THE RELATIONSHIP BETWEEN GOVERNMENT FINANCE, EDUCATIONAL ATTAINMENT, AND ECONOMIC PERFORMANCE

September 2018

Dennis Hoffman, Ph.D.
Professor, Department of Economics; Director, L. William Seidman Research Institute; and Director, Office of the University Economist

Tom Rex, M.B.A.
Associate Director, Center for Competitiveness and Prosperity Research; and Manager of Research Initiatives, Office of the University Economist

P3 PRODUCTIVITY AND PROSPERITY PROJECT

ASU W. P. CAREY SCHOOL of BUSINESS
ARIZONA STATE UNIVERSITY

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Research support provided by
Haley Klundt, B.S.
Research Economist, L. William Seidman Research Institute

Center for Competitiveness and Prosperity Research
L. William Seidman Research Institute
W. P. Carey School of Business
Arizona State University
Box 874011
Tempe, Arizona 85287-4011

(480) 965-5362
EMAIL: Tom.Rex@asu.edu
wpcarey.asu.edu/research/competitiveness-prosperity-research
economist.asu.edu

ASU W. P. Carey School of Business
Arizona State University

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SUMMARY

Across the states, a positive relationship exists between indicators of public finance, educational attainment, and economic productivity and prosperity. After adjusting for geographic differences in the cost-of-living, states with higher levels of overall state and local government revenues and expenditures, measured per person, and higher levels of education funding, measured per student, generally have greater educational attainment among the adult population, and greater productivity (such as per worker gross domestic product) and prosperity (such as per capita personal income). States with lower levels of public finance tend to have lower educational attainment, productivity, and prosperity. However, these associations do not prove causation. For example, most states will find it necessary to maintain a certain level of spending to achieve attainment goals, but the observed correlations do not guarantee that raising spending in any particular state will be sufficient to achieve better outcomes. Ultimate results will depend on an array of factors, including financial support.

Arizona has experienced significant declines relative to the nation in the public finance indicators since the late 1960s, dropping from above average to considerably below average in per capita government revenues — including both tax and nontax sources of revenue — and per capita expenditures. Declines relative to the nation have occurred in funding for public education per student, with the state dropping from near average to substantially below average. The educational attainment of Arizona's adult population has dropped substantially over the same time period — attainment in Arizona exceeded the national average through 1970, but now is below average. Productivity and prosperity measures relative to the nation peaked in the early 1970s at near the U.S. average and have since dropped significantly. While the public finance, educational attainment, and productivity/prosperity measures have been declining simultaneously in Arizona, which fits the national relationships between these indicators, the correlations alone are not evidence of cause and effect.

In 1970, Arizona's "peer" states — those with similar ranks on indicators of public finance, educational attainment, and productivity and prosperity, included other western states, such as California, Oregon, and Washington, and some of the northeastern states. Today, Arizona compares unfavorably to those states. States that were inferior to Arizona in 1970 on these indicators are now Arizona's peers, including several of the southern states.

In contrast to the economic indicators that measure productivity and prosperity, economic indicators of the aggregate rate of growth, such as gross domestic product and employment, are unrelated across the states to changes in public finance and educational attainment, expressed relative to the national average. In Arizona, aggregate economic growth rates relative to the nation remained strong from the 1960s into the 2000s, despite relative declines in educational attainment, productivity, and prosperity. However, aggregate economic growth rates in Arizona have slowed over the last decade relative to the national average.

INTRODUCTION

In this paper, states are compared to each other and to the nation over time in three categories:

- Government (public) finance, which is divided first into total revenues and total expenditures and then into revenues and expenditures specific to education.
- Educational attainment.
- Economic performance.

Public finance data are reported by fiscal year (FY), which in most states runs from July 1 through June 30. The other data examined in this paper are expressed on a calendar year basis.

Correlations across the states between indicators in these categories are examined for recent years. In addition, relationships in the change over time in the indicators are analyzed. A correlation coefficient measures the strength of the relationship between two indicators. A value of 1 indicates perfect correspondence, a value of 0 indicates no correspondence, and a value of -1 indicates perfect inverse correspondence between indicators. At 95 percent confidence, a correlation coefficient of 0.28 is considered to be statistically significant for a correlation measured across 50 states and the District of Columbia. In this paper, correlations of 0.28 through 0.39 are considered to be low but significant, values of 0.40 through 0.59 are evaluated as moderate, values of 0.60 through 0.74 are termed moderately high, and correlations of at least 0.75 are considered to be high.

Standardization of Government Finance Data

Since the size of states — as measured by population or some economic measure — varies so widely, dollar measures used to compare states must be adjusted for state size. Similarly, dollar measures should be adjusted for geographic differences in the cost of living, which are substantial across states. Time series analyses of dollar measures need to be adjusted for inflation and for the varying rates of growth in the size of states.

Size

Various measures of size are used to adjust government finance data; the most common are population and personal income.[1] Since per capita (per person) personal income varies widely by state, even after adjusting for the cost of living, significant differences relative to the national average may exist in a state between government finance expressed per capita versus relative to personal income. When adjusting government finance data by personal income, the figures typically are expressed per $1,000 of personal income.

Population estimates are produced by the U.S. Census Bureau and estimates of personal income are produced by the U.S. Bureau of Economic Analysis (BEA). The BEA's data by state, and the Census Bureau's population estimates, are available at http://bea.gov/regional/index.htm. In order to adjust the fiscal-year government-finance data, the population and personal income estimates have been converted into fiscal year averages.

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[1] The personal income of an area represents the income that is received by, or on behalf of, all the persons who live in that area. It is the sum of wages and salaries, supplements to wages and salaries (employee benefits), proprietors' income, rental income of persons, personal dividend income, personal interest income, and personal current transfer receipts (including retirement and disability insurance such as Social Security, medical benefits such as Medicare, veterans' benefits, income maintenance programs such as food stamps, and other transfers), less contributions for government social insurance.

The primary reason for adjusting government finance figures by personal income rather than by population is that the division by personal income provides an indicator of the ability of residents to pay taxes and government fees that is not present in the per capita measure. However, expenditure data for a given year that are compared across states typically are not adjusted by personal income. If policymakers in a state with below-average prosperity (for example, as measured by per capita personal income) — such as Arizona — limit certain types of expenditures due to the below-average ability of its taxpayers to pay taxes, the result may be to perpetuate the state's low prosperity. States compete with each other (and with other countries) for economic development. The two most important business location factors are the availability and quality of the workforce and the availability and quality of the physical infrastructure. A state that does not adequately prepare its residents for the workforce through K-12 education, higher education, and job training and that provides an inferior physical infrastructure is placing itself at a significant disadvantage in economic development, particularly in terms of competing for high-quality jobs that would improve the state's prosperity.

Since state and local governments must have a balanced budget, revenues and expenditures in a given year cannot be too different. Thus, revenues also are commonly expressed on a per capita basis to be consistent with the expenditure data.

For public programs that serve only a portion of the population, such as elementary and secondary education, the actual number of people served — the caseload — is a far better measure of size than total population. For elementary and secondary (K-12) education programs, the caseload is the number of students. For higher education, full-time-equivalent (FTE) enrollment generally is used instead of the headcount since so many students, particularly at community colleges, are enrolled part time.

Inflation and Cost of Living

A state's estimate of personal income reflects the state's population and cost of living; a time series of personal income also reflects inflation. Thus, a dollar measure expressed relative to personal income need not be adjusted since both the numerator and denominator are measured in dollars; algebraically, the inflation or cost-of-living figures cancel out.

In contrast, per capita measures ideally are adjusted for the geographic cost of living; changes over time need to be adjusted for inflation. Inflation measures the change in prices over time. Most commonly in analyses of government finance, the adjustment for inflation is made by the national gross domestic product implicit price deflator (GDP deflator) produced by the BEA.

The BEA produces annual estimates of living costs by state, referred to as the regional price parity (RPP), but these estimates are available for only 2008 through 2016. Historical information on geographic differences in the cost of living are limited. Those historical data that are available suggest that geographic differences in the cost of living have not changed substantially over time, except in Nevada. Thus, although longer time series analyses in this paper cannot incorporate geographic variations in the change in the cost of living, the historical pattern likely would not be much different if cost-of-living estimates were available.

Standardization of Economic Data

As with the government finance data, economic data used to compare states on a per person basis need to be adjusted for the cost of living and inflation. Per capita economic indicators measure prosperity. Economic indicators divided by employment are proxies for true measures of productivity, which are not produced for states.

GOVERNMENT REVENUE

The primary source of state-level public-finance data is the U.S. Department of Commerce's Census Bureau. Revenue data are examined in this section, followed by a look at other sources of information on the tax burden by state. The focus then turns specifically to revenue raised to support public education, from kindergarten through higher education. The Census Bureau as well as other sources provide data specific to education.

State and Local Government Revenue

The Census Bureau annually reports on state and local government revenues and expenditures by state. This series extends from fiscal year 1960 through FY 2015, though data are not available for a few years. Data back to FY 1992 are available online (https://www.census.gov/govs/local/). The Census Bureau separately reports data for state governments, local governments (counties, municipalities, school districts, and special districts), and combined state and local governments by state. Since the responsibility for various public programs differs by state between the state government and local governments, the combined state and local government revenue and expenditure data provide the most accurate comparison of states.

The Census Bureau provides considerable categorical detail on revenue sources. Three revenue categories are the primary focus in this section: tax collections; total own-source revenue collections, which include user fees and various other revenues as well as taxes; and total revenue, which adds funding from the federal government to own-source revenue.

Fiscal Year 2015

State and local government revenue figures for fiscal year 2015 are summarized in Table 1. In order to compare Arizona to other states and the nation, three methods of adjusting the revenue figures are employed: per capita, per capita adjusted for the cost of living, and per $1,000 of personal income.

These methods yield varying results. In FY 2015, total state and local government revenue in Arizona was not as far below the national average when adjusted by personal income (7.8 percent lower) as by population (24.6 percent lower) since Arizona's per capita personal income was 18.3 percent lower than the national average.

Since Arizona's cost of living in FY 2015 was only 4.0 percent less than the national average, the adjustment of the per capita figures to reflect living costs had only a modest effect on Arizona's comparison to the national average. Despite its below-average living costs, Arizona's rank among the states on most per capita measures is lower after adjusting for living costs. Arizona's per capita personal income was 14.9 percent less than the national average in FY 2015 after adjusting for the cost of living; the shortfall in adjusted total revenue per capita was 21.5 percent.

Arizona's total revenue, as well as its own-source revenue — both tax and nontax collections — was far below the national average and most states measured on a per capita basis and below average when adjusted by personal income. In contrast, Arizona's intergovernmental revenue from the federal government was near the national per capita average and above average relative to personal income. Arizona's relatively high amount of revenue from the federal government in

TABLE 1
STATE AND LOCAL GOVERNMENT REVENUE, FISCAL YEAR 2015

	United States	Arizona	Arizona Share of Nation	Arizona Rank*
Standardization Measures				
Population in Millions	319.7	6.8		
Personal Income in Billions	$15,215.8	$263.3		
Regional Price Parity (RPP)	100.0	96.0		
Per Capita Personal Income	$47,589	$38,895	81.7%	42
Per Capita Personal Income, Adjusted by RPP	$47,589	$40,516	85.1	47
Total Revenue				
Per Capita	$9,133	$6,884	75.4	48
Per Capita, Adjusted by RPP	$9,133	$7,171	78.5	51
Per $1,000 of Personal Income	$191.9	$177.0	92.2	39
Intergovernmental Revenue				
Per Capita	$2,057	$1,970	95.8	31
Per Capita, Adjusted by RPP	$2,057	$2,053	99.8	28
Per $1,000 of Personal Income	$43.2	$50.7	117.2	18
Own-Source Revenue				
Per Capita	$7,076	$4,914	69.4	51
Per Capita, Adjusted by RPP	$7,076	$5,119	72.3	51
Per $1,000 of Personal Income	$148.7	$126.3	85.0	48
Tax Revenue				
Per Capita	$4,901	$3,510	71.6	45
Per Capita, Adjusted by RPP	$4,901	$3,657	74.6	47
Per $1,000 of Personal Income	$103.0	$90.3	87.6	40
Nontax Revenue				
Per Capita	$2,175	$1,403	64.5	51
Per Capita, Adjusted by RPP	$2,175	$1,462	67.2	49
Per $1,000 of Personal Income	$45.7	$36.1	78.9	44

* Among 51 states (including the District of Columbia), where 1 equals the highest value.

Note: Total state and local government revenue is the sum of intergovernmental revenue from the federal government and own-source revenue, which is the sum of state and local government tax revenue and nontax revenue.

Source: U.S. Department of Commerce: Census Bureau, State and Local Government Finance (revenue and population), and Bureau of Economic Analysis (personal income and regional price parity).

part results from some of the federal programs being tied to measures of prosperity — since Arizona has low incomes and high poverty rates, it receives more on a per capita basis.

Per capita and adjusted for the cost of living, tax revenue in Arizona was 25 percent below the national average, fifth lowest among the states (Alabama, Alaska, Florida, and Tennessee were lower). Adjusted own-source revenue was even further below the per capita norm (28 percent less, last in the nation) since Arizona's adjusted per capita nontax revenue also was far below average (33 percent below average, with only Connecticut and Maine lower). Since revenue received from the federal government was similar to the per capita average, Arizona was not

quite as far below the national average (21 percent) on adjusted per capita total revenue, though the state ranked last.

Adjusted by personal income, Arizona's government revenue figures were not as far below the national average, but the shortfalls still were substantial. Among the states, Arizona ranked 40th on taxes and 48th on own-source revenue.

Among 10 western states (Arizona, California, Colorado, Idaho, Nevada, New Mexico, Oregon, Texas, Utah, and Washington), Arizona's revenue collections in fiscal year 2015 were the lowest or near the lowest on tax revenue, own-source revenue, and total revenue, regardless of whether the adjustment was made by population (adjusted for the cost of living) or personal income.

Change Over Time

Total state and local government revenue in Arizona rose at the second-lowest pace in the nation on a per capita basis (Nevada ranked last) and at the third-lowest pace relative to personal income (Louisiana and South Dakota were lower) between FYs 1960 and 2015. The per capita percent change in Arizona ranked second to last on own-source revenue, tax revenue, and nontax revenue (Nevada was lower in each category). The ranks were 48th or 49th relative to personal income. Louisiana and South Dakota were lower in each category, with Florida also lower on taxes and North Dakota also lower on nontax revenue. Gains in revenue from the federal government also were below average in Arizona, but not to the same extent.

Arizona's history relative to the nation, expressed on a per capita basis, is shown in Chart 1 for three revenue categories. Arizona's own-source revenue relative to the national average is shown on a per capita basis and relative to personal income in Chart 2. The measures display a similar decline over time, with the percentage of the national average higher based on the personal income measure throughout the time period since FY 1960.

The FY 1960-to-2015 period is divided into shorter time segments in Table 2 for the per capita revenue measures. The overall decline in per capita revenue in Arizona relative to the national average between FYs 1960 and 2015 largely occurred in three time segments that covered about half of the time period.[2] The first of the three significant declines occurred between FYs 1967 and 1974, when per capita revenue dropped from above-to-below the U.S. average. Over the next 12 years, some of the loss in per capita revenue relative to the nation was offset. The second period of decline was between FYs 1986 and 1998.[3] It was during this period that Arizona first fell into the bottom tier of states. Another period of partial recovery occurred between FYs 1998 and 2007. Between FYs 2008 and 2015, Arizona again fell to among the lowest states. The decline in per capita taxes relative to the national average during this period was the greatest of the three periods of decline.

