

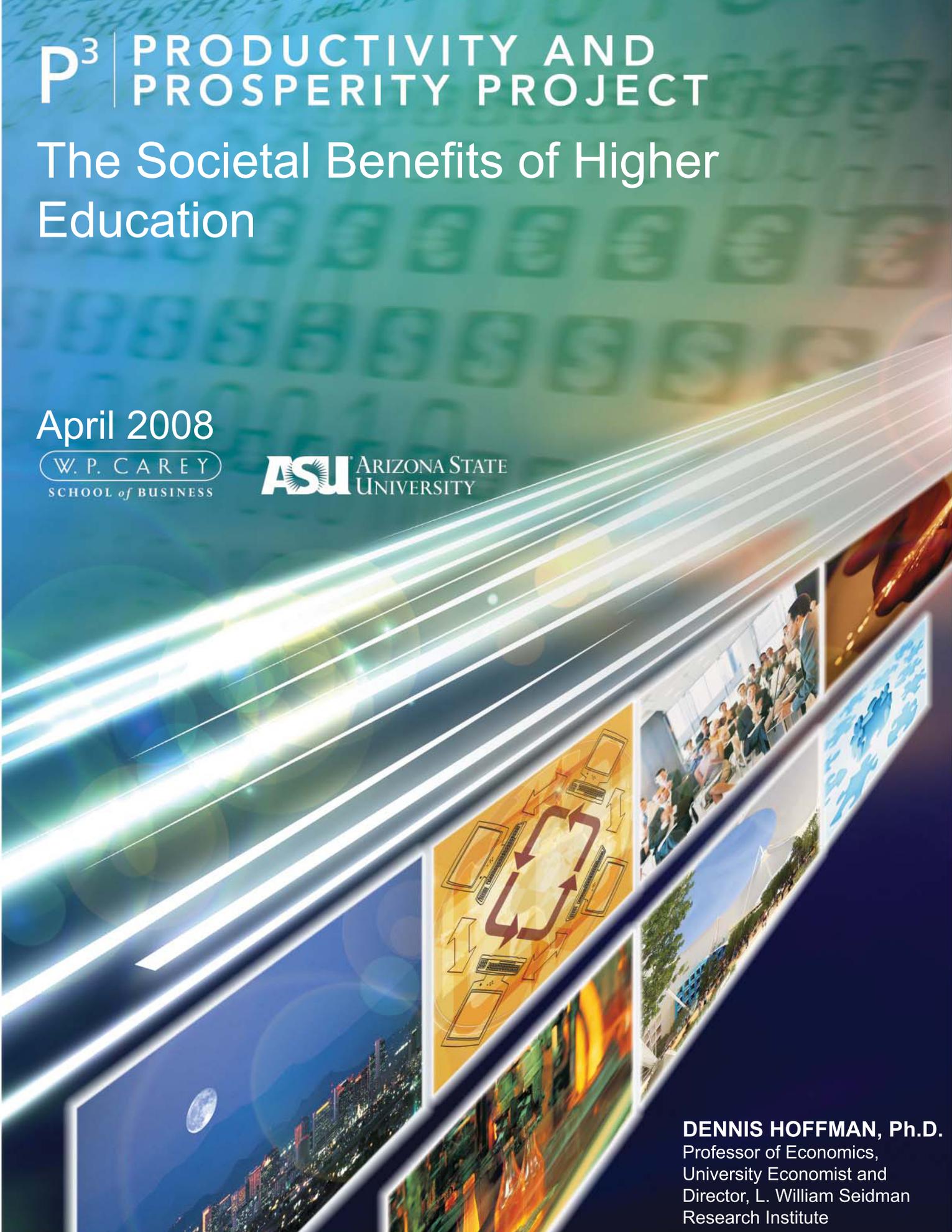
P³ | PRODUCTIVITY AND PROSPERITY PROJECT

The Societal Benefits of Higher Education

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ASU ARIZONA STATE UNIVERSITY



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THE SOCIETAL BENEFITS OF HIGHER EDUCATION

A Report from the Productivity and Prosperity Project (P3)

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SUMMARY

The educational attainment of Arizona's workforce is less than the national average and has deteriorated over time relative to the U.S. average. Job quality and average earnings in Arizona also are below the national average. These three factors — job quality, earnings, and educational attainment — are interrelated. On average, the higher the educational attainment of a worker, the higher are his or her earnings. The largest increase by far occurs with the completion of a university degree. In Arizona, the average earnings of those with a college degree are approximately \$28,140 (73 percent) higher than those with only some college. Thus, working individuals financially benefit from enhancing their educational attainment.

