

THE IMPACT OF ARIZONA STATE UNIVERSITY GRADUATES EMPLOYED IN ARIZONA IN 2015

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SUMMARY

Arizona State University (ASU) graduates are employed throughout the world. This paper examines only those graduates employed in Arizona — those contributing to the productivity and prosperity of the state.

Approximately 223,600 ASU graduates were working in Arizona in 2015. More than one-in-four of the state's working individuals who had earned at least a bachelor's degree had graduated from ASU. The aggregate earnings of the ASU graduates were around \$13.2 billion. Based on these earnings, these individuals contributed between \$941 million and \$1.079 billion in state and local government taxes, including between \$560 million and \$642 million in state government taxes, depending on the tax rate assumed.

The estimate of the number of ASU graduates working in Arizona in 2015 is based on actual employment and wage data for 143,871 individuals who graduated from ASU between 1990 and 2015 and were covered by the state's unemployment insurance program. Estimates of those who graduated from ASU prior to 1990 and of ASU graduates who were not covered by the unemployment insurance program but were working in Arizona in 2015 were added to the 143,871 figure to reach the total of approximately 223,600.

The impact of ASU graduates working in Arizona has increased gradually over time. Between 2012 and 2015, the share of the Arizona workforce who were ASU graduates increased from 6.17 percent to 6.31 percent. The share of aggregate wages earned by ASU graduates increased more, from 8.28 percent to 8.68 percent. Thus, the average wage of ASU graduates climbed from 137.3 percent of the average wage of other workers to 141.1 percent. The estimated share of Arizona workers holding at least a bachelor's degree who are a graduate of ASU also has climbed. In 2012, the share was 25.9 percent; in 2015, the estimate was 28.0 percent.

DESCRIPTION OF DATA

University Graduates Employed in Arizona

For each year from 2012 through 2015, the Arizona Board of Regents (ABOR) has created a dataset of graduates of Arizona's three public universities who were employed in Arizona during the year. While the ABOR dataset includes the number of "degrees awarded," this number really refers to the number of individuals earning a degree. An individual earning more than one degree is counted only once in this dataset, categorized in the year of the most recent degree. Thus, the dataset's number of "degrees awarded" is less than the official number of degrees awarded.

The ABOR dataset is created by matching Social Security numbers of university graduates to the numbers in the unemployment insurance file maintained by the Arizona Department of Economic Security, which works in conjunction with the U.S. Department of Labor. Reporting from the unemployment insurance file — the Quarterly Census of Employment and Wages (QCEW) — is done quarterly, with annual average figures also produced.

Each quarter, every business that employs workers covered by the state's unemployment insurance program must report (1) employment in each of the three months of the quarter during the pay period that includes the 12th day of the month and (2) total wages paid by the business during the quarter. Federal government civilian workers covered by the comparable federal unemployment insurance program also are included in the reporting.

Various members of the workforce are not included in the QCEW: most agricultural workers on small farms, those self-employed, those in the Armed Forces, and various others. Reporting is by job, not by individual — an individual working more than one covered job will appear in the file more than once.

Since the unemployment insurance records are confidential, ABOR's dataset of graduates employed in Arizona includes only aggregate totals. There are two significant limitations to this dataset. First, the unemployment insurance file does not include a significant number of workers — in 2015, the employment count from the unemployment insurance file was only 74 percent of the total employment in Arizona, as reported by the U.S. Bureau of Economic Analysis (BEA). Second, the dataset of graduates employed in Arizona constructed by the Board of Regents only includes graduates since 1990. Thus, the number of graduates of Arizona's public universities who are working in Arizona is understated significantly. This understatement effectively becomes even larger when the number of *individuals* counted in the Board of Regents dataset is compared to the total number of *jobs* reported in the QCEW.

The dataset constructed by the Board of Regents is subdivided by various characteristics:

- university
- bachelor's degrees versus graduate degrees
- those who attended school as Arizona residents versus nonresidents

The analysis described in this paper uses a dataset specific to Arizona State University (ASU) provided by ASU's Office of the University Provost.

By year of graduation, the following data items are available from the dataset of university graduates employed in Arizona:

- number of graduates
- number employed in Arizona (in any quarter during the year)
- percent of graduates employed in Arizona
- total wages of graduates employed in Arizona
- estimated state taxes paid by graduates employed in Arizona
- number employed in Arizona in all four quarters
- median wage of those employed in Arizona in all four quarters

The number of graduates is reported by academic year — for example, for 2015, the sum of the number graduating in August 2014, December 2014, and May 2015. The employment data are for calendar year 2015.

While the median wage of those employed in all four quarters is a reasonable measure of the typical annual wage of graduates included in the dataset, use of the median wage is arithmetically quite limited. Thus, the average wage of those employed in any quarter during the year also is calculated, as total wages divided by the total number employed.

Employment

The employment figures reported in the QCEW are based on a census of all covered workers and therefore are highly accurate, but as noted above, a large number of workers are not covered by the unemployment insurance program. Thus, focusing only on those covered by the program significantly understates the contribution of university graduates to the Arizona economy.

Employment estimates are available from several sources, but these estimates are not consistent due to definitional differences (certain categories of workers may be excluded by one source but not by another), differences in the way the data are collected (such as a sample of employers versus a census), and timing differences in when the data are collected. In order to provide a more complete picture of the economic activity in Arizona of ASU graduates, more complete employment estimates from the BEA are used in this report. BEA employment data for 2015 were not released until late September 2016.

Most of the employment estimates, including those of the QCEW and BEA, do not differentiate between a person working full time and one working fewer hours. Employment is categorized by the place of work, not by where the worker lives. For example, an Arizona resident of Bullhead City who works across the Colorado River in Laughlin, Nevada is counted in the Nevada employment figures. Further, most of the employment estimates report the number of jobs, not the number of people employed — an individual working two jobs is counted twice in the employment figures. This is an important distinction when comparing the number of ASU graduates (individuals) employed in Arizona to total employment (number of jobs).