The declines over time in state and local government tax revenue in Arizona relative to the national average, whether measured per capita or per $1,000 of personal income, largely can be

[2] A shorter period of decline between FYs 1979 and 1982 was more than offset between FYs 1982 and 1986.

[3] Expressed per $1,000 of personal income, the second period of decline in the three revenue categories did not start until after FY 1990 or FY 1991.

CHART 1
STATE AND LOCAL GOVERNMENT TOTAL REVENUE PER CAPITA, ARIZONA AS A PERCENTAGE OF THE NATIONAL AVERAGE

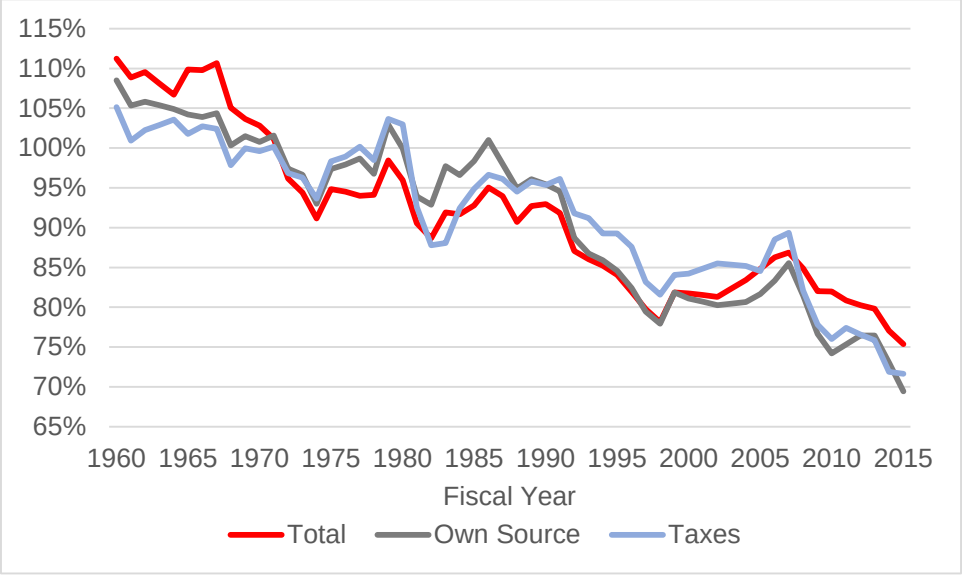
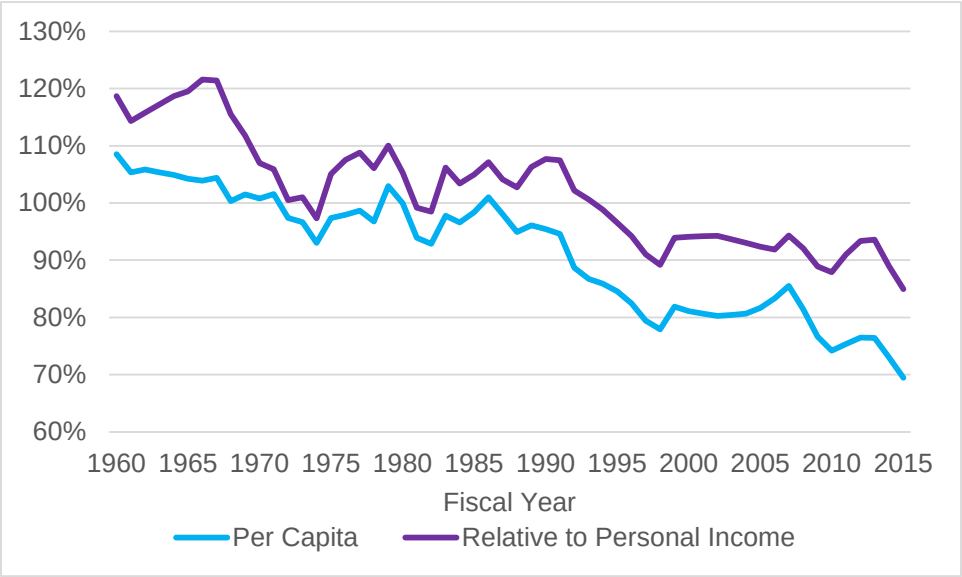


CHART 2
STATE AND LOCAL GOVERNMENT OWN-SOURCE REVENUE, ARIZONA AS A PERCENTAGE OF THE NATIONAL AVERAGE



Charts 1 and 2:

Note: Total state and local government revenue is the sum of intergovernmental revenue from the federal government and own-source revenue, which is the sum of state and local government tax revenue and nontax revenue.

Source: U.S. Department of Commerce: Census Bureau, State and Local Government Finance (revenue and population); and Bureau of Economic Analysis (personal income).

TABLE 2
STATE AND LOCAL GOVERNMENT REVENUE PER CAPITA, ARIZONA, SELECTED YEARS

	Total Revenue		Own-Source Revenue		Taxes	
Fiscal Year	**% US***	**Rank****	**% US***	**Rank****	**% US***	**Rank****
1960	111.2%	17	108.5%	10	105.2	18
1967	110.7	15	104.4	5	102.4	19
1974	91.2	31	93.0	21	93.6	25
1986	95.0	25	101.0	16	96.6	20
1998	78.1	51	77.9	47	81.6	41
2007	86.8	40	85.5	38	89.4	29
2015	75.4	48	69.4	48	71.6	45
Change:						
1960-67	-0.5	2	-4.1	5	-2.8	-1
1967-74	-19.5	-16	-9.4	-16	-8.8	-6
1974-86	3.8	6	8.0	5	3.0	5
1986-98	-16.9	-26	-23.1	-31	-15.0	-21
1998-2007	8.7	11	7.6	9	7.8	12
2007-15	-11.4	-8	-16.1	-10	-17.8	-16

* Arizona's per capita revenue as a percentage of the national average.
** Among 51 states (including the District of Columbia), where 1 equals the highest value.

Note: Total state and local government revenue is the sum of intergovernmental revenue from the federal government and own-source revenue, which is the sum of state and local government tax revenue and nontax revenue.

Source: U.S. Department of Commerce: Census Bureau, State and Local Government Finance.

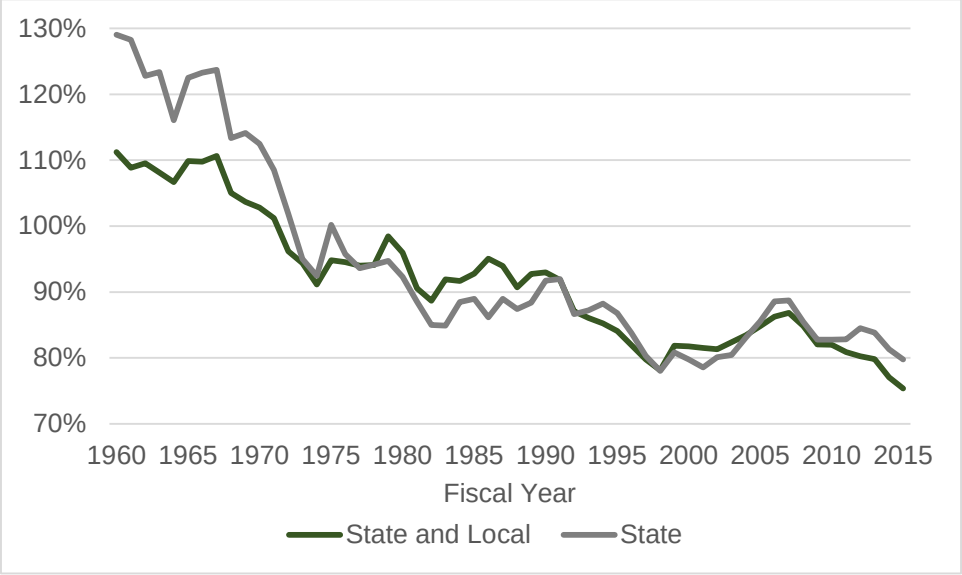
traced to tax law changes at the state government level that reduced tax rates and narrowed the tax base. Dependence on the sales tax has increased, but increases in sales tax revenue do not keep pace with economic and demographic growth as consumer purchases have shifted to untaxed services and untaxed online purchases.

State Government Revenue

To gain historical perspective prior to 1960, annual data on state government revenue, which began in FY 1937, is examined. Caution is required in the use of state government public finance data, since the division in revenue and expenditure authority between the state government and local governments varies by state. Further, the responsibilities of state and local governments may have changed over time in some states.

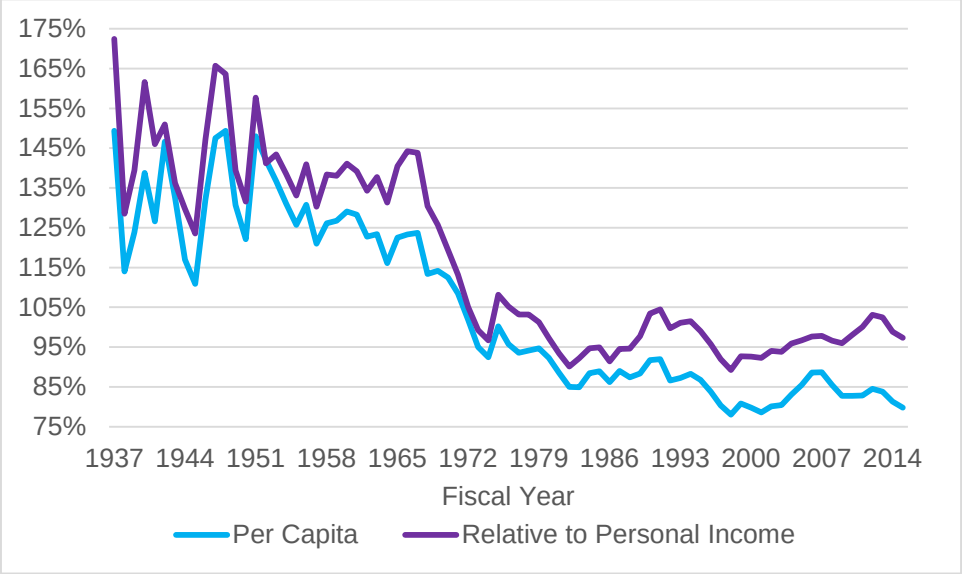
A comparison of the state government data to the combined state and local government data is shown in Chart 3 for the period since FY 1960. The two measures have closely corresponded since the early 1970s. In the 1960s, Arizona was further above the national per capita average based on the state government data than on the combined state and local government data. If this relationship was present prior to FY 1960, then the magnitude of the differential between Arizona and the nation shown using the state government data in Chart 4 overstates the difference had combined state and local government data been available.

CHART 3
GOVERNMENT TOTAL REVENUE PER CAPITA,
ARIZONA AS A PERCENTAGE OF THE NATIONAL AVERAGE



Source: U.S. Department of Commerce, Census Bureau.

CHART 4
STATE GOVERNMENT TOTAL REVENUE,
ARIZONA AS A PERCENTAGE OF THE NATIONAL AVERAGE



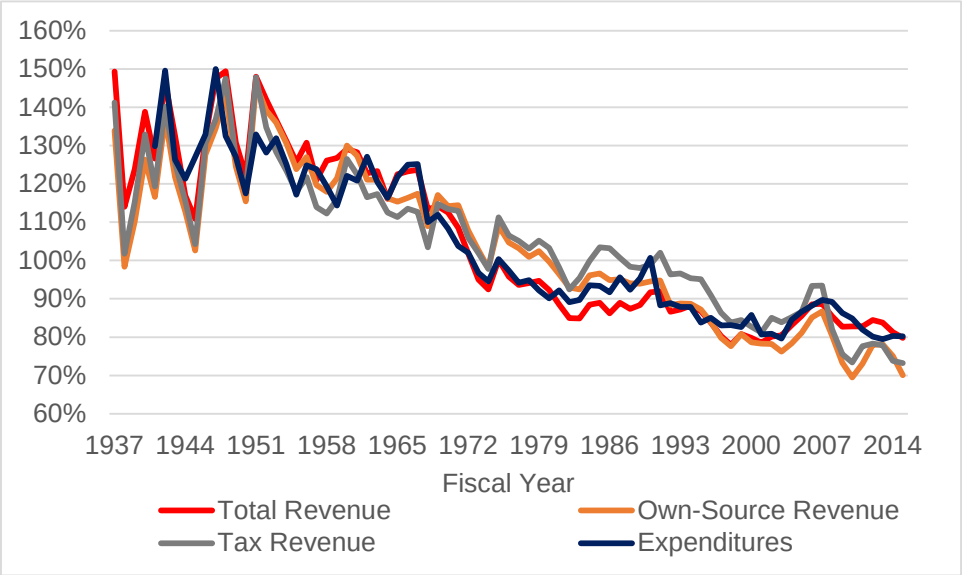
Source: U.S. Department of Commerce: Census Bureau (revenue and population) and Bureau of Economic Analysis (personal income).

State government revenue in Arizona was considerably above the national average — both per capita and relative to personal income — from the beginning of the time series through fiscal year 1967. While the percentage of the national average fluctuated by year, no trend was present in the measure relative to personal income through FY 1967, but a downward trend began in the 1950s on a per capita basis.

Between fiscal years 1967 and 1974, Arizona's percentage of the U.S. average for state government revenue — per capita and relative to personal income — fell sharply to below the national average. The state and local government figures also dropped during this period, as seen in Chart 3. Chart 5 demonstrates that a decline relative to the nation similar to that of per capita total state government revenue occurred in per capita state government own-source revenue and per capita state government taxes. Per capita state government expenditures followed the same pattern.

The large decline in both state government and combined state and local government revenue (and expenditures) in Arizona relative to the nation between FYs 1967 and 1974 corresponds to a U.S. Supreme Court decision in April 1966. While the case was specific to Hawaii, the Court's decision applied to all states. The Court held that both houses of a state legislature must be apportioned substantially on a population basis. Until this decision, the Arizona Senate consisted of two members per county. House membership was based on the number of votes cast for governor at the last general election.

CHART 5
STATE GOVERNMENT REVENUES AND EXPENDITURES PER CAPITA, ARIZONA AS A PERCENTAGE OF THE NATIONAL AVERAGE



Note: Total state government revenue is the sum of intergovernmental revenue from the federal government and own-source revenue, which is the sum of state government tax revenue and nontax revenue.

Source: U.S. Department of Commerce, Census Bureau.

Prior to the Court's decision, the Democratic Party had dominated the Arizona Legislature since statehood, generally holding more than two-thirds of the seats in both chambers of the Legislature. Republicans held the majority only once (in the Senate in 1921-22). The governor was a Democrat 69 percent of the time. At the time of the Court's decision, Democrats held 26 of 28 senate seats, 45 of 80 house seats, and the governorship.

The U.S. Supreme Court's decision greatly shifted membership in the Senate from the less-populous rural counties to Maricopa County, a Republican stronghold. The number of Republican Senators increased from two of 28 to 16 of 30 after the 1966 election. The Republican Party also gained in the House, winning 33 of 60 seats, and won the governorship. The first budget that was determined by the Republican majority was for FY 1968. In this budget, Arizona fell relative to the nation in the various measures of revenues and expenditures. The relative declines ceased when the Democrats regained the majority in the Senate and also won the race for governor in the 1974 election.

The Democratic Party had the majority in the Senate from 1975 through 1978 and from 1991 through 1992. They shared control of the Senate in 2001 and 2002. The Republican Party has continually controlled the House since the 1966 election. The governor has been a Republican 60 percent of the time since 1966.