It is likely that the below-average job quality in Arizona disproportionately attracts a workforce with below-average educational attainment, and also that the subpar educational attainment in Arizona disproportionately attracts lower-wage job creation. If the state is to achieve a higher job quality, along with higher wages and an enhanced standard of living for its residents, it likely will be necessary to make changes in economic development policy *and* to increase the educational attainment of the workforce.

The share of the Arizona workforce with at least a bachelor's degree was approximately 1 percentage point less than the national average in 2000, but the differential may be close to 3 percentage points lower today. If the proportion in Arizona was 1 percentage point higher than the actual figure, then an additional 30,320 workers would have a bachelor's degree instead of some college as their maximum attainment. Aggregate earnings would be \$853 million higher, resulting in increased spending at Arizona merchants and increased tax collections by Arizona governments. Thus, monetary societal benefits also accrue when individuals enhance their educational attainment.

In addition, an increase in the share of college graduates raises the earnings of other workers as well. The benefits "spill over" to all workers due to enhanced worker productivity associated with greater educational attainment. While the effect on other workers is modest — an increase in earnings of less than 2 percent, or about \$500 or less, per worker per year — these effects apply to all 3 million members of the Arizona workforce. Thus, the aggregate spillover is large at \$1,262 million, exceeding the aggregate \$853 million realized by those workers who increased their educational attainment. The total societal impact therefore is \$2,115 million per year.

An increase in the share of college-educated individuals in the Arizona workforce could be achieved through higher educational attainment of those who move to Arizona: an increase in the share of more highly educated in-migrants (from elsewhere in the United States or from other countries) and/or a decrease in the share of highly educated out-migrants. Similarly, an increase in the share of college-educated individuals in the Arizona workforce could result from enhanced educational attainment of Arizona's youths and young adults.

It likely will take years to achieve an additional 30,320 college graduates (a 1 percentage point increase in the share of college graduates) over and above the state's natural rate of growth in number of college graduates. Thus, the full \$2.1 billion in higher annual earnings will not be realized immediately.

Society benefits in other ways from a populace that is better educated. Nonmonetary societal benefits in regions with high proportions of college graduates include lower crime rates, greater and more informed civic participation, and improved performance across a host of socioeconomic measures.