Unlike other employment estimates, the employment data reported from the American Community Survey (ACS) reflects the number of individuals working and workers are classified by place of residence. The ACS is an ongoing survey of households conducted by the U.S. Census Bureau that is the source of a wide variety of socioeconomic data. The main shortcoming

of the ACS is that it is based on a relatively small number of households. Sampling error can be a significant concern. The accuracy of self-reporting, particularly for questions related to wages and income, also is an issue. Various ACS tables provide insight on employment in Arizona. The ACS employment figures are based on an individual's employment status at the time the questionnaire is completed.

Educational Attainment

In order to provide context on the contribution of ASU graduates employed in Arizona, the educational attainment of the Arizona workforce is examined. The ACS is the best source of data on educational attainment at a subnational level. In this report, Arizona's educational attainment is compared to the nation using three ACS tables: attainment for the population age 25 or older, attainment in each of five age groups, and attainment by labor force status among those 25-to-64 years old.

While ACS data for five years often are combined to reduce sampling error, the ACS data from 2015 are used in this analysis in order to be consistent with the Board of Regents dataset. For Arizona, sampling error for a single year of ACS data ranges from insignificant for broad measures to significant for small subsets of the population. Thus, the attainment data for the entire population at least 25 years of age is more reliable than the data for each of five age groups.

The Impact of College Graduates on the Workforce

Educational attainment is strongly correlated to an individual's earnings, with a bachelor's degree in particular causing a boost in earnings. The higher earnings realized over a lifetime of work greatly exceeds the costs of attending college.¹ Society also benefits from an educated populace in various ways, such as the lower crime rates of educated individuals.²

One of the benefits of having highly educated individuals in the workforce is to raise the wages of the entire workforce. Enrico Moretti specified this relationship in his 2004 *Journal of Econometrics* paper, "Estimating the Social Return to Higher Education: Evidence From Longitudinal and Repeated Cross-Sectional Data."³ The spillover of benefits to all workers 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.⁴

¹ See "Has the Return to Investing in a College Education Declined?," December 2013, and earlier papers at <http://economist.asu.edu/p3/education>.

² See "Benefits From Improving Educational Attainment in Arizona," August 2012, and earlier papers at <http://economist.asu.edu/p3/education>.

³ Accessible from <http://economist.asu.edu/p3/education>.

⁴ See "The Economic Impact of Raising the Educational Attainment of Arizona's Workforce," May 2015, at <https://wpcarey.asu.edu/sites/default/files/uploads/center-competitiveness-and-prosperity-research/impactedattain05-15.pdf>.

ARIZONA STATE UNIVERSITY GRADUATES EMPLOYED IN ARIZONA IN 2015

Employment

According to the QCEW, annual average Arizona employment in 2015 totaled 2,609,425. The BEA's wage and salary employment estimate was 2,743,361, meaning that approximately 133,936 wage and salary workers were not covered by unemployment insurance. The BEA estimates that the number of proprietors (self-employed, also not included in the QCEW) was 799,608, for a total employment figure of 3,542,969.

According to the ACS, an estimated 2,937,510 Arizonans were employed in 2015 in civilian jobs; an additional 17,617 were members of the armed forces. The total of 2,955,127 is 83 percent of the BEA's total number of jobs, suggesting that many workers (1) are employed by more than one business and/or (2) hold a wage and salary job as well as report self-employment income. Other data from the ACS indicates that 23 percent of employed Arizonans worked less than 35 hours per week.

Educational Attainment

Most commonly, educational attainment is expressed for those at least 25 years old. Though the age of 25 is arbitrary, a high proportion of individuals have completed their educations by that age. In 2015, Arizona's educational attainment in this large cohort was inferior to the nation. The share without either a high school diploma or a GED (general education development) certificate was higher in Arizona: 13.9 percent versus 12.9 percent nationally. Relative to the nation, lesser shares of Arizonans had earned a graduate degree (10.3-versus-11.6 percent nationally) and a bachelor's degree (17.4-versus-19.0 percent).

An examination of educational attainment by age group reveals that Arizona was particularly far below the nation among those younger than 35 in 2015. Arizona also was below average among those 35-to-64 years old. In contrast, the educational attainment of those 65 or older was higher in Arizona than nationally. Since few of those age 65 or older are working, the standard statistics on the entire 25-or-older population understate Arizona's educational disadvantage as it applies to the workforce.

Data on educational attainment by labor force status indicate that among those in the workforce, the educational attainment in Arizona of those 25-to-64 years old was below the national figure in 2015. The proportion with at least a bachelor's degree was 31 percent in Arizona and 36 percent nationally.

Arizona State University Graduates Employed in Arizona

The following are among the basic conclusions that can be reached using the dataset of ASU graduates from academic years 1990 through 2015 who were employed in Arizona in 2015:

- The number of individuals earning a degree has increased significantly over time.
- The number of individuals earning a degree has been much higher for those who were classified as residents while attending school than among those classified as nonresidents.
- The percentage of graduates employed in Arizona has been much higher for residents than nonresidents.

- The share of graduates employed in Arizona decreases significantly with the number of years since graduation, for those who were classified as residents and nonresidents while students.
- The average wage and the median wage increase significantly with the number of years elapsed since graduation.
- The median wage has been about the same for residents and nonresidents, as has the average wage.
- The average wage (of all graduates employed at some point during the year) was less than the median wage (of graduates employed in all four quarters) among recent graduates, likely due to those not employed in all four quarters lowering the calculated average wage. Among older graduates, this downward bias in the average wage is overcome, presumably because of a small number of graduates earning very high wages that boosts the average but not the median.
- The percentage employed in all four quarters was less than 80 percent among recent graduates but was greater than 80 percent among older graduates.
- Data for graduates in the most recent academic year are inconsistent with graduates of earlier years. For those graduating in academic year 2015 relative to earlier grads, the percent employed in Arizona is high, the average wage and median wage is very low, and the percentage employed in all four quarters is very low. The inconsistent data of the academic year 2015 graduates presumably results from those graduating in May 2015 (the majority of the academic year graduates) — for these individuals, the employment and wage data for calendar year 2015 reflect full-time employment after graduating and/or part-time employment while still attending school.