Tax Burden

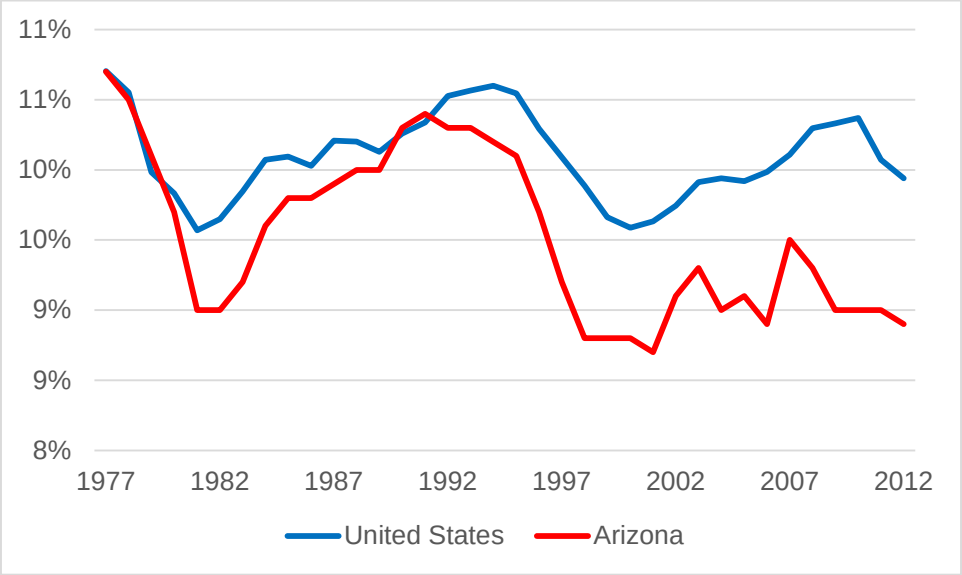
In addition to using the Census Bureau's state and local government tax revenue data adjusted for population or personal income as an estimate of the tax burden, other organizations produce estimates of the tax burden.

Tax Foundation

The Tax Foundation has produced a time series of the tax burden in each state from 1977 through 2012 (https://taxfoundation.org/state-local-tax-burden-rankings-fy-2012/). The Tax Foundation uses the Census Bureau's data on tax collections as a starting point, but focuses on who is actually paying the taxes. For example, some of the taxes collected by Arizona governments are paid by tourists, seasonal visitors, and others who are not residents of the state. The Tax Foundation's allocation of tax collections realized by state and local governments to the residence of those paying the taxes is based on a number of assumptions. Similarly, the Tax Foundation starts with the BEA's estimates of personal income but adds and subtracts income categories to come to its own definition of income.

The tax burden is calculated by the Tax Foundation as total taxes paid per capita divided by income per capita. Arizona is compared to the nation in Chart 6. Other than from 1977 through 1979 and from 1989 through 1991, when the tax burden in Arizona was similar to the national average, the tax burden has been below the national norm in Arizona. In 2012, the last year of data, Arizona's tax burden was 11 percent less than average and ranked 37th among the 50 states and the District of Columbia. The decline in Arizona's tax burden relative to the national average was the sixth largest among the states from 1977 through 2012.

CHART 6
STATE AND LOCAL GOVERNMENT TAXES AS A SHARE OF INCOME



Source: Tax Foundation.

Among the 10 western states, Arizona's tax burden in 2012 as estimated by the Tax Foundation was seventh lowest (the burden was lower in Nevada, New Mexico, and Texas). Between 1977 and 2012, Arizona's tax burden relative to the nation dropped the most of the 10 western states.

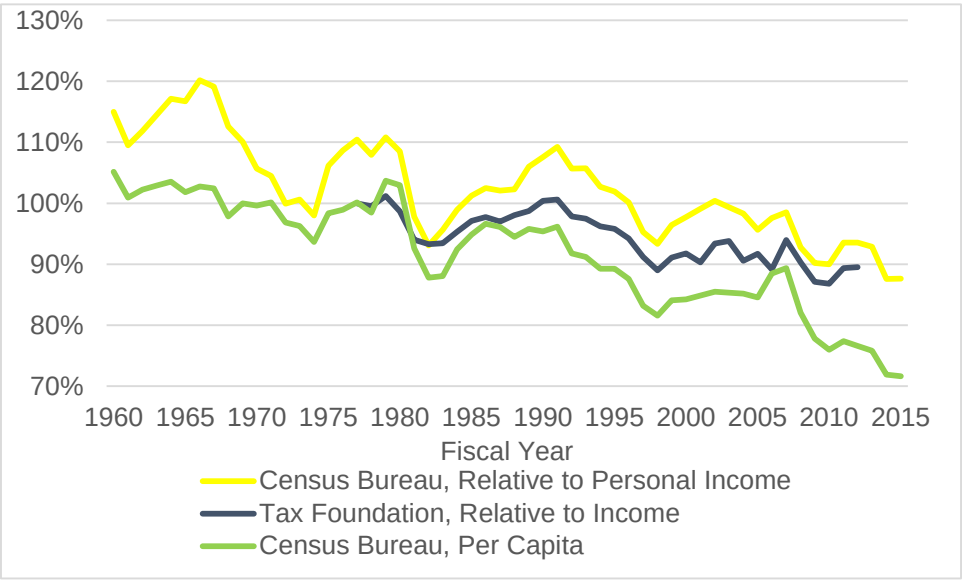
Across the states, the correlation in 2012 between the Tax Foundation's measure of tax burden and the Census Bureau's tax collections relative to personal income was slight and insignificant at 0.1, an indication of the definitional differences in the two measures. The 2012 correlation is representative of the correlations in the prior several years; in some years before then, a moderate correlation was present between the two measures of tax burden.

In all but one year between 1977 and 2012, Arizona's tax burden relative to the nation was lower using the Tax Foundation's data than the Census Bureau's data, using income to adjust the tax data (see Chart 7). In each of the measures of tax burden, Arizona's burden has declined over time relative to the nation, with a greater decrease measured on a per capita basis than relative to income. The timing of the second of three periods of decline differs between the per capita measure, which peaked in FY 1986, and the measures relative to income, which did not peak until FY 1991.

Other Sources of Tax Burden

Recent data from two other sources of tax burden are examined in this subsection. An annual study by the District of Columbia focuses on the taxes paid by individuals (https://cfo.dc.gov/page/tax-burdens-comparison). A second study, done by Ernst & Young for the Council on State Taxation, looks at taxes paid by businesses (http://cost.org/state-tax-resources/cost-studies-articles-and-reports/).

CHART 7
COMPARISON OF TAX BURDEN MEASURES,
ARIZONA AS A PERCENTAGE OF THE NATIONAL AVERAGE



Sources: Tax Foundation; and U.S. Department of Commerce: Census Bureau (tax collections and population) and Bureau of Economic Analysis (personal income).

The tax burden study done by the District of Columbia estimates the individual tax burden in four categories of taxes — income, property, sales, and automobile related — in the largest city of each state for a hypothetical family at each of five income levels. Expressing the tax burden as a ratio to the average of the cities, the tax burden across the states at the $25,000 income level hardly was correlated to the tax burden at the higher income levels. In contrast, very high correlation was present in the tax burdens at each of the other income levels. The results at each of the income levels are positively correlated to the Tax Foundation's tax burden measure, though the correlation at the $25,000 income level is slight. However, the District of Columbia's estimates are not correlated with the Census Bureau's tax collections, whether the latter are adjusted by population or personal income.

The 2016 District of Columbia data indicated that the overall tax burden in Phoenix was somewhat higher than the average of the 51 cities for those earning $25,000, near average for those earning $50,000, and below average for those earning more. In Phoenix, the sales tax burden was considerably above average at each income level; the property tax burden was below average for those earning $25,000 and near average for those earning more; the income tax burden was far below average except for those earning $25,000, who pay little income tax; and auto-related taxes were below average at each income level.

The Ernst & Young study of business taxes looks at seven categories of taxes, measuring the burden as a percentage of private-sector gross product — a standardization preferable to personal income or population when gauging business taxes. A slight negative relationship exists between the business tax burden estimated by Ernst & Young and the individual tax burden calculated by the District of Columbia at each of the income levels. Ernst & Young's results also are

negatively correlated to the Tax Foundation's tax burden. However, Ernst & Young's results are moderately correlated to the Census Bureau's tax collections, adjusted by both population and personal income.

The overall business tax burden in Arizona in fiscal year 2016 was somewhat above the national average, due to a very high sales tax burden and an above-average business property tax burden. In each of the other five categories, the burden in Arizona was considerably below average. The amount of property tax paid by businesses appears to be overestimated by Ernst & Young, compared to data compiled by the Arizona Tax Research Association (ATRA). If the lower property tax figure from ATRA is substituted for Ernst & Young's estimate, Arizona's overall business tax burden and business property tax burden drop to slightly below average.

Education Revenue

Given the focus in this paper on educational attainment, public education finance is specifically examined, with revenues analyzed in this subsection and expenditures discussed in the next section.

Public K-12 Education Revenue

Two sources provide a time series of public K-12 education finance by state. The Census Bureau provides detail on public K-12 education finance in its annual report "Public Education Finances." Revenue data by source (federal government, state government, and local government) are available for fiscal years 1987 through 2016; the data for FYs 1992 through 2016 are available online at http://www.census.gov/govs/school/. Charter schools operated by a nongovernmental entity are not included in the Census Bureau's data.

A second source of information on public education finance is the U.S. Department of Education's National Center for Education Statistics (NCES). It also provides revenue and expenditure data by source, but its time series is much longer, extending back into the 19th century, though the data were generated every other year until FY 1976, with data missing for some of these years. Data were collected for Arizona and the nation back to Arizona's statehood in 1912. Data by state are available online (https://nces.ed.gov/) back to FY 1993; the latest data are for FY 2015.

Moderately high correlations exist between the indicators of per student K-12 finance produced by the Census Bureau and the NCES, and the Census Bureau's indicators of total government finance per capita, with correlations ranging from 0.6 to 0.8.

Because the NCES includes all charter schools, it reports a greater amount of K-12 revenue and expenditures than the Census Bureau, as well as a greater number of students. In FY 2015, the Census Bureau reported 3.6 percent fewer students and 1.0 percent less revenue. In Arizona, which has a higher proportion of charter schools in general, as well as those operated by a nongovernmental entity, the differences between the Census Bureau and the NCES were much larger: 15 percent for the number of students and 17 percent for total revenue.

Despite the definitional difference between the NCES and Census Bureau and the larger differential between Arizona and the nation, the per student figures in Arizona relative to the

national average are similar from the NCES to those from the Census Bureau, as seen in Table 3. Using data adjusted for the cost of living, each source indicates that Arizona in FY 2015 was far below average on per student revenue, in total and from state and local government sources, while Arizona's per student revenue from the federal government was above average. Arizona was not quite as far below the national average based on the NCES data as on the Census Bureau data.

The latest data, from the Census Bureau, are for FY 2016. Total revenue per student in Arizona, adjusted for the cost of living, was 32 percent below the national average, with only Idaho and Utah having lower figures. State and local government funding per student was 36 percent below

TABLE 3
PUBLIC ELEMENTARY AND SECONDARY SCHOOL REVENUE PER STUDENT ADJUSTED FOR THE COST OF LIVING, FISCAL YEARS 2015 AND 2016

	United States	Arizona	Arizona Share of Nation	Arizona Rank*
Standardization Measures				
Enrollment in thousands:				
NCES, FY 2015	50,313	1,112		
Census Bureau, FY 2015	48,514	945		
Census Bureau, FY 2016	48,572	938		
Regional Price Parity (RPP)	100	96		
Total Revenue				
NCES, FY 2015	$12,873	$9,239	71.8%	49
Census Bureau, FY 2015	13,221	8,994	68.0	49
Census Bureau, FY 2016	13,814	9,364	67.8	49
From Federal Government				
NCES, FY 2015	1,093	1,197	109.5	24
Census Bureau, FY 2015	1,099	1,206	109.7	20
Census Bureau, FY 2016	1,115	1,290	115.7	14
From State and Local Governments				
NCES, FY 2015	11,780	8,042	68.3	49
Census Bureau, FY 2015	12,122	7,788	64.2	49
Census Bureau, FY 2016	12,699	8,074	63.6	50
From State Government				
NCES, FY 2015	5,993	4,072	67.9	46
Census Bureau, FY 2015	6,213	3,563	57.3	50
Census Bureau, FY 2016	6,546	3,822	58.4	49
From Local Governments				
NCES, FY 2015	5,787	3,971	68.6	39
Census Bureau, FY 2015	5,909	4,226	71.5	34
Census Bureau, FY 2016	6,153	4,253	69.1	35

* Among 51 states (including the District of Columbia), where 1 equals the highest value.

Source: U.S. Department of Commerce: Census Bureau, Public Education Finances (revenue and enrollment), and Bureau of Economic Analysis (regional price parity); and U.S. Department of Education, National Center for Education Statistics (revenue and enrollment).

average, with only Idaho lower. In contrast, federal funding per student was 16 percent above average; Arizona ranked 14th.

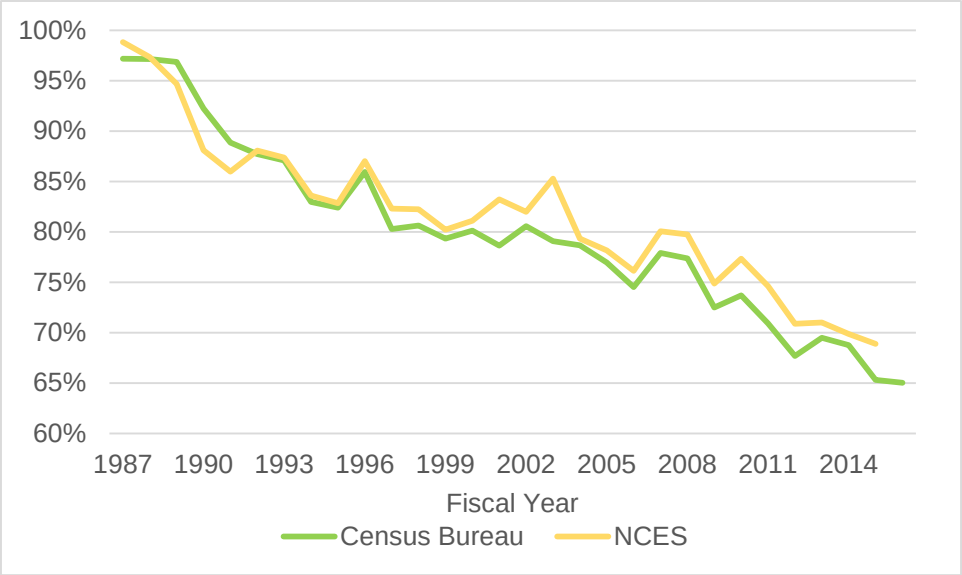
As a time series, total revenue per student in Arizona as a percentage of the national average from the two sources is compared in Chart 8. Close correspondence between the two sources is seen, with a clear downtrend in per student revenue in Arizona relative to the national average since the late 1980s.

The longer history of per student revenue in Arizona as a percentage of the national average is shown in Chart 9 using data from the NCES. Total revenue and the portion contributed by state and local governments are graphed; the two measures closely track since the share of total revenue contributed by the federal government is small (14 percent in FY 2016). In the early decades of statehood, per student revenue in Arizona was considerably above the national average.

Beginning in the Great Depression, per student revenue in Arizona was closer to the national average; though fluctuating, it remained near average into the 1960s. Arizona was close to the national average as recently as the late 1980s, but per student revenue has fallen substantially since then.