EARNINGS AND EDUCATION

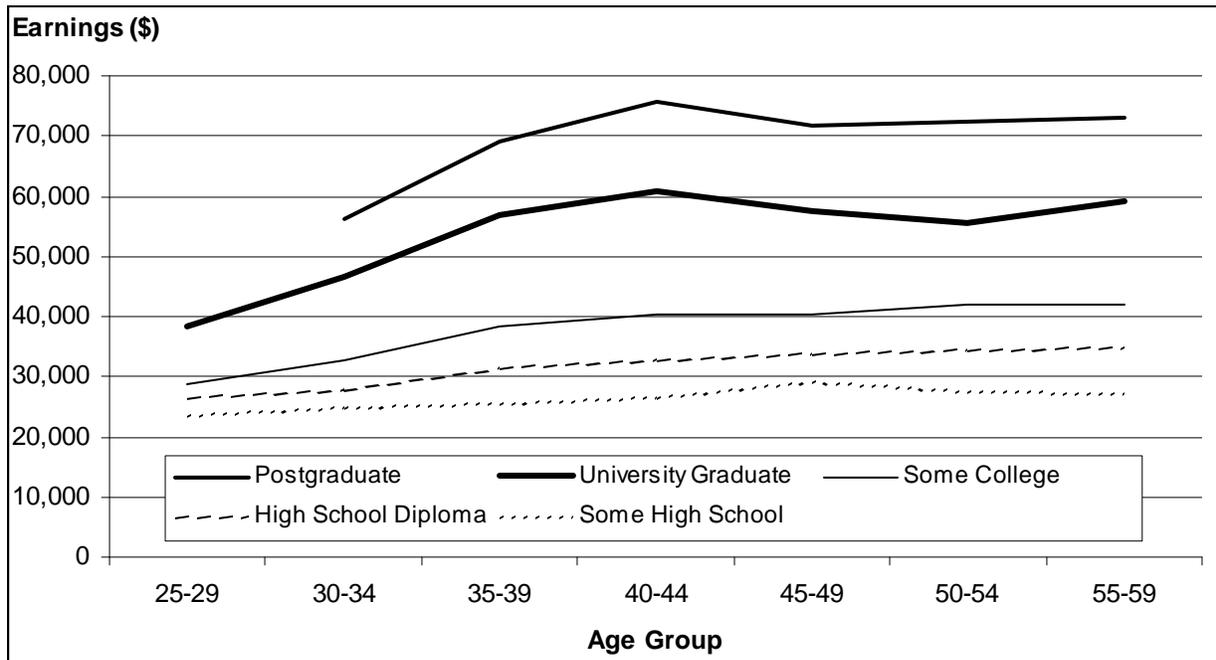
Workforce earnings are directly related to educational attainment: on average, the higher the educational attainment of a worker, the higher are his or her earnings. As seen in Table 1, while earnings rise with increased educational attainment across the entire distribution of attainment, the largest increase by far occurs with the completion of a university degree. More detail is displayed in Chart 1, splitting the bachelor's degree or more category into two and showing earnings by age. The conclusion is obvious — individuals benefit considerably from enhancing their educational attainment.

TABLE 1
EARNINGS BY EDUCATIONAL ATTAINMENT IN ARIZONA IN 1999

Maximum Educational Attainment	All Who Worked During 1999		Full-Time, Year-Round Workers	
	Mean Earnings	Percentage of the Total	Mean Earnings	Percentage of the Total
Total	\$31,638		\$40,482	
Less than High School	18,200	57.5%	24,194	59.8%
High School Graduate	24,271	76.7	30,655	75.7
Some College	29,343	92.7	37,380	92.3
Bachelor's Degree or More	51,185	161.8	61,209	151.2

Source: U. S. Department of Commerce, Census Bureau, 2000 census, PHC-T-39.

CHART 1
MEAN ANNUAL EARNINGS BY AGE
AND MAXIMUM EDUCATIONAL ATTAINMENT IN ARIZONA
Full-time, Year-Round Workers, 1999



Source: U.S. Department of Commerce, Bureau of the Census, 2000 Census Public Use Microdata Sample.

Further, the differential in earnings by educational attainment has increased over time, with earnings by university graduates rising considerably. Chart 2 displays the earnings ratio between those whose maximum educational attainment is a bachelor's degree and those with less educational attainment, using national data. The rising ratio reflects the transition of the national economy to a knowledge economy in which highly educated individuals are especially valued.