The number of individuals who graduated from ASU between academic years 1990 and 2015 who worked at jobs in Arizona that were covered by the unemployment insurance program in calendar year 2015 was 143,871. ASU graduates between 1990 and 2015 accounted for 5.5 percent of the QCEW total number employed, but this share is understated since it compares *individuals* with ASU degrees to the *number of jobs*.

The aggregate wages of individuals who graduated from ASU between academic years 1990 and 2015 (\$8.9 billion) accounted for 7.1 percent of the QCEW total. The average wage of ASU graduates between 1990 and 2015 of \$61,562 was 30.6 percent higher than the average of the rest of the QCEW file (a group that includes those without a bachelor’s degree, those who earned a degree from another institution, and ASU graduates from prior to 1990). ABOR estimates that “state tax revenue” (really, state and local government tax revenue in Arizona) in 2015 by those who graduated from ASU between 1990 and 2015 — based only on wages earned as part of the unemployment insurance program — was \$633 million: 7.15 percent of aggregate wages.

Detailed figures from the dataset of 1990-through-2015 graduates of Arizona State University who were employed in Arizona during 2015 are provided in the appendix. Figures are shown by undergraduate versus graduate degree and by residency status while a student. A summary of the

cumulative figures for the 26 years of graduates is provided in the top portion of Table 1. The bottom portion of Table 1 focuses on academic year 2014 graduates.⁵

Table 1 needs to be interpreted carefully. Student characteristics vary by residency status and by undergraduate and graduate programs. For example, the magnitude of the difference in the average wage between undergraduate and graduate degrees reflects not only the wage premium of the graduate degree but also the greater number of years of work experience among those with a graduate degree. The differential in the average wage of those with undergraduate and graduate degrees declines with the number of years of work experience. Among graduates from academic year 2014, the average wage in 2015 of those with a graduate degree was 71 percent higher than those with a bachelor's degree, but the differential for graduates over the entire 1990-to-2015 period was 41 percent. According to the 2015 ACS, all Arizona workers with a graduate degree (including those graduating before 1990) earned 22 percent more than those with a bachelor's degree.

Alternative Estimates of Taxes Paid

According to a study of tax burdens produced by the government of the District of Columbia, combined state and local government taxes in Arizona are about 7.8 percent of gross income except among those earning less than \$50,000 per year.⁶ This percentage is slightly understated since this study does not measure every state and local tax, though it includes income taxes, sales taxes, property taxes, and automobile-related taxes. A study by the Institute on Taxation and Economic Policy (ITEP), which includes all taxes, reports a similar state and local government tax burden in Arizona.⁷ The figure is 8.2 percent for those earning between \$52,000 and \$87,000; the average wage of ASU graduates employed in Arizona reported by the ABOR is within this range. Using the 8.2 percent tax rate and the aggregate income figures calculated from the ABOR dataset, Arizona state and local government taxes paid on QCEW wages by those who graduated from ASU between 1990 and 2015 was approximately \$726 million in 2015.

In order to estimate the amount of taxes paid just to state government, U.S. Census Bureau data were used. In fiscal year 2013, state tax collections accounted for 59.5 percent of combined state and local government tax collections in Arizona.⁸ Applying this percentage to the estimates of state and local government taxes paid on QCEW wages by those who graduated from ASU between 1990 and 2015, the result is \$377 million based on the ABOR state and local government tax rate of 7.15 percent and \$432 million based on the 8.2 percent state and local government tax rate.

⁵ Graduates from 2014 instead of 2015 are used since the statistics for those graduating in May 2015 are inconsistent with those of earlier graduates.

⁶ "Tax Rates and Tax Burdens in the District of Columbia — A Nationwide Comparison, 2014," December 2015, Government of the District of Columbia, <http://cfo.dc.gov/node/215912>.

⁷ Institute on Taxation & Economic Policy, *Who Pays? A Distributional Analysis of the Tax Systems in All 50 States*, January 2015, <http://www.itep.org/whopays/>.

⁸ U.S. Department of Commerce, Census Bureau, State and Local Government Finance, <http://www.census.gov/govs/local/>.

TABLE 1
ARIZONA STATE UNIVERSITY GRADUATES

	Total	Total Under-grad Degrees	Resident Under-grad Degrees	Non-resident Undergrad Degrees	Total Graduate Degrees	Resident Graduate Degrees	Non-resident Graduate Degrees
Graduates From 1990 Through 2015:							
Number Graduating From Arizona State University	294,086	211,635	167,971	43,664	82,451	52,021	30,430
Employed in Arizona and Covered by the Unemployment Insurance Program in 2015:							
Number	143,871	108,595	99,881	8,714	35,276	29,795	5,481
Share (Percent)	49	51	60	20	43	57	18
Aggregate Wages (Dollars, Millions)	8,856	6,078	5,590	488	2,779	2,369	410
Average Wage (Dollars)	61,562	55,967	55,962	56,017	78,787	79,505	74,887
Estimated State Tax Payments (Dollars, Millions)	633	437	402	35	196	167	29
Graduates From 2014:							
Number Graduating From Arizona State University	18,398	13,097	9,958	3,139	5,301	2,712	2,589
Employed in Arizona and Covered by the Unemployment Insurance Program in 2015:							
Number	10,966	8,289	7,477	812	2,677	2,067	610
Share (Percent)	60	63	75	26	51	76	24
Aggregate Wages (Dollars, Millions)	433	279	253	26	154	120	34
Average Wage (Dollars)	39,512	33,690	33,873	32,003	57,538	57,955	56,128
Estimated State Tax Payments (Dollars, Millions)	32	21	19	2	11	8	2

Note: Tax payment estimates are based on a tax rate of 7.15 percent.

