does, at some levels, exceed and overwhelm these other dimensions. Of course, other factors not considered in this report, such as occupation or time period, may also act to mediate the effects of education and, ultimately, the earnings that accrue over time. Because the focus of this analysis has been fundamentally focused on the impact of education, we have not introduced occupational effects.

COMPUTATION ISSUES FOR SYNTHETIC WORK-LIFE EARNINGS ESTIMATES

There are a number of technical and computational issues associated with the calculation of SWE.

Several are discussed here; others are detailed in the working paper on this topic (see footnote 6).

The SWE estimates were constructed by calculating medians within a basic, five-way cross-classification table. This consisted of a nine category education variable crossed by two genders; five race/ethnicity groups; and eight age groups for a total of 720 cells for each of the three work universes. An example of this calculation is provided earlier in the report under "Synthetic Work-Life Earnings Estimates" and discussed in detail in the previously cited working paper.

Standard errors for these estimates utilized the 80 replicate weight factors provided in the ACS dataset. A simple explanation of this method is that the replicate weights are used to compute 80 different estimates as well as their standard errors with slightly different weights each time (reflecting the complex sampling design of the survey). The average of these 80 estimates constitutes a better, less biased estimate than conventional direct estimation provides.[9] Once medians were calculated for each cell, the values were multiplied by five and summed for each of the 8 age groups to represent a full life of earnings for that education level for each specific race/ethnicity by gender by work status group. These results are shown in Tables 2-A, 2-B, and 2-C.

Adding more variables to the model becomes too cumbersome for the tabular method. A regression method allowed us to explore more factors without encountering small cell size problems associated with a very large table.

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[9] See Chapter 12 of the Design and Methodology Report for more information at <www.census.gov/acs/www/SBasics/desgn_meth.htm>.

The regression modeling of earnings used the SAS QUANTREG procedure to produce coefficients at the 50th percentile and take into account the replicate weights and complex sampling design of the ACS. These models were estimated using dummy variables for each category of each variable. Model 1 accounts for the basic relationship between education and earnings only. Model 2 adds gender, race/ethnicity, and age to mimic the estimates produced in the tabular method. Model 3 takes everything in Model 2 then adds citizenship, English-speaking ability, and geographic location.

SOURCE OF THE DATA

Estimates in this report are from the ACS, 2006 to 2008. The population represented (the population universe) in the 2006 to 2008 ACS includes both the household and the group quarters populations (that is, the resident population). The group quarters population consists of the institutionalized population (such as people in correctional institutions or nursing homes) and the noninstitutionalized population (most of whom are in college dormitories).

ACCURACY OF THE ESTIMATES

Statistics from sample surveys are subject to sampling error and nonsampling error. All comparisons presented in this report have taken sampling error into account and are significant at the 90 percent confidence level. This means the 90 percent confidence interval for the difference between estimates being compared does not include zero. Nonsampling error in surveys may be attributed to a variety of sources, such as how the survey was designed, how respondents interpret questions, how able and willing respondents are to provide correct answers, and how accurately answers are coded and classified. To minimize these errors, the Census Bureau employs quality control procedures in sample selection, the wording of questions, interviewing, coding, data processing, and data analysis.

The final ACS population estimates are adjusted in the weighting procedure for coverage error by controlling specific survey estimates to independent population controls by sex, age, race, and Hispanic origin. This weighting partially corrects for bias due to over- or undercoverage, but biases may still be present, for example, when people who were missed differ from those interviewed in ways other than sex, age, race, and Hispanic origin. How this weighting procedure affects other variables in the survey is not precisely known. All of these considerations affect comparisons across different surveys or data sources. For information on sampling and estimation methods, confidentiality protection, and sampling and nonsampling errors, please see the "2006–2008 ACS 3-Year Accuracy of the Data" document located at <www.census.gov/acs/www /Downloads/data_documentation /Accuracy/accuracy2006-2008ACS3-Year.pdf>.

FOR MORE INFORMATION

Further information from the 2006 to 2008 ACS is available from the American FactFinder on the Census Bureau's Web site at <http://factfinder.census.gov /home/saff/main.html?_lang=en>.

Measures of ACS quality—including sample size and number of interviews, response and nonresponse rates, coverage rates, and item allocation rates—are available at <www.census.gov /acs/www/methodology /sample_size_and_data_quality/>.

Additional information about educational attainment is available on the Census Bureau's Web site at <www.census.gov/hhes/socdemo /education/index.html>.

CONTACT

Contact the U.S. Census Bureau Customer Services Center at 1-800-923-8282 (toll free) or visit <ask.census.gov> for further information.

SUGGESTED CITATION

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USER COMMENTS

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