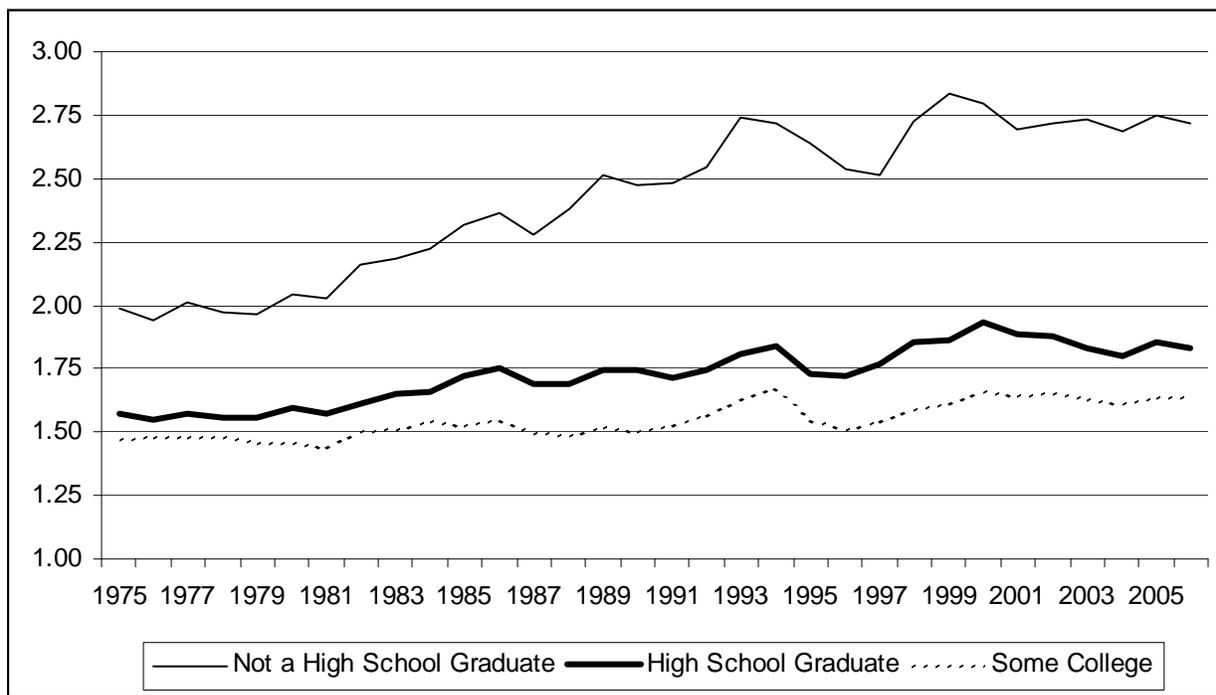
EDUCATIONAL ATTAINMENT

The most commonly expressed measure of educational attainment is the maximum education achieved by individuals aged 25 or older. Versions of this measure include the percentage of the population who are at least a high school graduate and the share with at least a bachelor's degree.

Based on the percentage of the population aged 25 or older, educational attainment in Arizona is similar to the national average. According to the 2000 census, the percentage of the population 25 or older with at least a high school diploma was slightly higher in Arizona than the national average, but the share with at least a bachelor's degree was a little less than the U.S. average.

Educational attainment based on all residents aged 25 or older does not necessarily provide an accurate representation of the educational attainment of the workforce. In Arizona, labor force participants have less educational attainment than their national counterparts. The educational attainment of younger adults in Arizona is far below the national average while the

CHART 2
MEAN EARNINGS OF WORKERS AGED 18 OR OLDER IN UNITED STATES
RATIO OF THOSE WITH A BACHELOR'S DEGREE
TO THOSE WITH LESS EDUCATIONAL ATTAINMENT