Source: Arizona Board of Regents and Arizona State University, Office of Institutional Analysis.

Extending the Analysis to Include Those Who Graduated From ASU Before 1990

In order to provide an estimate of the number of individuals who graduated from ASU before 1990 and who were working in Arizona in 2015, actual data on the number of degrees awarded by ASU before 1990 were collected, with the earliest data from 1971. The official graduation data from ASU count number of degrees — individuals with more than one ASU degree are counted more than once. These data are not consistent with the figures used in the Arizona Board of Regents dataset, which counts individuals, not number of degrees. Thus, in order to estimate the number of individuals who had earned a degree from ASU before 1990, the historical graduation data for the years before 1990 were adjusted, using the ratio from the 1990-through-1999 period of the number of graduates counted in the Board of Regents database to the official count of degrees granted. The ratio was 88.9 percent for those with an undergraduate degree and 91.3 percent for those with a graduate degree.

In order to estimate the number of ASU graduates from before 1990 who were working in Arizona in 2015 and counted in the unemployment insurance program, a “backward projection” was made of the percentage of ASU graduates who were employed in Arizona in 2015. The percentage drops with the number of years since graduation; the rate of decline is rapid among recent grads but is lower and relatively stable among earlier graduates. The average annual decrease of 1.24 percentage points between 1990 and 1999 was used for the pre-1990 period. Using the adjusted graduation figures and the estimated percentage of graduates employed in Arizona, the number of employed ASU graduates was calculated by year for the pre-1990 period.

The average wage for graduates in the pre-1990 period was backward projected in the same manner as the percentage employed. The average wage rises significantly by the number of years since graduation for relatively recent graduates. Among earlier graduates, the increase in the average wage by year is lower and more stable. The annual average increase from the 1990-through-1999 period was 0.88 percent; this figure was applied to the pre-1990 period.

Using these backward projections, the number of individuals who graduated from ASU through academic year 2015 who worked at jobs in Arizona that were covered by the unemployment insurance program in 2015 is estimated to be 164,624 — 14.4 percent higher than the number of those who graduated from 1990 through 2015. Due to the high average wage of individuals who graduated prior to 1990, the differential in the aggregate wage of the entire set of ASU graduates relative to the 1990-to-2015 group was greater at 22.6 percent.

This methodology does not directly address the increasing share of retirees among older ASU graduates. While the percentage of ASU graduates working in Arizona declines with the number of years since graduation over the 1990-to-2015 period, this decrease presumably occurs mostly due to out-migration. Few ASU graduates since 1990 — most of whom were less than 50 years old in 2015 — are likely to have retired. In contrast, retirement becomes increasingly likely among those who graduated during the 1970s. Thus, the estimates of the numbers employed in Arizona of graduates from this time period may be overstated. However, the results of the methodology that was used results in only 8 percent of 1971 undergraduates, and 5 percent of those who earned a graduate degree in 1971, employed in Arizona in 2015. Any overstatement of graduates from the 1970s working in Arizona is partially offset by the exclusion of graduates from before 1971, a few of whom likely were still part of the workforce in 2015. Further, it

seems unlikely that the rate of out-migration from Arizona for job-related reasons would be as high among those approaching retirement age as among those who are younger. Thus, the estimated number of older ASU graduates working in Arizona is believed to be reasonable.

Those who have graduated from ASU accounted for 6.3 percent of the QCEW number of jobs in Arizona in 2015, but again this share is understated since it compares *individuals* with ASU degrees to the *number of jobs*. The aggregate wage of individuals who have graduated from ASU accounted for 8.7 percent of the QCEW total. The 2015 average wage of \$65,935 of those who have graduated from ASU was 41.1 percent higher than the average of the rest of the QCEW file (a group that includes those without a bachelor's degree and those who earned a degree from another institution). Based on the 7.15 percent tax rate and estimated QCEW wages, ASU graduates paid \$776 million in state and local government taxes in 2015, of which \$462 million was paid to state government. Using the 8.2 percent tax rate, state and local government taxes paid amounted to \$890 million, of which \$530 million was paid to state government.

Estimates from the ACS for 2015 indicate that 753,462 Arizona residents between the ages of 25 and 64 who had received at least a bachelor's degree were employed in civilian jobs. Based on various data from the ACS, the estimated total number of people working in civilian jobs in Arizona in 2015 who have earned a bachelor's or higher degree is 834,234. The estimated number of ASU graduates employed in the state and covered by the unemployment insurance program accounts for 19.7 percent of the estimated number of civilian workers with at least a bachelor's degree.

Extending the Analysis to Include ASU Graduates Employed in Arizona but Not Covered by the Unemployment Insurance Program

In order to estimate the number of ASU graduates working in Arizona in wage and salary jobs not covered by unemployment insurance or as proprietors (self-employed), the ASU shares of the QCEW total (6.31 percent of employment and 8.68 percent of wages) were applied to the BEA's total employment figure. The result is a total of 233,561 ASU graduates working in Arizona in 2015 (see Table 2). This figure is understated because the 6.31 percent figure is based on individuals with ASU degrees and the number of QCEW jobs.

The estimate of 233,561 ASU graduates working in Arizona accounts for 28.0 percent of the estimated number of employed Arizonans with at least a bachelor's degree in 2015. Thus, more than one-in-four working individuals in Arizona who had earned at least a bachelor's degree had graduated from ASU. The aggregate earnings of the ASU graduates were around \$13.2 billion. Based on the 7.15 percent tax rate and \$13.2 billion in earnings, ASU graduates paid \$941 million in state and local government taxes in 2015, of which \$560 million was paid to state government. Using the 8.2 percent tax rate, state and local government taxes paid amounted to \$1,079 million, of which \$642 million was paid to state government.