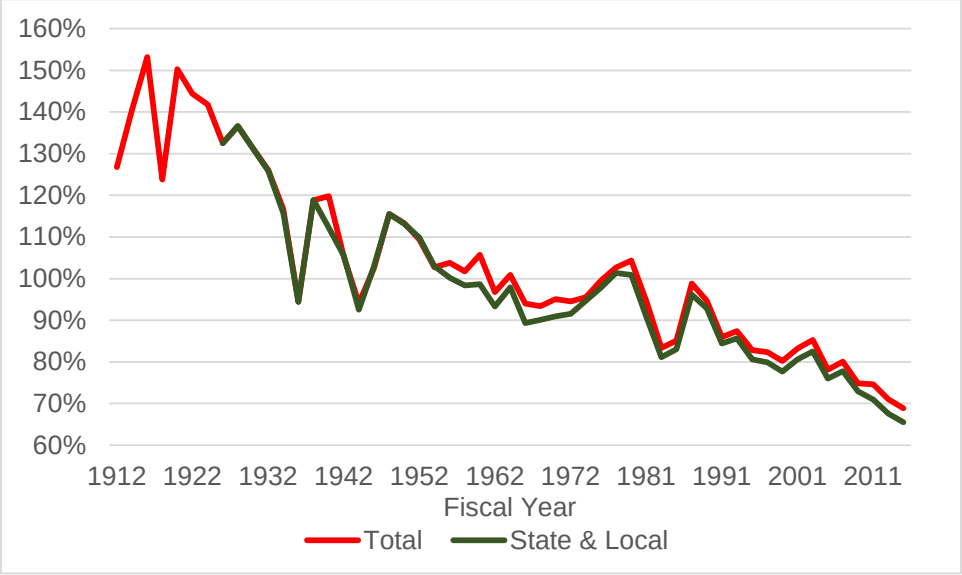
State and local government appropriations per student for selected years from the NCES are provided in Table 4. The left side of the table shows a decline in the percentage of the national

CHART 8
COMPARISON OF PUBLIC ELEMENTARY AND SECONDARY SCHOOL TOTAL REVENUE PER STUDENT, ARIZONA AS A PERCENTAGE OF THE NATIONAL AVERAGE



Sources: U.S. Department of Education, National Center for Education Statistics (NCES) and U.S. Department of Commerce, Census Bureau, Public Education Finance.

CHART 9
PUBLIC ELEMENTARY AND SECONDARY SCHOOL REVENUE PER STUDENT, ARIZONA AS A PERCENTAGE OF THE NATIONAL AVERAGE



Note: Data are displayed for even-numbered years through fiscal year 1976 and in odd-numbered years after that, through fiscal year 2015. Total revenue consists of revenue received from the federal government as well as revenue received from state and local governments.

Source: U.S. Department of Education, National Center for Education Statistics, and predecessor agencies.

TABLE 4
PUBLIC ELEMENTARY AND SECONDARY SCHOOL STATE AND LOCAL GOVERNMENT APPROPRIATIONS PER STUDENT, ARIZONA, SELECTED YEARS

Fiscal Year	% US*	Change**	Fiscal Year	% US*	Change**
1920	150.3%		1948	115.5%	
1932	125.9	-24.4	1966	89.4	-26.1
1942	105.5	-20.4	1977	101.3	11.9
1950	113.2	7.7	1983	81.1	-20.2
1960	98.7	-14.5	1987	96.1	15.0
1970	90.9	-7.8	2015	65.6	-30.5
1980	99.6	8.7			
1990	86.4	-13.2			
2000	78.0	-8.4			
2010	72.0	-6.0			
2015	65.5	-6.5			

* Arizona's per capita revenue as a percentage of the national average.
** Change in the percentage of the U.S. average from the previous year listed.

Source: U.S. Department of Education, National Center for Education Statistics, and predecessor agencies.

average in most decades (data for 1930 and 1940 are not available) since 1920. The right side of the table provides peaks and troughs relative to the nation. This pattern of ups and downs in revenue per student in Arizona relative to the national average is different from total state and local government revenue per capita. In particular, education revenue per student did not decline immediately after the 1966 election.

Public Higher Education Revenue

Two sources also are available for data on public higher education finance. Both sources combine data for community colleges and universities. Since many college students, especially those at community colleges, attend school part time, higher education finance data ideally are expressed on a full-time-equivalent student basis.

Higher education finance data from the NCES begin in fiscal year 1966, as do total enrollment figures. The figures extend through FY 2016. However, FTE enrollment data do not begin until FY 1985. Total higher education revenue as reported by the NCES is broadly defined, including state and local government appropriations, tuition and fees, grants and contracts, gifts and endowments, auxiliary enterprises, and university-operated hospitals.

In contrast, revenue data from the State Higher Education Executive Officers Association (SHEEO) in their "State Higher Education Finance" project (http://sheeo.org/projects/shef-%E2%80%94-state-higher-education-finance) are much more narrowly defined. Total revenue includes only two categories:

- State and local government appropriations for public higher education — excluding appropriations for special purposes, research, and medical programs.
- Tuition, excluding tuition monies used for capital or debt service.[4]

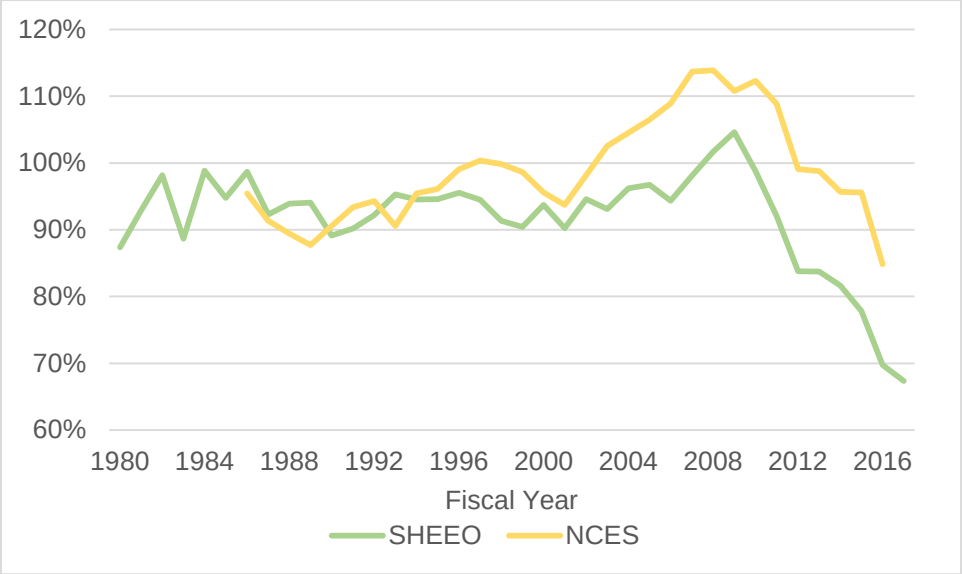
Data for FYs 1980 through 2017 are available. A measure of full-time-equivalent (FTE) enrollment that excludes medical students is included in the SHEEO's database.

In Chart 10, the data from the NCES are compared to SHEEO's data for state and local government appropriations. Despite the difference in definition, each source shows a sharp downtrend in state and local government appropriations per FTE student in Arizona relative to the national average since FY 2010 that places Arizona's percentage of the national average below the historical norm, which was less than the national average.

Based on the data from the NCES, total public higher education revenue per FTE student in Arizona, adjusted for the cost of living, was 19 percent less than the national average and ranked 43rd in FY 2016. Among the western states, Idaho and Nevada had lower figures. Looking only at state and local government appropriations, Arizona also was below the national average per FTE student in FY 2016, ranking 36th at 12 percent below average after adjusting for living costs. Among the western states, Colorado and Washington had lower figures.

[4] According to the SHEEO, net tuition revenue does not measure 'net price,' but measures the revenue that institutions receive from tuition. It is a straightforward measure of the proportion of public institution instructional costs borne by students and families. Federal grant assistance (primarily from Pell Grants) are not deducted from gross tuition revenue, since these are nonstate funds that substitute, at least in part, for costs borne by students. Measures of net price for the student need to include nontuition costs and all forms of aid.

CHART 10
COMPARISON OF HIGHER EDUCATION STATE AND LOCAL GOVERNMENT APPROPRIATIONS PER FULL-TIME-EQUIVALENT STUDENT, ARIZONA AS A PERCENTAGE OF THE NATIONAL AVERAGE



Note: Higher education includes community colleges and universities. The SHEEO defines appropriations more narrowly than the NCES, excluding appropriations for special purposes, research, and medical programs,

Sources: U.S. Department of Education, National Center for Education Statistics (NCES) and State Higher Education Executive Officers Association (SHEEO).

As seen in Chart 11, total public higher education revenue per student in Arizona has been considerably below the national average for the entire time period available from the NCES. The data for state and local government appropriations per student are graphed in Chart 12; these data are not available prior to FY 1986. Per student appropriations have fluctuated but generally have been below the national average. A very large decline in Arizona relative to the nation has occurred since FY 2010.

Based on the data from the SHEEO, state and local government appropriations accounted for only 39 percent of higher education revenues in Arizona, the 40th-lowest share among the 50 states in FY 2017. Among the western states, the share was lower only in Colorado. Without adjusting for the regional cost of living (RPP figures have not been released yet for 2017), appropriations per FTE student were 32.6 percent below average in Arizona and ranked 44th. In contrast, net tuition per FTE student was 25.7 percent above average and ranked 20th. Total revenue per FTE student was 7.4 percent below average and ranked 32nd.

In FY 2016 using the SHEEO's data, appropriations per FTE student adjusted for living costs were 27.3 percent below average in Arizona and ranked 45th among the 50 states. Only Colorado was lower among the western states. In contrast, net tuition per FTE student was 29.7 percent above average and ranked 21st; in the West, Colorado and Oregon had higher figures.

CHART 11
PUBLIC HIGHER EDUCATION REVENUE PER STUDENT,
ARIZONA AS A PERCENTAGE OF THE NATIONAL AVERAGE

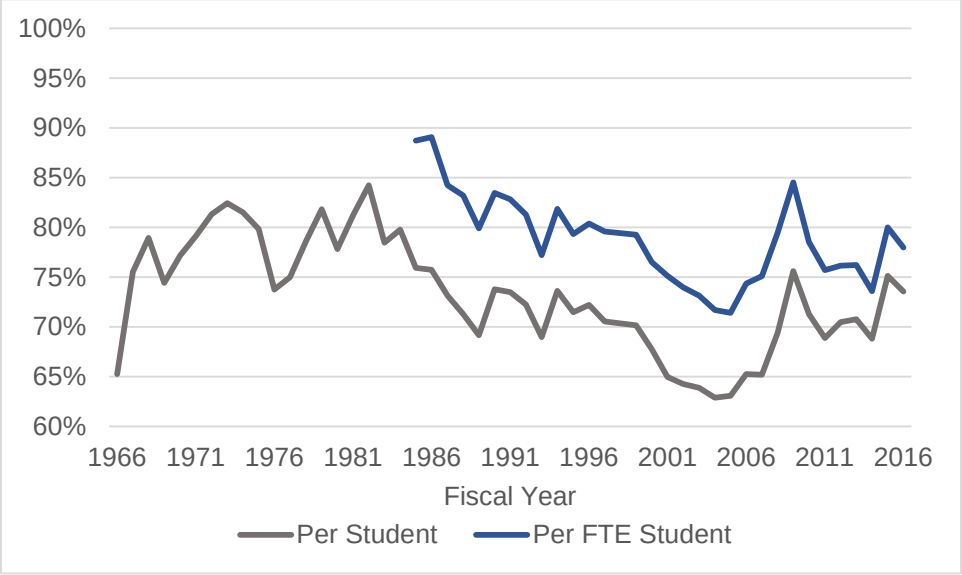
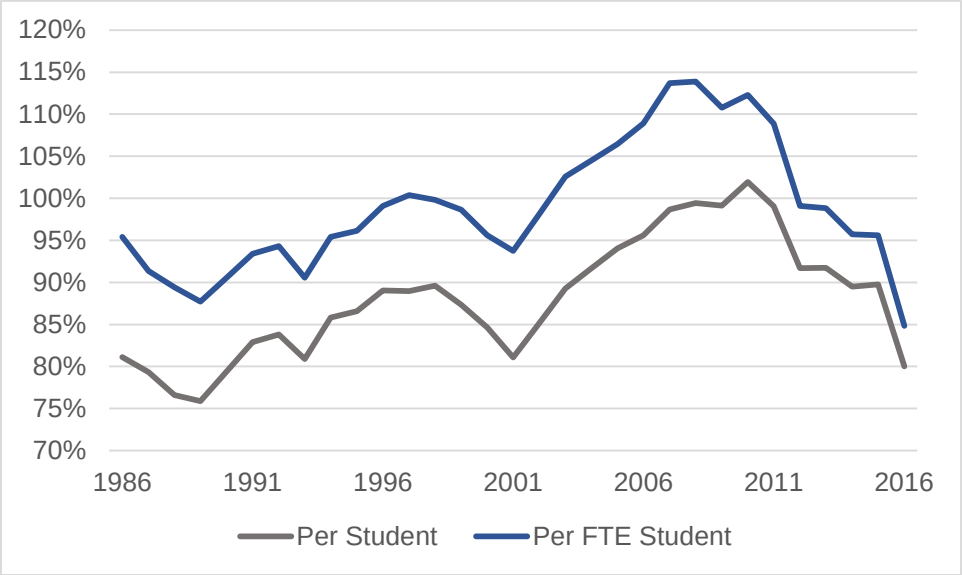


CHART 12
PUBLIC HIGHER EDUCATION STATE AND LOCAL GOVERNMENT
APPROPRIATIONS PER STUDENT,
ARIZONA AS A PERCENTAGE OF THE NATIONAL AVERAGE



Charts 11 and 12:

Note: Higher education includes community colleges and universities. Revenue is broadly defined to include all sources.

Source: U.S. Department of Education, National Center for Education Statistics.

Total revenue per FTE student was 2.9 percent below average and ranked 35th, though only two western states (Colorado and Oregon) had higher figures.

The change over time in Arizona's financing of public higher education is striking relative to the rest of the nation. In FY 1980, the earliest data from the SHEEO, appropriations accounted for 78.7 percent of total revenue in Arizona — double the share in FY 2017. While this share began to decline in the 1980s, it still was 64 percent in FY 2009. In the next eight years, it fell to 39 percent. The appropriations share in Arizona ranked between 15th and 29th through FY 2011, before dropping to 40th (see Chart 13).

As seen in Chart 14, appropriations per FTE student in Arizona generally ranged between 90-and-98 percent of the national average from FYs 1980 through 2011, but plummeted to 67.4 percent in FY 2017. The rank among the states fell from 26th in FY 2011 to 44th. In contrast, tuition per FTE student in Arizona typically ranged from a little below to a little above the national average through FY 2008, but has since climbed to 25.7 percent above average. Due to the large increase in tuition since FY 2008, total revenue per FTE student has remained in the historical range at somewhat below the national average.

The net tuition line in Chart 14 does not reflect financial aid. At Arizona's universities, the increase in tuition has been accompanied by large university-funded increases in financial aid. This increase in financial aid has left the universities with fewer resources with which to cover other expenses.

Moderately strong correlations are present between the Census Bureau's per capita indicators of total government finance and state and local government appropriations for higher education per FTE student as reported by the NCES. However, the correlations are lower with total revenue per FTE student from the NCES. Correlations are low with SHEEO's measures of higher education finance. This indicates that tuition and other higher education revenue sources are not correlated with other measures of government finance.