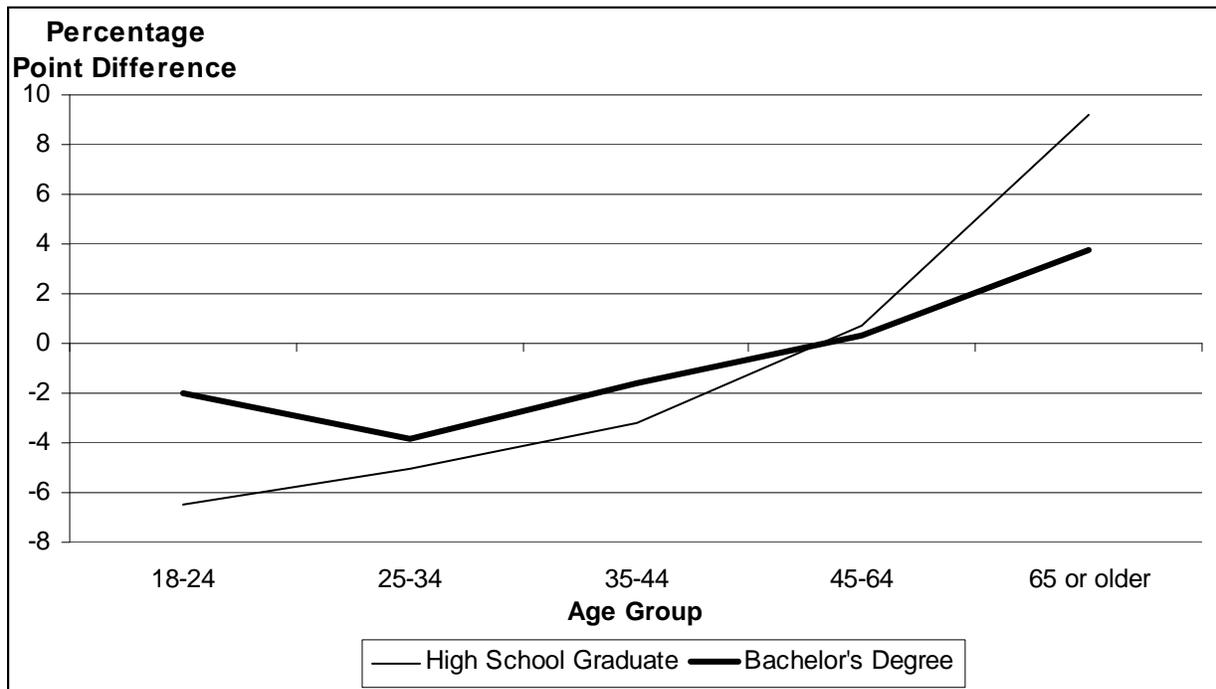


Source: U.S. Department of Commerce, Bureau of the Census, Current Population Survey.

older population, especially those of retirement age, have much higher attainment in Arizona than nationally (see Chart 3).

Educational attainment of labor force participants aged 25 to 64 is summarized in Table 2. (Results are similar for the labor force aged 18 to 64, though Arizona compares less favorably.) Looking first at the figures from the 2000 census, the workforce in Arizona had lesser attainment than the national average based on both the high school graduate and university

CHART 3
EDUCATIONAL ATTAINMENT IN ARIZONA IN 2000 RELATIVE TO THE NATIONAL AVERAGE BY AGE GROUP, POPULATION 18 OR OLDER



Source: U.S. Department of Commerce, Bureau of the Census, 2000 census, PHC-T-39.

TABLE 2
EDUCATIONAL ATTAINMENT OF LABOR FORCE PARTICIPANTS AGED 25 TO 64

Maximum Educational Attainment	1990	2000	2006	Change	
				1990-2000	2000-2006
High School Graduate or More					
United States	84.5%	87.8%	89.6%	3.3	1.8
Arizona	86.0	86.0	87.4	0.0	1.4
Arizona less United States	1.5	-1.8	-2.2	-3.3	-0.4
Bachelor's Degree or More					
United States	24.8	28.6	31.8	3.8	3.2
Arizona	24.7	27.4	29.0	2.7	1.6
Arizona less United States	-0.1	-1.2	-2.8	-1.1	-1.6

Source: U.S. Department of Commerce, Census Bureau, 1990 and 2000 censuses and 2006 American Community Survey.

graduate versions of the measure. Comparing the 2000 census figures to those from the 1990 census and those from the 2006 American Community Survey, educational attainment among Arizona's workforce has deteriorated over time relative to the U.S. average. (Since the survey error from one year of the American Community Survey is much greater than from the decennial census, the change between 2000 and 2006 needs to be interpreted cautiously.)

EDUCATIONAL ATTAINMENT AND ECONOMIC DEVELOPMENT

Average earnings in Arizona in 2006 (the last year for which complete economic data are available) were 5 percent less than the national average, calculated from U.S. Bureau of Economic Analysis data that include proprietors as well as wage and salary workers. This differential is typical of the historical record, as Arizona's average earnings have ranged from nearly equal to the national average in the early 1970s to more than 10 percent less in the early 1990s.