The Impacts of ASU Graduates on the Workforce

The estimates of 233,561 ASU graduates working in Arizona, earning \$13.2 billion, and paying between \$941 million and \$1.079 billion in state and local government taxes do not provide a complete accounting of the impacts of ASU graduates on the Arizona economy. College graduates in the workforce boost the productivity of all workers, which results in an increase in

TABLE 2
ARIZONA STATE UNIVERSITY GRADUATES EMPLOYED IN ARIZONA IN 2015
COMPARED TO TOTAL EMPLOYMENT IN ARIZONA

	Employment	Aggregate Earnings*	Average Earnings
Totals From QCEW	2,609,425	\$125,089	\$47,937
ASU Graduates From 1990 Through 2015	143,871	8,857	61,562
Estimate of ASU Graduates From Before 1990	20,753	1,997	96,251
Total Number of ASU Graduates	164,624	10,854	65,935
ASU Share of Total	6.31%	8.68%	137.5%
Other Wage and Salary Workers From BEA	133,936	\$8,936	\$66,718
Proprietors From BEA	799,608	17,562	21,963
Totals From BEA	3,542,969	151,587	42,785
ASU Total	223,561	13,158	58,855

* In millions. Consists of wages and salaries and proprietors' Income.

Sources: U.S. Department of Labor, Bureau of Labor Statistics (QCEW: Quarterly Census of Employment and Wages); U.S. Department of Commerce, Bureau of Economic Analysis (BEA); Arizona Board of Regents and Arizona State University, Office of Institutional Analysis (ASU graduates).

wages for all workers. This is discussed in the May 2015 University Economist Paper, “The Economic Impact of Raising the Educational Attainment of Arizona’s Workforce,”

<https://wpcarey.asu.edu/sites/default/files/uploads/center-competitiveness-and-prosperity-research/impactedattain05-15.pdf>.

**ARIZONA STATE UNIVERSITY GRADUATES EMPLOYED IN ARIZONA,
2012 THROUGH 2015**

The impact of ASU graduates working in Arizona has increased gradually over time due to the rate of increase in the number of ASU graduates outpacing employment growth (see Table 3). The large increases in recent years in the number of ASU graduates has more than offset the declining share of ASU graduates employed in Arizona. This share has slipped (from 42.3 percent in 2012 to 41.2 percent in 2015, including those graduating prior to 1990) as nonresident students have become a greater share of all ASU graduates — the nonresident share of graduates was 25.6 percent in 2012 and 34.6 percent in 2015. Relative to residents, a much lesser share of nonresidents stay to work in Arizona. For example, three-fourths of the ASU graduates in 2014 who were residents were working in Arizona in 2015, compared to only one-fourth of the nonresidents.

In 2012, the estimated number of ASU graduates (including those graduating prior to 1990) working in Arizona and covered by unemployment insurance accounted for 6.17 percent of all workers in the unemployment insurance program. In 2015, this share was 6.31 percent. The share of aggregate wages earned by ASU graduates increased more, from 8.28 percent to 8.68 percent. Thus, the average wage of ASU graduates climbed from 137.3 percent of the average wage of other workers covered by unemployment insurance to 141.1 percent.

The estimated share of Arizona workers holding at least a bachelor's degree who are a graduate of ASU also has climbed. In 2012, the share was 25.9 percent; in 2015, the estimate was 28.0 percent.

TABLE 3
SUMMARY OF ARIZONA STATE UNIVERSITY GRADUATES EMPLOYED IN
ARIZONA, 2012 THROUGH 2015

	Employment		Aggregate Earnings		Average Earnings	
	Number	Share of Total	Millions of 2015 Dollars	Share of Total	2015 Dollars	Share of Total
2012	203,473	6.17%	\$11,402	8.28%	\$56,036	134.3%
2013	211,482	6.27	12,094	8.55	57,187	136.4
2014	218,932	6.35	12,668	8.71	57,862	137.2
2015	223,561	6.31	13,158	8.68	58,855	137.5

Source: Calculated by authors.

APPENDIX
ARIZONA STATE UNIVERSITY GRADUATES FROM 1990 THROUGH 2015 EMPLOYED IN ARIZONA IN 2015:
DETAIL BY CATEGORY OF DEGREE

Source: Arizona State University, Office of the University Provost.

ALL DEGREES

2015

Academic Year of Graduation	Number of Degrees Awarded	Number Employed in Arizona	Percent Employed in Arizona	Aggregate Wages in Millions	Average Wage	Estimated State Tax Payments in Millions	Number Employed in Arizona During All Four Quarters	Percent Employed in All Four Quarters
1990	6,758	2,124	31.4%	\$191.0	\$89,927	\$13.4	1,781	83.9%
1991	7,130	2,491	34.9	224.5	90,139	15.8	2,087	83.8
1992	7,106	2,514	35.4	225.0	89,487	15.8	2,141	85.2
1993	7,664	2,739	35.7	233.9	85,399	16.4	2,322	84.8
1994	7,759	2,961	38.2	258.6	87,329	18.2	2,497	84.3
1995	8,105	3,267	40.3	286.4	87,653	20.1	2,747	84.1
1996	8,074	3,320	41.1	282.1	84,979	19.8	2,875	86.6
1997	8,581	3,575	41.7	306.6	85,767	21.5	3,083	86.2
1998	9,131	3,817	41.8	315.3	82,607	22.2	3,295	86.3
1999	9,239	3,893	42.1	318.4	81,799	22.4	3,348	86.0
2000	9,678	4,243	43.8	349.2	82,305	24.5	3,668	86.4
2001	9,413	4,048	43.0	322.7	79,720	22.7	3,512	86.8
2002	9,928	4,593	46.3	350.4	76,290	24.7	3,930	85.6
2003	10,529	4,923	46.8	366.3	74,401	25.8	4,179	84.9
2004	11,137	5,298	47.6	379.4	71,604	26.7	4,545	85.8
2005	11,406	5,598	49.1	382.2	68,273	27.0	4,771	85.2
2006	11,741	5,819	49.6	390.3	67,073	27.5	4,966	85.3
2007	12,149	6,116	50.3	390.4	63,835	27.6	5,152	84.2
2008	12,855	6,455	50.2	397.0	61,501	28.2	5,396	83.6
2009	13,925	6,877	49.4	397.8	57,852	28.2	5,682	82.6
2010	14,692	7,843	53.4	420.6	53,633	30.0	6,511	83.0
2011	15,297	8,361	54.7	420.8	50,323	30.2	6,851	81.9
2012	16,131	9,084	56.3	417.4	45,948	30.2	7,296	80.3
2013	17,262	10,190	59.0	437.4	42,924	32.0	8,025	78.8
2014	18,398	10,966	59.6	433.3	39,512	32.3	8,490	77.4
2015	19,998	12,756	63.8	360.0	28,219	29.5	7,638	59.9
1990-2015	294,086	143,871	48.9	8,857.0	61,562	633.0	116,788	81.2