Government Revenue Summary

Based on data from the Census Bureau, state and local government revenue in Arizona, whether measured on a per capita basis or relative to personal income was historically higher than the national average. This began to change after 1966, with Arizona's per capita figure falling to below the national average by FY 1974. Additional periods of decline relative to the U.S. average between FYs 1986 and 1998 and between FYs 2007 and 2015 left Arizona's per capita revenue far below average.

In fiscal year 2015, on a per capita basis adjusted for the cost of living, state and local government tax collections in Arizona ranked 47th at 25 percent below average. Relative to personal income, tax collections were 12 percent below average and ranked 40th. Since nontax revenue per person was even further below average in Arizona, own-source revenue per capita, adjusted for the cost of living, also was far below than the national average — the lowest figure in the nation at 28 percent less than the U.S. average. Adjusted by personal income, own-source revenue was 15 percent below average and ranked 48th. Arizona was not quite as far below

CHART 13
STATE AND LOCAL GOVERNMENT APPROPRIATIONS
AS A SHARE OF PUBLIC HIGHER EDUCATION REVENUE, ARIZONA

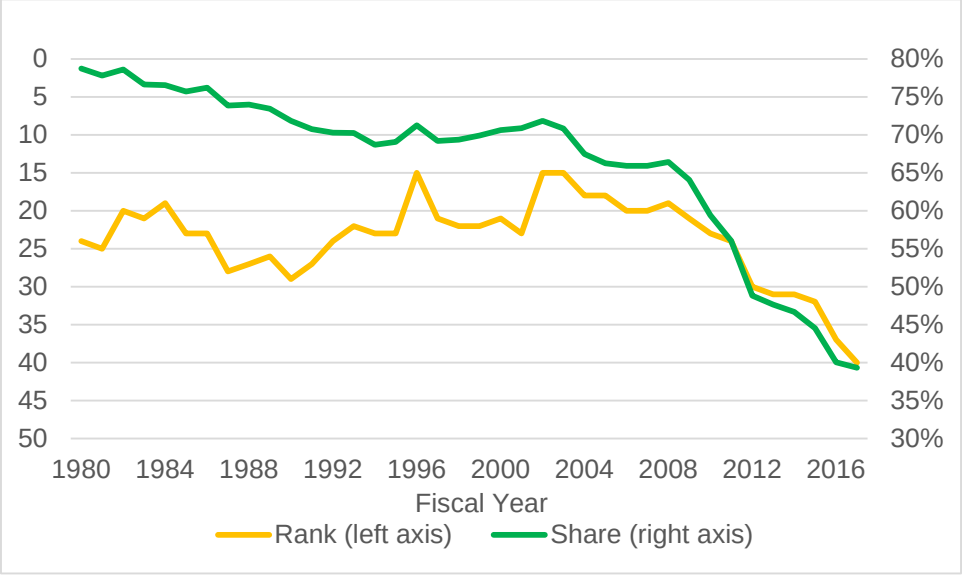
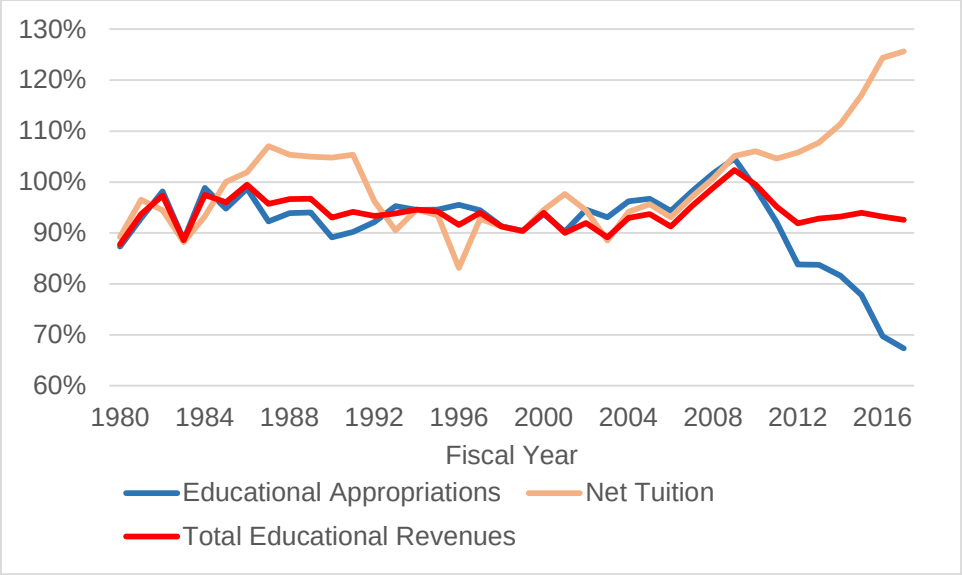


CHART 14
PUBLIC HIGHER EDUCATION REVENUE PER FULL-TIME-EQUIVALENT STUDENT, ARIZONA AS A PERCENTAGE OF THE NATIONAL AVERAGE



Charts 13 and 14:

Note: Higher education includes community colleges and universities. Appropriations exclude funding for special purposes, research, and medical programs. Net tuition excludes tuition monies used for capital or debt service. The net tuition figure does not deduct student aid. Total revenue is the sum of the narrowly defined appropriations and net tuition.

Source: State Higher Education Executive Officers Association.

average on total revenue, since revenue received from the federal government was at the U.S. average on a per capita basis (adjusted for living costs) and above average relative to personal income.

Tax Burden

Using data from the Tax Foundation, Arizona's tax burden relative to income was 11 percent less than average and ranked 37th among the 50 states and the District of Columbia in 2012, the last year of data. In the late 1970s and again around 1990, Arizona's tax burden had been similar to the national average.

Based on the studies by the District of Columbia and Ernst & Young, the low overall tax burden in Arizona largely is due to a low tax burden on individuals. The business tax burden is only a little below the U.S. average.

Public Education Funding

For the first few decades after statehood, per student revenue for K-12 education in Arizona exceeded the national average. As recently as the late 1980s, Arizona's figure was near the U.S. average. Since then, the ratio to the national average has declined substantially. In FY 2015, adjusted for the cost of living, total revenue per student was approximately 30 percent below the national average, third-lowest in the nation. Adjusted state and local government appropriations per student also were third lowest in the nation, at more than 30 percent below the U.S. average.

State and local government appropriations for higher education per FTE student historically were a little below average in Arizona. In the last several years, however, public support for higher education in Arizona has dropped substantially. A large increase in tuition has offset the decline in appropriations, holding total revenue per FTE student steady at a little below the national average.

State and local government appropriations for higher education per FTE student adjusted for the cost of living also are substantially below the national average in Arizona. Using data from the SHEEO, Arizona's FY 2016 figure was 27 percent below average, ranking 45th.

GOVERNMENT EXPENDITURES

Since state and local governments are unable to engage in deficit spending, total expenditures are not substantially different from total revenue. Expenditures generally are divided into capital outlays — for the purchase of land, construction of buildings, and the purchase of major equipment — and noncapital expenditures. Noncapital expenditures benefit the existing population and generally do not vary much from year to year. In contrast, capital outlays benefit future residents and can be highly erratic in magnitude from year to year.

State and Local Government Expenditures

The Census Bureau is the source of government expenditure data. Though the Census Bureau provides categorical detail on the nature of the expenditures, the focus in this section is on total expenditures, total capital outlays, and total noncapital expenditures.

Fiscal Year 2015

State and local government expenditure figures in fiscal year 2015 are summarized in Table 5. Arizona's total expenditures, as well as its noncapital expenditures and capital outlays, were far below the national average and most states measured on a per capita basis and below average when adjusted by personal income.

Per capita and adjusted for the cost of living, total expenditures in Arizona were 22 percent below the national average in FY 2015, second lowest in the nation (Idaho was lower). Capital outlays were 35 percent below the per capita norm and also ranked 50th in the nation (New

TABLE 5
STATE AND LOCAL GOVERNMENT EXPENDITURES, FISCAL YEAR 2015

	United States	Arizona	Arizona Share of Nation	Arizona Rank*
Total Expenditures				
Per Capita	$8,877	$6,648	74.9%	50
Per Capita, Adjusted by RPP	$8,877	$6,925	78.0	50
Per $1,000 of Personal Income	$186.5	$170.9	91.6	39
Noncapital Expenditures				
Per Capita	$8,001	$6,102	76.3	49
Per Capita, Adjusted by RPP	$8,001	$6,356	79.4	50
Per $1,000 of Personal Income	$168.1	$156.9	93.3	36
Capital Outlays				
Per Capita	$876	$546	62.4	51
Per Capita, Adjusted by RPP	$876	$569	65.0	50
Per $1,000 of Personal Income	$18.4	$14.0	76.3	47

* Among 51 states (including the District of Columbia), where 1 equals the highest value.

Source: U.S. Department of Commerce: Census Bureau, State and Local Government Finance (expenditures and population), and Bureau of Economic Analysis (personal income and regional price parity).

Hampshire was lower) after adjusting for the cost of living. Arizona's per capita adjusted noncapital expenditures were 21 percent below average, also second lowest (Idaho was lower).

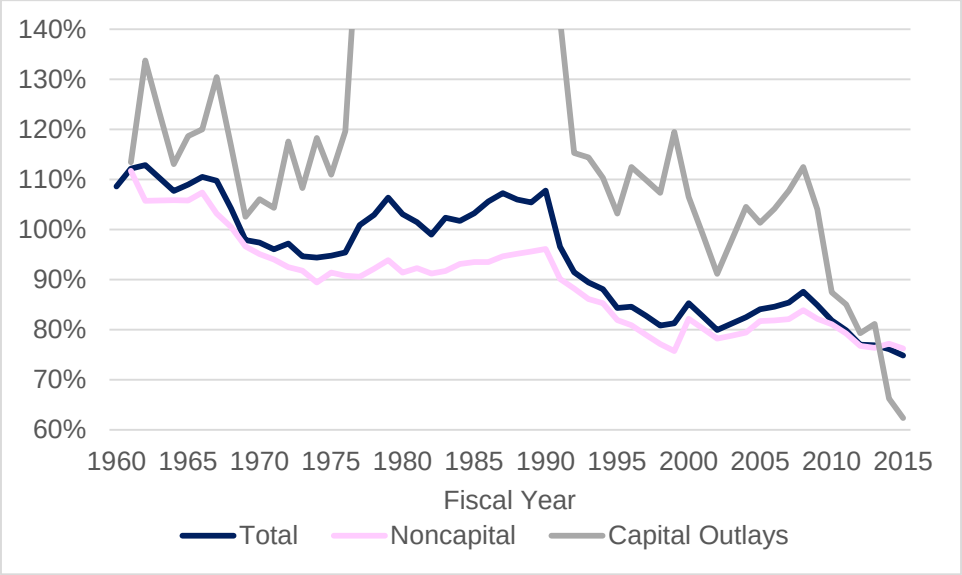
Adjusted by personal income, Arizona's government expenditure figures were not as far below the national average, but the shortfalls still were substantial. Among the states, Arizona ranked 39th on total expenditures (sixth among the western states), 36th on noncapital spending (sixth among the western states), and 47th on capital outlays (lowest among the western states).

Change Over Time

The time series analysis of state and local government expenditures extends from fiscal years 1960 through 2015, though data were not collected in a few of those years. Between fiscal years 1960 and 2015, the percent change in Arizona ranked 50th on a per capita basis (Nevada was lower) and 47th relative to personal income (Louisiana, North Dakota, Oklahoma, and South Dakota were lower) on both total state and local government expenditures and noncapital expenditures. In the capital outlays category, Arizona ranked second to last (to Nevada) on per capita expenditures and 49th relative to personal income (New Hampshire and Vermont were lower).

Arizona's history relative to the nation, expressed on a per capita basis, is shown in Chart 15 for the three expenditure categories. During the 1960s, Arizona's per capita spending exceeded the national average in each category. Arizona's percentage of the national average has dropped considerably since then in each category.

CHART 15
STATE AND LOCAL GOVERNMENT EXPENDITURES PER CAPITA, ARIZONA AS A PERCENTAGE OF THE NATIONAL AVERAGE



Note: Per capita capital outlays in Arizona exceeded 140 percent of the national average from fiscal years 1977 through 1991.

Source: U.S. Department of Commerce, Census Bureau, State and Local Government Finance.

The FY 1960-to-2015 period is divided into shorter time segments in Table 6. The overall decline in per capita expenditures in Arizona relative to the national average between FYs 1960 and 2015 largely occurred in three time segments that totaled a little less than half of the time period, with the timing of the declines slightly different from that of revenues. The timing also was different in the erratic capital outlays series from noncapital expenditures. The first of the three significant declines occurred between FYs 1967 and 1974, when per capita total expenditures and noncapital expenditures dropped from above-to-below average. Over the next 16 years, some of the loss in per capita expenditures relative to the nation was offset. The second period of decline was between FYs 1990 and 2002. It was during this period that Arizona first fell into the bottom tier of states. Another period of partial recovery occurred between FYs 2002 and 2008. Between FYs 2008 and 2015, Arizona again fell to among the lowest states.

State Government Expenditures

As with revenue, a longer time series on expenditures is available for state governments. FY 1941 is the first year of consistent expenditure data. The time series on state government expenditures is similar to that of state government revenues, as was seen in Chart 5. Expenditures per capita were well above the national average through FY 1966, but have dropped to substantially below average since then.

Education Expenditures

The NCES and the Census Bureau divide noncapital expenditures into current operations and other expenditures, with the latter consisting primarily of interest payments.

TABLE 6
STATE AND LOCAL GOVERNMENT EXPENDITURES PER CAPITA, ARIZONA, SELECTED YEARS

	Total Expenditures		Capital Outlays		Noncapital Expenditures	
Fiscal Year	**% US***	**Rank****	**% US***	**Rank****	**% US***	**Rank****
1961	112.2%	13	113.5%	19	111.8	12
1967	109.7	16	130.5	11	103.2	17
1974	94.4	23	118.3	11	89.5	27
1990	107.8	13	188.8	3	96.1	20
2002	79.9	51	91.2	30	78.2	51
2008	87.6	37	112.5	15	83.9	44
2015	74.9	50	62.4	51	76.3	49
Change:						
1960-67	-2.5	-3	17.0	8	-8.6	-5
1967-74	-15.3	-7	-12.2	0	-13.7	-10
1974-90	13.4	10	70.5	8	6.6	7
1990-2002	-27.9	-38	-97.6	-27	-17.9	-31
2002-08	7.7	14	21.3	15	5.7	7
2008-15	-12.7	-13	-50.1	-36	-7.6	-5

* Arizona's per capita revenue as a percentage of the national average.
** Among 51 states (including the District of Columbia), where 1 equals the highest value.

Source: U.S. Department of Commerce: Census Bureau, State and Local Government Finance.

Public K-12 Education Expenditures
As with K-12 revenue, K-12 expenditure data are available from both the NCES and the Census Bureau. A high correlation exists between these two sources for current operations spending.

Despite the definitional difference between the NCES and Census Bureau — total expenditures according to the Census Bureau were lower than those reported by the NCES by 1.8 percent nationally and 18.5 percent in Arizona — the per student figures in Arizona relative to the national average are similar from the NCES to those from the Census Bureau, as seen in Table 7. Using data adjusted for the cost of living, each source indicates that Arizona in FY 2015 was far below average on per student total expenditures and noncapital expenditures. Arizona was not quite as far below the national average based on the NCES data as on the Census Bureau data. The two sources differed considerably in the amount of capital outlays, though each indicated that Arizona's per student amount was below average.