A number of factors contribute to lower average earnings in Arizona. Some cannot be affected by public policy. For example, it appears that people are willing to move to Arizona and accept a lower wage than they would demand elsewhere due to the perceived benefits of living in Arizona, particularly the moderate winter climate. Other factors, such as job quality, can be influenced by public policy, largely through economic development policies. Economic development is defined broadly in this sense to include quality workforce development, quality public infrastructure, an emphasis on quality of life and amenities, and maintaining a business climate conducive to attracting quality employment opportunities.

Job quality — which in Arizona is less than the national average — is closely related to educational attainment. It is unclear to what extent the below-average job quality in Arizona disproportionately attracts a workforce with below-average educational attainment, and to what extent the subpar educational attainment in Arizona disproportionately attracts lower-wage job creation. It is likely that a dual relationship exists: (1) because a disproportionate share of the jobs created do not require a university degree, the workforce has subpar educational attainment, and (2) because Arizona's educational attainment is below average, a lesser share of higher-quality jobs are created in the state. Thus, if the state is to achieve a higher job quality, along with higher wages and an enhanced standard of living for its residents, it likely will be necessary to make changes in economic development policy *and* to increase the educational attainment of the workforce.

THE SOCIAL FINANCIAL RETURN TO HIGHER EDUCATION

During 2006, approximately 3,032,000 Arizonans were part of the workforce. If the share of the workforce with at least a bachelor's degree had been one percentage point higher than the actual figure, then 30,320 workers would have had a bachelor's degree instead of some college as their maximum attainment. On average, the earnings of those with a college degree are considerably higher than those with only some college. Thus, substantially higher aggregate earnings would have been present in Arizona, as seen in Table 3. (The mean earnings figures include those working part time and/or less than year round.) The additional \$853 million in earnings would have resulted in increased spending at Arizona merchants and increased tax collections by Arizona governments. Thus, in addition to the personal benefit realized by the individuals with enhanced educational attainment, societal benefits would accrue as well.

The higher earnings of individuals with greater educational attainment is not the only financial benefit to society that results from increasing the educational attainment of the

workforce. According to Enrico Moretti in his 2004 *Journal of Econometrics* paper, “Estimating the Social Return to Higher Education: Evidence from Longitudinal and Repeated Cross-Sectional Data,” economists have speculated for at least a century that the social return to education may exceed the private return. Moretti was the first to quantify this, estimating the effect on the earnings of all working adults from increasing the proportion of the workforce with a university degree.

Moretti found that a 1 percentage point increase in the share of college graduates (alternatively, a “1 percent increase in the proportion of college-educated workers”) raised wages throughout the workforce. He estimated the increase in wages by the educational attainment of workers:

- 1.9 percent among those with less than a high school diploma
- 1.6 percent among high school graduates
- 1.2 percent among those with some college
- 0.4 percent among college graduates.

Thus, it is not just individuals who benefit financially from enhancing their educational attainment. Instead, the benefits “spill over” to all workers. This spillover can be traced to the enhanced worker productivity associated with greater educational attainment. Improved productivity results from the sharing of knowledge and skills across workers and from shifts in the industrial mix to knowledge-based activities. These productivity gains translate into higher output and earnings.

The aggregate impact of these higher wages is shown in Table 4. While the effect on other workers is modest (an increase in earnings of less than 2 percent, or about \$500 or less, per worker per year), these effects apply to all 3 million members of the Arizona workforce. Thus, the aggregate spillover (“Moretti effect”) is large at \$1,262 million, exceeding the aggregate \$853 million realized by those workers who increased their educational attainment. The total societal impact therefore is approximately \$2,115 million per year.

As discussed in the prior section, for Arizona to realize a more educated workforce will require changes in both economic development policy and educational policy. In order to achieve an additional 30,320 college graduates (a 1 percentage point increase in the share of college graduates) over and above the state’s natural rate of growth in number of college graduates likely will take years to achieve. Thus, the full \$2.1 billion in higher annual earnings will not be realized immediately.

This analysis represents a point-in-time snapshot of the effects of a more educated workforce based on the situation in Arizona in 2006. In reality, during the time it will take to achieve the higher educational attainment and higher earnings, Arizona’s workforce will continue to grow and the inflation-adjusted earnings of workers will continue to rise. Thus, to achieve a 1 percentage point increase in the share of university graduates, more than 30,320 additional degrees eventually will be necessary, but the benefit will exceed \$2.1 billion per year.