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Academic Year of Graduation	Number of Degrees Awarded	Number Employed in Arizona	Percent Employed in Arizona	Aggregate Wages in Millions	Average Wage	Estimated State Tax Payments in Millions	Number Employed in Arizona During All Four Quarters	Percent Employed in All Four Quarters
1990	5,032	1,657	32.9%	\$143.9	\$86,862	\$10.1	1,395	84.2%
1991	5,274	1,947	36.9	172.2	88,429	12.1	1,649	84.7
1992	5,349	1,986	37.1	169.3	85,270	11.9	1,703	85.8
1993	5,656	2,106	37.2	173.5	82,402	12.2	1,792	85.1
1994	5,626	2,295	40.8	193.1	84,123	13.6	1,944	84.7
1995	5,746	2,455	42.7	202.6	82,544	14.3	2,082	84.8
1996	5,804	2,496	43.0	197.8	79,243	13.9	2,171	87.0
1997	6,109	2,691	44.0	219.3	81,508	15.4	2,328	86.5
1998	6,595	2,909	44.1	224.6	77,196	15.8	2,515	86.5
1999	6,601	2,888	43.8	218.6	75,701	15.4	2,488	86.1
2000	7,042	3,227	45.8	244.9	75,906	17.3	2,807	87.0
2001	6,850	3,108	45.4	224.1	72,112	15.8	2,708	87.1
2002	7,136	3,420	47.9	240.7	70,394	17.0	2,933	85.8
2003	7,550	3,671	48.6	248.2	67,624	17.5	3,116	84.9
2004	7,997	3,982	49.8	258.9	65,012	18.3	3,417	85.8
2005	8,536	4,332	50.7	268.4	61,957	19.0	3,691	85.2
2006	8,751	4,533	51.8	275.7	60,810	19.5	3,858	85.1
2007	8,927	4,699	52.6	270.1	57,473	19.2	3,942	83.9
2008	9,360	4,825	51.5	263.6	54,641	18.8	3,997	82.8
2009	9,754	5,008	51.3	253.1	50,541	18.1	4,110	82.1
2010	10,362	5,744	55.4	273.0	47,530	19.6	4,718	82.1
2011	10,736	6,143	57.2	272.2	44,306	19.7	4,959	80.7
2012	11,519	6,838	59.4	275.9	40,345	20.2	5,428	79.4
2013	12,343	7,687	62.3	284.4	36,992	21.2	5,953	77.4
2014	13,097	8,289	63.3	279.3	33,690	21.4	6,309	76.1
2015	13,883	9,659	69.6	230.2	23,833	19.8	5,822	60.3
1990-2015	211,635	108,595	51.3	6,077.7	55,967	437.2	87,835	80.9

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Academic Year of Graduation	Number of Degrees Awarded	Number Employed in Arizona	Percent Employed in Arizona	Aggregate Wages in Millions	Average Wage	Estimated State Tax Payments in Millions	Number Employed in Arizona During All Four Quarters	Percent Employed in All Four Quarters	Median Wage of Those Employed in All Four Quarters	Average Wage as a Proportion of the Median Wage
1990	4,118	1,555	37.8%	\$135.1	\$86,884	\$9.5	1,312	84.4%	\$75,612	114.9%
1991	4,282	1,832	42.8	162.6	88,738	11.5	1,557	85.0	74,659	118.9
1992	4,349	1,873	43.1	156.8	83,737	11.0	1,608	85.9	72,544	115.4
1993	4,505	1,961	43.5	159.9	81,533	11.2	1,671	85.2	71,520	114.0
1994	4,542	2,138	47.1	176.3	82,466	12.4	1,816	84.9	73,176	112.7
1995	4,743	2,319	48.9	188.7	81,384	13.3	1,959	84.5	69,771	116.6
1996	4,863	2,357	48.5	187.1	79,377	13.2	2,059	87.4	69,682	113.9
1997	4,980	2,513	50.5	203.9	81,128	14.3	2,179	86.7	69,102	117.4
1998	5,151	2,691	52.2	207.3	77,038	14.6	2,335	86.8	65,571	117.5
1999	5,126	2,648	51.7	198.2	74,859	14.0	2,280	86.1	65,691	114.0
2000	5,421	2,937	54.2	220.2	74,971	15.5	2,560	87.2	68,295	109.8
2001	5,303	2,852	53.8	203.5	71,365	14.3	2,491	87.3	63,161	113.0
2002	5,698	3,169	55.6	220.2	69,475	15.5	2,733	86.2	62,625	110.9
2003	6,029	3,374	56.0	225.7	66,886	15.9	2,875	85.2	60,299	110.9
2004	6,421	3,693	57.5	236.7	64,106	16.8	3,169	85.8	58,460	109.7
2005	6,806	4,010	58.9	246.9	61,561	17.5	3,423	85.4	57,396	107.3
2006	7,056	4,231	60.0	255.4	60,353	18.1	3,614	85.4	55,996	107.8
2007	7,179	4,343	60.5	247.0	56,880	17.6	3,640	83.8	54,638	104.1
2008	7,457	4,465	59.9	243.5	54,536	17.4	3,713	83.2	52,875	103.1
2009	7,698	4,652	60.4	233.2	50,138	16.7	3,831	82.4	49,999	100.3
2010	8,303	5,331	64.2	253.7	47,594	18.2	4,403	82.6	48,037	99.1
2011	8,606	5,689	66.1	252.5	44,384	18.3	4,622	81.2	45,246	98.1
2012	9,255	6,311	68.2	253.8	40,219	18.6	5,038	79.8	42,780	94.0
2013	9,813	7,067	72.0	261.4	36,992	19.5	5,508	77.9	40,370	91.6
2014	9,958	7,477	75.1	253.3	33,873	19.4	5,753	76.9	37,459	90.4
2015	10,309	8,393	81.4	206.6	24,615	17.6	5,242	62.5	28,767	85.6
1990-2015	167,971	99,881	59.5	5,589.6	55,962	401.9	81,391	81.5		