TABLE 7
PUBLIC ELEMENTARY AND SECONDARY SCHOOL EXPENDITURES PER STUDENT ADJUSTED FOR THE COST OF LIVING, FISCAL YEARS 2015 AND 2016

	United States	Arizona	Arizona Share of Nation	Arizona Rank*
Standardization Measures				
Enrollment in thousands:				
NCES, FY 2015	50,313	1,112		
Census Bureau, FY 2015	48,514	945		
Census Bureau, FY 2016	48,572	938		
Regional Price Parity (RPP)	100	96		
Total Expenditures				
NCES, FY 2015	$12,942	$9,064	70.0%	49
Census Bureau, FY 2015	13,178	8,693	66.0	49
Census Bureau, FY 2016	13,685	8,869	64.8	49
Capital Outlays				
NCES, FY 2015	1,006	924	91.8	31
Census Bureau, FY 2015	1,072	549	51.2	46
Census Bureau, FY 2016	1,177	587	49.9	46
Noncapital Expenditures				
NCES, FY 2015	11,836	8,140	68.2	49
Census Bureau, FY 2015	12,106	8,144	67.3	49
Census Bureau, FY 2016	12,508	8,282	66.2	49
Current Operations				
NCES, FY 2015	11,435	7,844	68.6	49
Census Bureau, FY 2015	11,702	7,943	67.9	49
Census Bureau, FY 2016	12,085	8,082	66.9	49

* Among 51 states (including the District of Columbia), where 1 equals the highest value.

Note: Current operations is the primary subcategory of noncapital expenditures.

Source: U.S. Department of Commerce: Census Bureau, Public Education Finances (expenditures and enrollment), and Bureau of Economic Analysis (regional price parity); and U.S. Department of Education, National Center for Education Statistics (expenditures and enrollment).

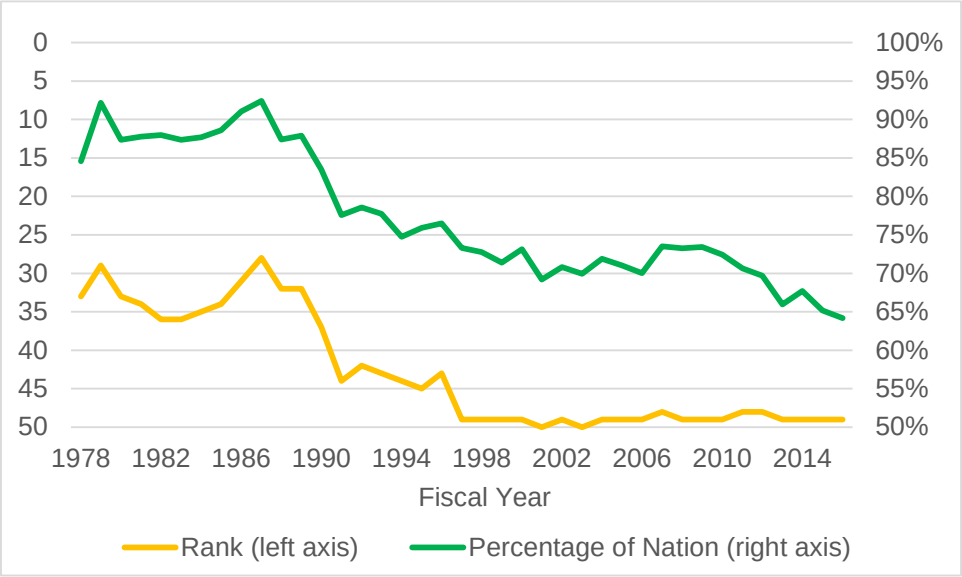
The latest data, from the Census Bureau, are for FY 2016. Total expenditures per student in Arizona, adjusted for the cost of living, were 35 percent below the national average, with only Idaho and Utah having lower figures. The differences from the national average were similar for noncapital expenditures per student and for current operations spending per pupil.

Year-by-year data from the Census Bureau for current operations spending per student are shown in Chart 16. After holding relatively steady from the late 1970s into the late 1980s, at about 10 percent below the national average, per student current operations spending in Arizona has declined significantly relative to the national average.

The longer time span available from the NCES is displayed in Chart 17 for per pupil current operations spending. Arizona's figure was far above the national average in the early years of statehood and similar to the U.S. average from the 1930s into the 1960s. Arizona still was near average in some years of the 1970s and 1980s.

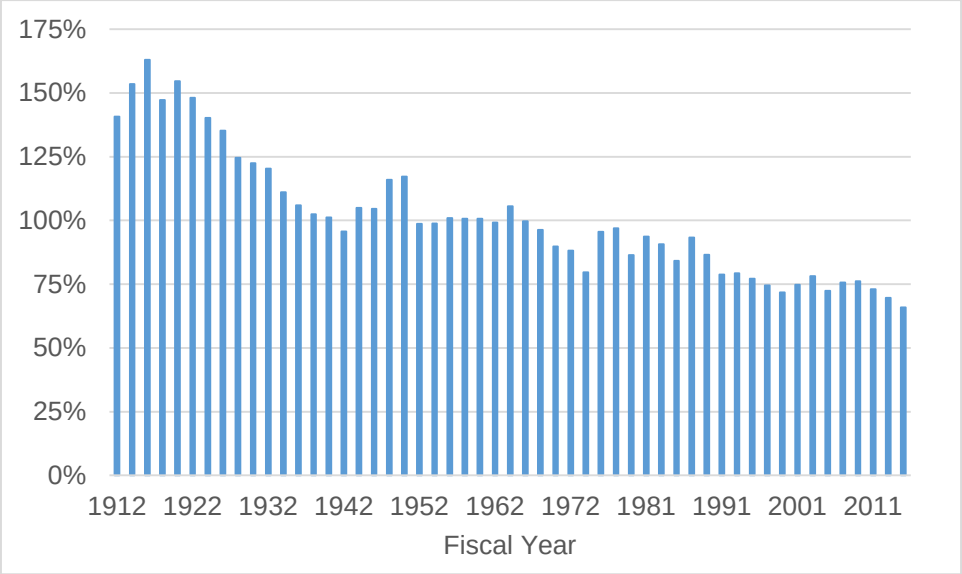
In Table 8, current operations expenditures per student in Arizona expressed as a percentage of the U.S. average are provided by decade (data for 1930 and 1940 are not available), using data from the NCES. Arizona experienced a decline in the percentage of the national average in most decades after 1920. Since FY 1960, the decline in current operations spending per student in Arizona versus the U.S. average, while somewhat erratic, displays a more steady downward trend than do total expenditures per capita.

CHART 16
PUBLIC ELEMENTARY AND SECONDARY SCHOOL
CURRENT OPERATIONS EXPENDITURES PER STUDENT, ARIZONA



Source: U.S. Department of Commerce, Census Bureau, Public Education Finance.

CHART 17
PUBLIC ELEMENTARY AND SECONDARY SCHOOL CURRENT OPERATIONS EXPENDITURES PER STUDENT, ARIZONA AS A PERCENTAGE OF THE NATIONAL AVERAGE



Note: Data are displayed for even-numbered years through fiscal year 1976 and for odd-numbered years after that, through fiscal year 2015.

Source: U.S. Department of Education, National Center for Education Statistics.

TABLE 8
PUBLIC ELEMENTARY AND SECONDARY SCHOOL CURRENT OPERATIONS SPENDING PER STUDENT, ARIZONA, SELECTED YEARS

Fiscal Year	% US*	Change**
1912	140.7%	
1920	154.6	13.9
1932	120.4	-34.2
1942	101.1	-19.3
1950	117.2	16.1
1960	100.6	-16.6
1970	89.8	-10.8
1980	89.3	-0.5
1990	80.4	-8.9
2000	72.8	-7.6
2010	74.9	2.1
2015	65.8	-9.1

* Arizona's per capita expenditures as a percentage of the national average.
** Change in the percentage of the U.S. average from the previous year listed.

Source: U.S. Department of Education, National Center for Education Statistics, and predecessor agencies.

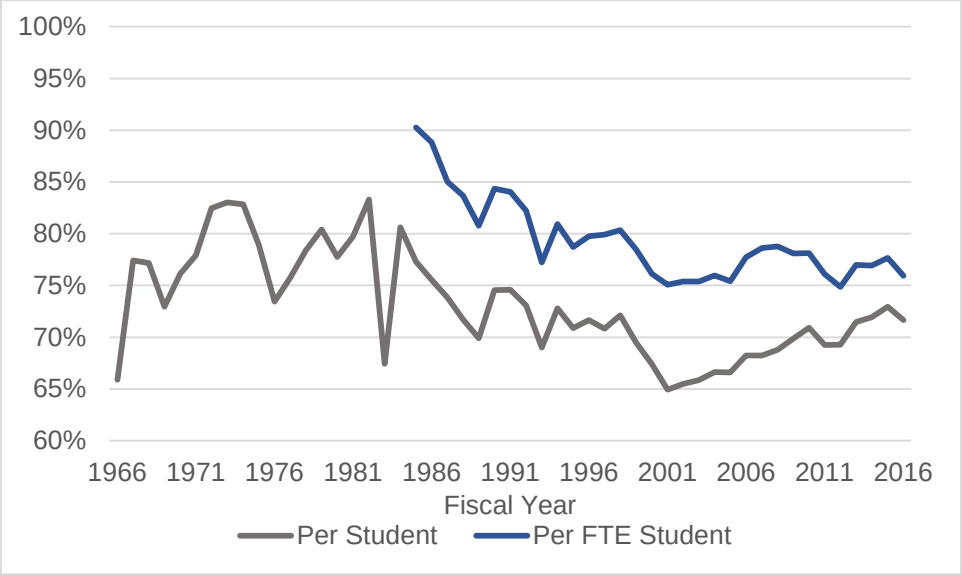
Public Higher Education Expenditures
The NCES is the only source of higher education expenditure data; its data are limited to total expenditures from fiscal years 1966 through 2016. Total public higher education expenditures per FTE student adjusted for the cost of living were 21 percent below the national average in FY 2016 in Arizona, ranking 44th. Among the western states, Idaho and Nevada had lower figures.

As seen in Chart 18, Arizona's per student expenditures have been below the national average throughout the available time period, measured both by FTE student and by total students. Per FTE student, the proportion of the U.S. average fell from about 90 percent in FY 1985 to 75 percent in FY 2000; it has remained near that level, as falling revenue from appropriations has been offset by higher tuition.

Government Expenditure Summary
Based on data from the Census Bureau, state and local government expenditures per capita in Arizona were historically higher than the national average. This began to change after 1966, with Arizona's per capita figure falling to below the national average by FY 1974. Additional periods of decline relative to the U.S. average between FYs 1990 and 2002 and between FYs 2007 and 2015 left Arizona's per capita expenditures far below average.

In fiscal year 2015, on a per capita basis adjusted for the cost of living, state and local government expenditures in Arizona ranked 50th at 22 percent below average. Noncapital expenditures per capita were 21 percent below average, also second lowest.

CHART 18
PUBLIC HIGHER EDUCATION EXPENDITURES PER STUDENT, ARIZONA AS A PERCENTAGE OF THE NATIONAL AVERAGE



Note: Higher education includes community colleges and universities. Because of the large number of part-time students, the per full-time-equivalent (FTE) measure is preferred.

Source: U.S. Department of Education, National Center for Education Statistics.

For the first few decades after statehood, per student current operations expenditures for K-12 education in Arizona exceeded the national average. As recently as the mid-1980s, Arizona's figure was near the U.S. average. Since then, the ratio to the national average has declined substantially. In FY 2016, adjusted for the cost of living, current operations spending per student was 33 percent below the national average, third-lowest in the nation. Adjusted total expenditures per student also were third lowest in the nation, at 35 percent below the U.S. average.

Expenditures for higher education per FTE student also were below average historically in Arizona. In FY 2016, higher education expenditures per FTE student in Arizona were 21 percent below average, ranking 44th.

EDUCATIONAL ATTAINMENT

The Census Bureau is the primary source of data on educational attainment. Questions on educational attainment were first included in the decennial census in 1940. The decennial census continued to ask questions on attainment through 2000. In most census years, the education questions were asked only of a sample of the population. Annually since 2005, questions on educational attainment have been included in the American Community Survey (ACS). The ACS data — the latest are for 2016 — are available online through the American FactFinder (https://factfinder.census.gov/faces/nav/jsf/pages/index.xhtml).

Generally, the Census Bureau reports educational attainment for all individuals age 25 and older. Historically, attainment was reported as the number of years completed. Since 1990, more detail is available for those who attend college, specifying the highest degree earned. Cross-tabulated data — such as educational attainment by age group or by workforce status — also are available, but the detail on the maximum attainment is limited due to sampling error. For example, the highest attainment category in a cross-tabulation may be bachelor's degree or more.

Numerous measures of educational attainment can be constructed, with the percentage earning a high school diploma or more and the share earning a bachelor's degree or more the most common. Historically, the share graduating from high school was widely used, but as this proportion increased (to at least 82 percent in every state among the population 25 and older), this measure became less useful.

It also is possible to estimate the mean number of years of schooling completed. In recent years, this measure has been most highly correlated with the share earning at least an associate's degree and with the proportion earning at least a bachelor's degree (correlations exceeding 0.9).

Among the measures expressed as the share with at least a certain level of educational attainment, the share earning at least a high school diploma has not been highly correlated with any of the other measures. In contrast, correlations exceed 0.9 between the shares earning at least an associate's degree and at least a bachelor's degree.

Latest Data

Educational attainment in Arizona in 2016 was below the national average. As seen in Table 9, an above-average share of Arizonans (age 25 and older) had not graduated from high school and the percentages who had earned a bachelor's degree or an advanced degree were considerably below the U.S. average. Arizona's below-average share with a high school diploma as maximum attainment is offset by the above-average share of Arizonans who have attended college but not earned a degree.

The educational attainment of Arizona residents was inferior to the national average in 2016 among those younger than 45, with a substantial shortfall in the 25-to-34 age group, as seen in Chart 19. In contrast, the educational attainment of Arizonans 65 and older, few of whom are active in the workforce, was considerably better than the U.S. average. Thus, educational attainment measures for the entire population age 25 and older overstate Arizona's attainment if the focus is the workforce.

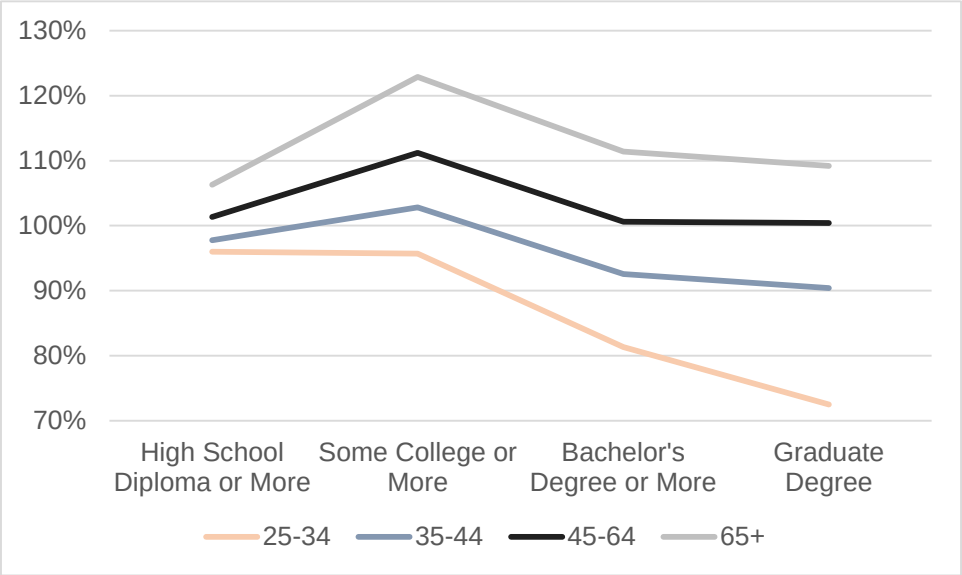
TABLE 9
MAXIMUM EDUCATIONAL ATTAINMENT OF THOSE 25 AND OLDER, ARIZONA, 2016

	Share	Share of National Average	Rank Among States*
Not a High School Graduate	13.28%	105.9%	14
High School Graduate or Equivalent	23.90	87.9	45
Some College, No Degree	25.50	123.5	5
Associate's Degree	8.45	101.1	28
Bachelor's Degree	18.07	93.4	35
Master's Degree	7.76	91.2	27
Professional Degree or Doctorate	3.05	88.7	29
High School Graduate or More	86.72	99.2	38
Some College or More	62.82	104.2	21
Associate's Degree or More	37.32	94.2	35
Bachelor's Degree or More	28.88	92.3	31
Master's Degree or More	10.81	90.5	26

* Among 51 states (including the District of Columbia), where 1 equals the highest value.