An increase in the share of college-educated individuals in the Arizona workforce could be achieved through higher educational attainment of those who move to Arizona: an increase in the share of more highly educated in-migrants (from elsewhere in the United States or from other countries) and/or a decrease in the share of highly educated out-migrants. Similarly, an increase in the share of college-educated individuals in the Arizona workforce could result from enhanced educational attainment of Arizona’s youths and young adults.

Whether the enhanced educational attainment comes from migrants or existing Arizonans, job quality in Arizona needs to be enhanced in order to retain these more highly

TABLE 3
CHANGE IN EARNINGS IN ARIZONA IN 2006
DUE TO THE HIGHER EARNINGS OF INDIVIDUALS ENHANCING THEIR EDUCATIONAL ATTAINMENT

Maximum Educational Attainment	Mean Earnings	Change in Number of Workers	Aggregate Change in Earnings (in millions)
Some College	\$38,516	-30,320	\$-1,167.805
Bachelor's Degree or More	66,656	30,320	2,021.010
TOTAL			853.205

Source: Calculated from U.S. Department of Commerce, Bureau of Economic Analysis.

TABLE 4
CHANGE IN EARNINGS IN ARIZONA IN 2006 DUE TO THE MORETTI EFFECT

Maximum Educational Attainment	Mean Earnings in 2006	Moretti Effect	Increase in Earnings	Number of Workers	Aggregate Change in Earnings (in millions)
Less Than High School	\$23,606	1.9%	\$449	483,758	\$217.207
High School Diploma	31,481	1.6	504	692,452	348.996
Some College	38,059	1.2	457	1,099,330	502.394
Bachelor's Degree or More	66,390	0.4	266	726,168	193.161
TOTAL					1,261.758

Source: Calculated from U.S. Department of Commerce, Bureau of Economic Analysis and Census Bureau, and Moretti (2004).

qualified individuals. While an improvement in the educational attainment of workers in Arizona by itself might result in somewhat better overall job quality, this would occur only with a lag. Further, it is unlikely that improving educational attainment alone would have the effect of creating enough high-quality jobs to meet the demand of the increased number of college graduates. Thus, any strategy to enhance the educational attainment of Arizonans needs to be paired with an economic development strategy to create a greater share of higher-quality jobs.

OTHER SOCIETAL BENEFITS FROM ENHANCED EDUCATION

Society benefits in other ways from a populace that is better educated. Nonmonetary societal benefits in regions with high proportions of college graduates include lower crime rates, greater and more informed civic participation, and improved performance across a host of socioeconomic measures. Intergenerational social benefits may be very large as degree attainment today translates into higher probabilities of degree attainment in future generations.

THE PRODUCTIVITY AND PROSPERITY PROJECT

The Productivity and Prosperity Project: An Analysis of Economic Competitiveness (P3) is an ongoing initiative begun in 2005, sponsored by Arizona State University president Michael M. Crow. P3 analyses incorporate literature reviews, existing empirical evidence, and economic and econometric analyses.

Enhancing productivity is the primary means of attaining economic prosperity. Productive individuals and businesses are the most competitive and prosperous. Competitive regions attract and retain these productive workers and businesses, resulting in strong economic growth and high standards of living. An overarching objective of P3's work is to examine competitiveness from the perspective of an individual, a business, a region, and a country.

THE CENTER FOR COMPETITIVENESS AND PROSPERITY RESEARCH

The Center for Competitiveness and Prosperity Research is a research unit of the L. William Seidman Research Institute in the W. P. Carey School of Business at Arizona State University. The Center administers the Productivity and Prosperity Project: An Analysis of Economic Competitiveness (P3), and the Office of the University Economist. These ongoing initiatives began in 2005 and are sponsored by university president Michael M. Crow.

Specializing in applied economic and demographic research with a geographic emphasis on Arizona and the metropolitan Phoenix area, the Center also conducts research projects under sponsorship of private businesses, nonprofit organizations, government entities, and other ASU units.



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