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Academic Year of Graduation	Number of Degrees Awarded	Number Employed in Arizona	Percent Employed in Arizona	Aggregate Wages in Millions	Average Wage	Estimated State Tax Payments in Millions	Number Employed in Arizona During All Four Quarters	Percent Employed in All Four Quarters	Median Wage of Those Employed in All Four Quarters	Average Wage as a Proportion of the Median Wage
1990	914	102	11.2%	\$8.8	\$86,519	\$0.6	83	81.4%	\$71,982	120.2%
1991	992	115	11.6	9.6	83,508	0.7	92	80.0	84,804	98.5
1992	1,000	113	11.3	12.5	110,685	0.9	95	84.1	81,756	135.4
1993	1,151	145	12.6	13.7	94,158	1.0	121	83.4	77,310	121.8
1994	1,084	157	14.5	16.8	106,696	1.2	128	81.5	85,811	124.3
1995	1,003	136	13.6	13.9	102,323	1.0	123	90.4	72,800	140.6
1996	941	139	14.8	10.7	76,970	0.8	112	80.6	69,433	110.9
1997	1,129	178	15.8	15.5	86,877	1.1	149	83.7	78,311	110.9
1998	1,444	218	15.1	17.3	79,158	1.2	180	82.6	73,750	107.3
1999	1,475	240	16.3	20.4	84,993	1.4	208	86.7	70,228	121.0
2000	1,621	290	17.9	24.8	85,374	1.7	247	85.2	78,938	108.2
2001	1,547	256	16.5	20.6	80,433	1.4	217	84.8	71,253	112.9
2002	1,438	251	17.5	20.6	82,000	1.4	200	79.7	71,431	114.8
2003	1,521	297	19.5	22.6	76,001	1.6	241	81.1	71,199	106.7
2004	1,576	289	18.3	22.1	76,589	1.6	248	85.8	70,855	108.1
2005	1,730	322	18.6	21.5	66,888	1.5	268	83.2	60,256	111.0
2006	1,695	302	17.8	20.3	67,210	1.4	244	80.8	63,226	106.3
2007	1,748	356	20.4	23.0	64,703	1.6	302	84.8	61,556	105.1
2008	1,903	360	18.9	20.1	55,943	1.4	284	78.9	56,383	99.2
2009	2,056	356	17.3	19.9	55,806	1.4	279	78.4	57,648	96.8
2010	2,059	413	20.1	19.3	46,704	1.4	315	76.3	49,783	93.8
2011	2,130	454	21.3	19.7	43,329	1.4	337	74.2	47,806	90.6
2012	2,264	527	23.3	22.1	41,853	1.6	390	74.0	46,564	89.9
2013	2,530	620	24.5	22.9	36,993	1.7	445	71.8	42,741	86.6
2014	3,139	812	25.9	26.0	32,003	2.0	556	68.5	37,734	84.8
2015	3,574	1,266	35.4	23.6	18,645	2.1	580	45.8	26,497	70.4
1990-2015	43,664	8,714	20.0	488.1	56,017	35.3	6,444	73.9		

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1990	1,726	467	27.1%	\$47.1	\$100,805	\$3.3	386	82.7%
1991	1,856	544	29.3	52.4	96,259	3.7	438	80.5
1992	1,757	528	30.1	55.6	105,347	3.9	438	83.0
1993	2,008	633	31.5	60.4	95,372	4.2	530	83.7
1994	2,133	666	31.2	65.5	98,374	4.6	553	83.0
1995	2,359	812	34.4	83.7	103,099	5.9	665	81.9
1996	2,270	824	36.3	84.3	102,353	5.9	704	85.4
1997	2,472	884	35.8	87.3	98,732	6.1	755	85.4
1998	2,536	908	35.8	90.7	99,939	6.4	780	85.9
1999	2,638	1,005	38.1	99.8	99,324	7.0	860	85.6
2000	2,636	1,016	38.5	104.3	102,630	7.3	861	84.7
2001	2,563	940	36.7	98.6	104,874	6.9	804	85.5
2002	2,792	1,173	42.0	109.7	93,480	7.7	997	85.0
2003	2,979	1,252	42.0	118.0	94,272	8.3	1,063	84.9
2004	3,140	1,316	41.9	120.5	91,551	8.4	1,128	85.7
2005	2,870	1,266	44.1	113.8	89,885	8.0	1,080	85.3
2006	2,990	1,286	43.0	114.6	89,151	8.0	1,108	86.2
2007	3,222	1,417	44.0	120.3	84,932	8.4	1,210	85.4
2008	3,495	1,630	46.6	133.3	81,806	9.4	1,399	85.8
2009	4,171	1,869	44.8	144.7	77,442	10.2	1,572	84.1
2010	4,330	2,099	48.5	147.6	70,335	10.4	1,793	85.4
2011	4,561	2,218	48.6	148.6	66,988	10.5	1,892	85.3
2012	4,612	2,246	48.7	141.5	63,007	10.0	1,868	83.2
2013	4,919	2,503	50.9	153.0	61,142	10.8	2,072	82.8
2014	5,301	2,677	50.5	154.0	57,538	10.9	2,181	81.5
2015	6,115	3,097	50.6	129.8	41,898	9.8	1,816	58.6
1990-2015	82,451	35,276	42.8	2,779.3	78,787	195.8	28,953	82.1