Source: U.S. Department of Commerce, Census Bureau, American Community Survey, Table B15003.

CHART 19
MAXIMUM EDUCATIONAL ATTAINMENT BY AGE GROUP, ARIZONA AS A PERCENTAGE OF THE NATIONAL AVERAGE, 2016



Source: U.S. Department of Commerce, Census Bureau, American Community Survey, Table B15003.

Educational attainment by workforce status is available for the 25-to-64 age group. As seen in Chart 20, compared to the national average, a lesser share of Arizona's workers had earned at least a bachelor's degree, while a greater share had not graduated from high school.

Relationship Between Educational Attainment and Earnings

Earnings rise with educational attainment, as seen in Chart 21. After adjusting for the geographic variation in the cost of living, median earnings in Arizona in 2016 were similar to the national average, except for a lower figure for those with a graduate degree. In Arizona, earnings were:

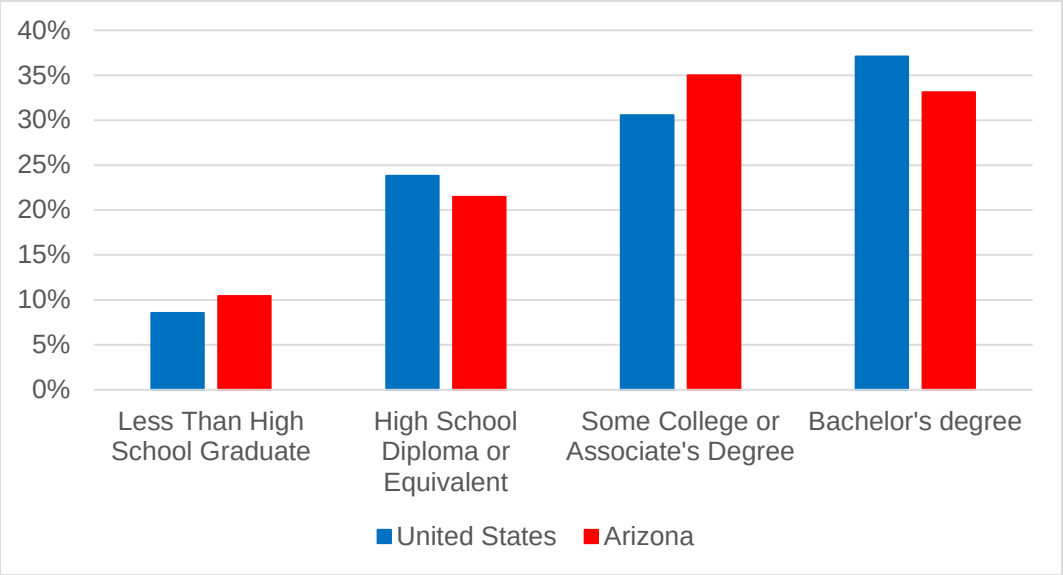
- 30.1 percent higher for high school graduates relative to those who did not have a high school diploma or equivalent.
- 23.6 percent higher for those with some college (including an associate's degree) relative to high school graduates.
- 47.4 percent higher for those with a bachelor's degree relative to those with some college.
- 22.9 percent higher for those with a graduate degree relative to those with a bachelor's degree.

Those with a bachelor's degree earned 82.2 percent more than those with no more than a high school diploma.

Educational Attainment by Place of Birth and Migrant Status

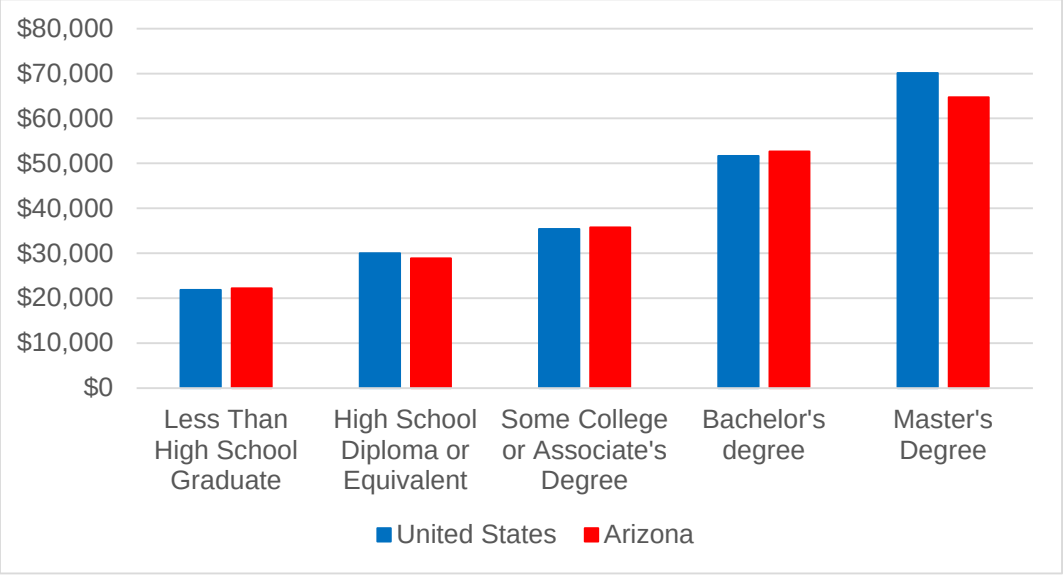
The overall data on educational attainment are not useful in determining how Arizona compares to the rest of the nation on educating its residents since so many adults move to a different state, or move to the United States from another country, after completing their education. Since information is not available on where a person attended school, only an approximation can be

CHART 20
MAXIMUM EDUCATIONAL ATTAINMENT OF EMPLOYED INDIVIDUALS BETWEEN THE AGES OF 25 AND 64, 2016



Source: U.S. Department of Commerce, Census Bureau, American Community Survey, Table B23006.

CHART 21
MEDIAN EARNINGS ADJUSTED FOR THE COST OF LIVING BY EDUCATIONAL ATTAINMENT, 2016



Source: U.S. Department of Commerce: Census Bureau, American Community Survey, Table B20004 (earnings and educational attainment); and U.S. Department of Commerce, Bureau of Economic Analysis (regional price parity).

made of the attainment of those educated in Arizona versus their counterparts in other states. One means is to examine educational attainment by place of birth.

Nationally, as seen in the top portion of Table 10, the educational attainment in 2016 of those born in another U.S. state considerably exceeded the attainment of those who remained in the state in which they were born. Of those born in another country who were not U.S. citizens by birth, a much higher share had not graduated from high school, but the share who had earned a graduate degree exceeded that of those living in the same state in which they were born. In addition to the groups shown in Table 10, a small percentage of the population are U.S. natives born outside the country (e.g. to American parents living abroad). Like immigrants, disproportionate shares of this group were at the two ends of the attainment spectrum relative to those living in the same state in which they were born.

The national relationship in educational attainment by place of birth generally holds in Arizona. However, the educational attainment in Arizona was less than the U.S. average in each category of place of birth, as seen in the bottom portion of Table 10. Among those living in the same state in which they were born and among foreign immigrants, a higher proportion of Arizonans had not earned a high school diploma and lower percentages had earned at least a bachelor's degree. Among those who had moved from one U.S. state to another, a disproportionate share living in Arizona had attended college without earning a degree, while a lesser share had earned at least a bachelor's degree. Regardless of place of birth, Arizona has an above-average share of those who have attended college without earning a degree. Presumably, this is a reflection of the job mix in Arizona.

TABLE 10
MAXIMUM EDUCATIONAL ATTAINMENT BY PLACE OF BIRTH OF THOSE 25 AND OLDER, 2016

		Place of Birth		
	Total	In State	Other U.S. State	Foreign
United States				
Less Than High School	12.5%	10.1%	7.1%	28.8%
High School Diploma or Equivalent	27.2	31.7	23.0	22.4
Some College/Associate's Degree	29.0	31.5	30.7	18.7
Bachelor's Degree	19.3	17.6	23.2	17.2
Graduate Degree	11.9	9.0	16.0	12.8
Arizona				
Less Than High School	13.3	13.4	6.6	35.0
High School Diploma or Equivalent	23.9	27.8	22.7	22.8
Some College/Associate's Degree	33.9	37.8	36.6	20.0
Bachelor's Degree	18.1	14.4	21.2	12.7
Graduate Degree	10.8	6.5	12.9	9.5
Percentage of U.S. Average				
Less Than High School	105.9	132.2	93.6	121.5
High School Diploma or Equivalent	87.9	87.8	99.1	101.6
Some College/Associate's Degree	117.1	120.0	119.0	107.0
Bachelor's Degree	93.4	81.9	91.0	73.6
Graduate Degree	90.5	72.0	80.7	74.0

Source: U.S. Department of Commerce, Census Bureau, American Community Survey, Table B06009.

Among those living in the same state in which they were born, Arizona had the 13th-highest share without a high school diploma, but ranked 39th on the share with a bachelor's degree and 45th on the percentage with a graduate degree. Arizona compared even worse among those foreign born, ranking eighth in the share without a high school diploma, but 47th on the share with a bachelor's degree and 46th on the percentage with a graduate degree. Arizona was closer to the middle of the states among those who had been born in another state.

The other method of approximating educational attainment by the location of where an individual attended school is to compare the educational attainment of in-migrants and out-migrants to those who had not moved across state lines. Since the ACS measures migration as those who moved in the last year, the number of migrants is small and therefore subject to considerable sampling error. To reduce sampling error, the last five years of ACS data were combined.

Conclusions regarding educational attainment by migrant status generally are consistent with those drawn from the data by birthplace. In Table 11, which is specific to Arizona, the "abroad" category includes both American citizens returning from living abroad and foreign nationals. Though a higher proportion in this category had not graduated from high school than those whose state of residence had not changed, a higher proportion of those who had been living abroad had earned at least a bachelor's degree. Those moving to Arizona from another U.S. state had considerably higher attainment than those who had not moved to or from Arizona. Among

TABLE 11
MAXIMUM EDUCATIONAL ATTAINMENT BY MIGRANT STATUS OF THOSE 25 AND OLDER, 2012 THROUGH 2016, ARIZONA

	Place of Residence in Prior Year of Those Living in Arizona					Moved From Arizona In Prior Year
	Same House	Same County	Same State	Different State	Abroad	
Share						
Less Than High School	13.8%	14.5%	15.1%	8.1%	23.2%	9.6%
High School Diploma or Equivalent	24.4	24.1	25.3	21.8	19.6	21.7
Some College/Associate's Degree	33.8	36.1	37.6	33.9	20.6	33.4
Bachelor's Degree	17.4	17.1	14.2	22.4	21.6	21.1
Graduate Degree	10.6	8.2	7.8	13.8	15.0	14.3

Source: U.S. Department of Commerce, Census Bureau, American Community Survey, Tables B07009 and B07409.

interstate migrants, in-migrants to Arizona had slightly greater education attainment than out-migrants from Arizona, consistent with the below-average attainment of those living in Arizona.

Among interstate in-migrants, Arizona ranked in the middle of the states in the shares without a high school diploma and with high school as the highest attainment. In contrast, Arizona ranked eighth on the share with some college, but 33rd on the share with a bachelor's degree and 39th on the percentage with a graduate degree. Thus, interstate migrants to Arizona are not as well educated as the typical interstate migrant

Historical Data

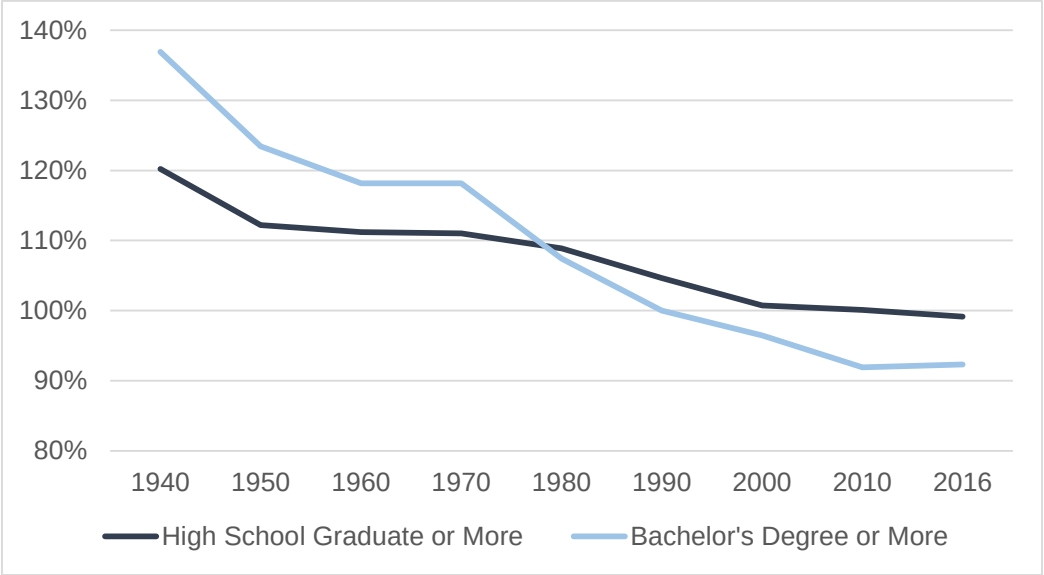
Until late in the 20th century, Arizona's educational attainment was superior to the national average. In Chart 22, educational attainment of the population 25 and older is measured in two ways: as the share who had earned a high school diploma or more and as the share who had earned at least a bachelor's degree. Arizona's percentages relative to the U.S. average are shown in the top graph, while Arizona's rank among the states is shown in the bottom graph. Arizona's educational attainment was substantially higher than the national average and ranked among the top 15 states through 1970. Attainment in Arizona relative to the rest of the nation has fallen since then, slipping below the U.S. average, with a rank below the middle of the states.

The decline over time in the educational attainment of Arizonans relative to the national average occurred in each age group and in each measure of educational attainment. The relative declines were greater among college graduates and greater among those 45 and older.