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1990	1,110	386	34.8%	\$38.5	\$99,831	\$2.7	319	82.6%	\$80,042	124.7%
1991	1,329	479	36.0	47.7	99,666	3.4	389	81.2	89,767	111.0
1992	1,248	481	38.5	51.7	107,437	3.6	397	82.5	78,713	136.5
1993	1,416	581	41.0	55.6	95,727	3.9	486	83.6	80,296	119.2
1994	1,539	629	40.9	61.7	98,101	4.3	524	83.3	84,413	116.2
1995	1,711	755	44.1	77.7	102,904	5.4	619	82.0	87,674	117.4
1996	1,629	755	46.3	77.7	102,978	5.4	644	85.3	86,372	119.2
1997	1,720	780	45.3	77.0	98,677	5.4	668	85.6	81,768	120.7
1998	1,770	798	45.1	78.9	98,850	5.5	686	86.0	83,434	118.5
1999	1,846	907	49.1	89.6	98,810	6.3	781	86.1	85,933	115.0
2000	1,784	883	49.5	91.1	103,122	6.4	754	85.4	91,636	112.5
2001	1,707	830	48.6	87.2	105,084	6.1	710	85.5	88,248	119.1
2002	1,975	1,051	53.2	98.6	93,841	6.9	900	85.6	78,210	120.0
2003	2,049	1,111	54.2	104.0	93,583	7.3	945	85.1	77,484	120.8
2004	2,013	1,115	55.4	101.6	91,150	7.1	957	85.8	78,550	116.0
2005	1,987	1,116	56.2	99.9	89,493	7.0	961	86.1	77,004	116.2
2006	1,893	1,112	58.7	99.0	89,052	6.9	960	86.3	79,556	111.9
2007	2,063	1,236	59.9	101.8	82,356	7.1	1,061	85.8	71,292	115.5
2008	2,337	1,447	61.9	117.3	81,070	8.2	1,250	86.4	69,472	116.7
2009	2,472	1,575	63.7	120.5	76,527	8.5	1,336	84.8	69,815	109.6
2010	2,717	1,779	65.5	122.2	68,702	8.6	1,539	86.5	62,206	110.4
2011	2,794	1,858	66.5	121.8	65,578	8.6	1,591	85.6	59,543	110.1
2012	2,670	1,822	68.2	111.9	61,440	7.9	1,529	83.9	58,661	104.7
2013	2,756	2,012	73.0	121.3	60,270	8.6	1,698	84.4	57,792	104.3
2014	2,712	2,067	76.2	119.8	57,955	8.5	1,732	83.8	53,260	108.8
2015	2,774	2,230	80.4	94.5	42,399	7.1	1,454	65.2	46,893	90.4
1990-2015	52,021	29,795	57.3	2,368.8	79,505	166.7	24,890	83.5		

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1990	616	81	13.1%	\$8.5	\$105,446	\$0.6	67	82.7%	\$87,367	120.7%
1991	527	65	12.3	4.6	71,153	0.3	49	75.4	65,238	109.1
1992	509	47	9.2	3.9	83,953	0.3	41	87.2	72,384	116.0
1993	592	52	8.8	4.8	91,407	0.3	44	84.6	75,177	121.6
1994	594	37	6.2	3.8	103,013	0.3	29	78.4	97,517	105.6
1995	648	57	8.8	6.0	105,675	0.4	46	80.7	108,407	97.5
1996	641	69	10.8	6.6	95,513	0.5	60	87.0	80,322	118.9
1997	752	104	13.8	10.3	99,142	0.7	87	83.7	90,700	109.3
1998	766	110	14.4	11.9	107,838	0.8	94	85.5	98,565	109.4
1999	792	98	12.4	10.2	104,078	0.7	79	80.6	106,805	97.4
2000	852	133	15.6	13.2	99,358	0.9	107	80.5	96,966	102.5
2001	856	110	12.9	11.4	103,289	0.8	94	85.5	107,667	95.9
2002	817	122	14.9	11.0	90,368	0.8	97	79.5	88,568	102.0
2003	930	141	15.2	14.1	99,704	1.0	118	83.7	96,507	103.3
2004	1,127	201	17.8	18.8	93,775	1.3	171	85.1	88,684	105.7
2005	883	150	17.0	13.9	92,804	1.0	119	79.3	96,430	96.2
2006	1,097	174	15.9	15.6	89,782	1.1	148	85.1	89,925	99.8
2007	1,159	181	15.6	18.6	102,524	1.3	149	82.3	97,576	105.1
2008	1,158	183	15.8	16.0	87,625	1.1	149	81.4	90,619	96.7
2009	1,699	294	17.3	24.2	82,346	1.7	236	80.3	85,955	95.8
2010	1,613	320	19.8	25.4	79,413	1.8	254	79.4	75,195	105.6
2011	1,767	360	20.4	26.7	74,265	1.9	301	83.6	69,035	107.6
2012	1,942	424	21.8	29.6	69,739	2.1	339	80.0	66,237	105.3
2013	2,163	491	22.7	31.8	64,716	2.3	374	76.2	62,654	103.3
2014	2,589	610	23.6	34.2	56,128	2.5	449	73.6	54,622	102.8
2015	3,341	867	26.0	35.2	40,610	2.7	362	41.8	47,055	86.3
1990-2015	30,430	5,481	18.0	410.5	74,887	29.1	4,063	74.1		