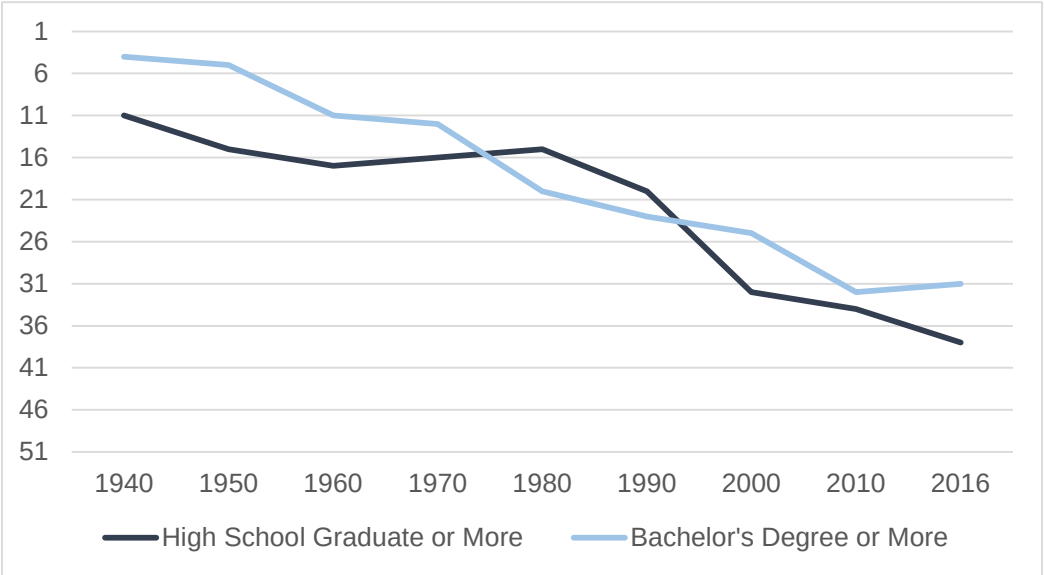
Arizona's decline relative to the nation between 1940 and 2016 in the percentage with a bachelor's degree was the third worst in the nation, exceeded only by the District of Columbia and Nevada. California and Utah also experienced large declines. Chart 23 shows Arizona's performance compared to nine other western states. Educational attainment in most of the

CHART 22
MAXIMUM EDUCATIONAL ATTAINMENT OF THOSE 25 AND OLDER, ARIZONA

AS A PERCENTAGE OF THE NATIONAL AVERAGE



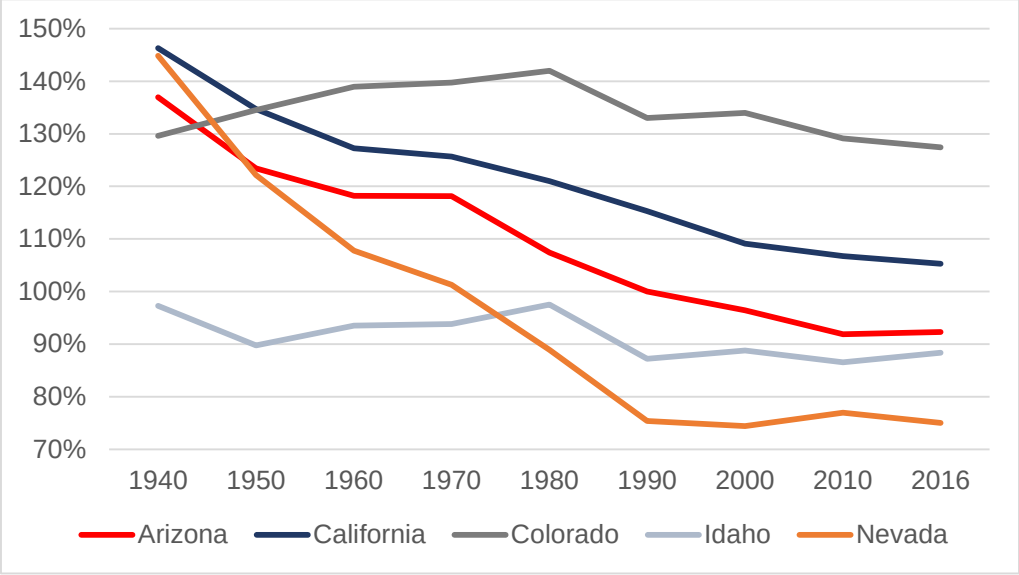
AS A RANK AMONG THE STATES*

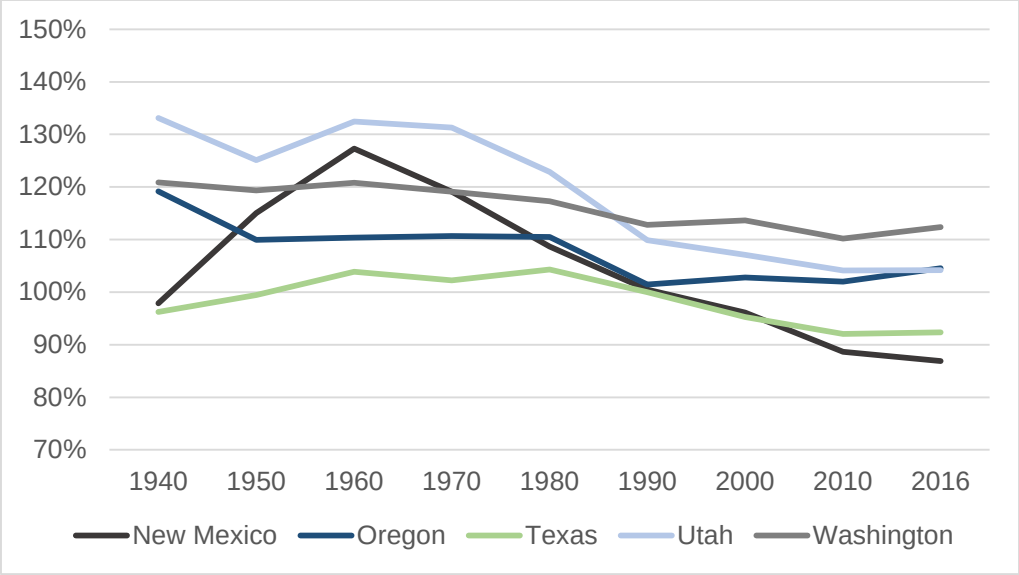


* The highest share of the U.S. average is given a rank of 1.

Source: U.S. Department of Commerce, Census Bureau, decennial censuses (1940-2000) and American Community Survey (2010 and 2016).

CHART 23
PERCENTAGE OF THOSE 25 AND OLDER WITH A BACHELOR'S DEGREE OR MORE, WESTERN STATES AS A PERCENTAGE OF THE NATIONAL AVERAGE





Source: U.S. Department of Commerce, Census Bureau, decennial censuses (1940-2000) and American Community Survey (2010 and 2016).

western states declined at least a little relative to the U.S. average, though Colorado's attainment has remained much above the national average.

Educational Attainment Summary

The educational attainment of Arizona's adults is below the national average — considerably below average among those younger than 45. The attainment of Arizonans in the workforce also is below average. The low overall attainment is primarily due to the low attainment of those receiving their education in Arizona and the low attainment of Arizona's immigrants. In addition, a below-average share of interstate migrants to Arizona have earned at least a bachelor's degree. Since educational attainment is strongly correlated with earnings, educational attainment plays a large role in the state's below-average income.

Arizona's poor performance on educational attainment is a relatively recent phenomenon. Through 1970, Arizona was among the national leaders on educational attainment and it was not until after 1990 that Arizona fell below average. Arizona continues to fall further behind.

ECONOMIC PERFORMANCE

The BEA produces annual estimates by state of earnings and personal income back to 1929, gross product back to 1963 (but only to 1987 on a real basis), and employment back to 1969 (https://bea.gov/regional/index.htm). A longer time series for employment (back to 1939) is available from the U.S. Department of Labor's Bureau of Labor Statistics (BLS, https://www.bls.gov/sae/), but this series is limited to nonfarm wage and salary employment.

Employment, gross product, and earnings are aggregate measures of economic performance. Per worker measures of gross product and earnings are proxies for productivity. Per capita measures of gross product, earnings, and personal income provide insight into prosperity. Of the per capita measures, per capita personal income is related to economic well-being since it includes transfer payments, and dividends, interest and rent. Per capita gross product and per capita earnings are more closely related to economic performance.

Among the prosperity measures in recent years, the correlation across the states between per capita personal income and per capita earnings has been 0.95. The correlations between these two measures and per capita gross product have been lower at about 0.7. The two per worker measures have been strongly correlated at approximately 0.8. The per worker and per capita measures also have been highly correlated at 0.7 or more, except for a lower correlation with per worker GDP.

Prosperity

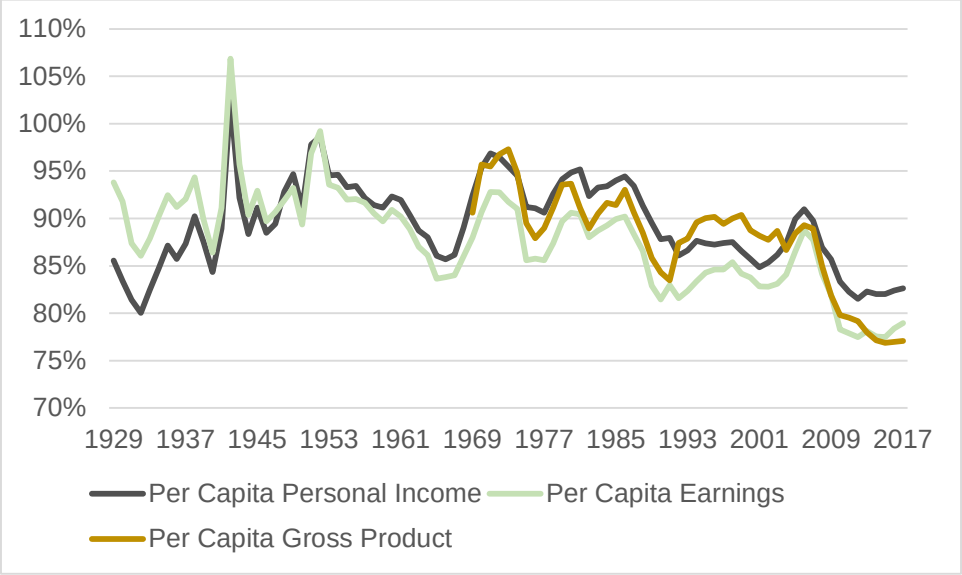
Arizona is far below the national average on measures of prosperity. In 2016, adjusted for the cost of living, Arizona's per capita gross product was 20 percent below the national average and ranked 46th among the states. Adjusted per capita earnings were 18 percent below average, also ranking 46th; adjusted per capita personal income was 14 percent below average and ranked 47th.

In only one year (during World War II) have Arizona's per capita figures exceeded the national average. Arizona's performance relative to the nation on measures of prosperity vary with the economic cycle — prosperity tends to improve in Arizona relative to the nation during periods of economic growth but falls at other times. In addition, prosperity relative to the nation has followed long cycles. Generally, Arizona improved relative to the nation from the 1930s into the 1950s. Arizona's percentage of the U.S. average then fell into the 1960s before recovering in the late 1960s and early 1970s, as seen in the top graph of Chart 24. Since the early 1970s, Arizona's prosperity has declined considerably relative to the nation. Record low values have been registered in recent years, except on the per capita personal income measure, in which one year during the Great Depression was lower.

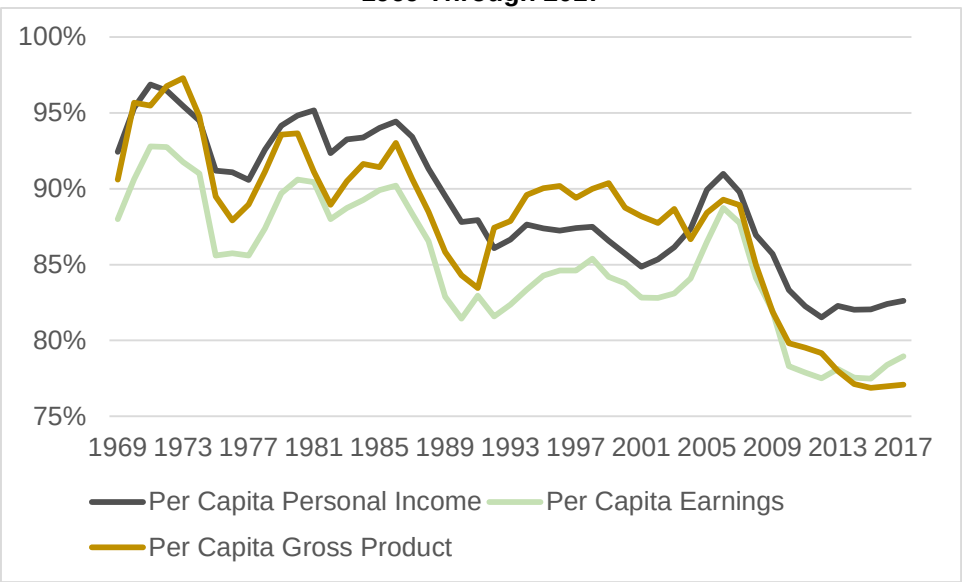
The second graph of Chart 24 narrows the time period to 1969 to date. A downtrend has been present throughout the period since the early 1970s, but ups and downs related to the economic cycle are also apparent. The current economic cycle is an exception, with hardly any improvement in prosperity relative to the nation, despite a lengthy expansion.

CHART 24
MEASURES OF PROSPERITY,
ARIZONA AS A PERCENTAGE OF THE NATIONAL AVERAGE

1929 Through 2017



1969 Through 2017



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

Productivity

Arizona is not as far below average on proxy measures of productivity. In 2016, adjusted for the cost of living, per worker earnings were 7 percent below average and ranked 37th; per worker gross product was 8 percent below average and ranked 39th.

Though Arizona has experienced a significant decrease in these per worker measures relative to the national average since the early 1970s (see Chart 25), the magnitude of the decline has not been as great as for the per capita measures.

Aggregate Growth

In sharp contrast to Arizona's poor performance on the prosperity and productivity measures, aggregate growth rates in Arizona have exceeded the national average for decades, as measured by annual average growth rates by economic cycle. Within each economic cycle, Arizona typically experiences considerably faster aggregate growth during economic expansions, but performs at or below the national average during recessionary periods.

A long time series is available for three aggregate economic measures: personal income, earnings, and nonfarm wage and salary employment. On each measure, in each economic cycle from the end of World War II through 2001, the annual average growth rate in Arizona was substantially above the national average and ranked among the top states, as seen in Table 12. Arizona did not compare quite as favorably during the 2001-through-2009 economic cycle as in earlier cycles. In the 2009-through-2017 period, the percentage-point difference from the

CHART 25
MEASURES OF PRODUCTIVITY,
ARIZONA AS A PERCENTAGE OF THE NATIONAL AVERAGE

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

TABLE 12
ANNUAL AVERAGE AGGREGATE GROWTH RATES BY ECONOMIC CYCLE, ARIZONA

	Difference From U.S. Average			Rank Among States		
Economic Cycle	Real Personal Income	Real Earnings	Employ-ment	Real Personal Income	Real Earnings	Employ-ment
1933-38	3.15	2.77		10	9	
1938-45	3.52	3.15		11	13	
1945-49	2.96	2.06	1.03	5	7	16
1949-54	3.89	3.90	4.05	2	2	2
1954-58	3.62	3.74	7.06	3	3	1
1958-61	4.29	3.93	4.85	3	3	2
1961-70	2.02	1.64	2.13	5	6	4
1970-75	2.96	2.66	4.24	5	6	3
1975-82	2.60	2.80	2.87	4	6	3
1982-91	1.55	1.43	2.07	4	4	2
1991-2001	1.85	2.21	2.28	3	3	2
2001-09	1.54	1.27	0.96	6	10	8
2009-17	0.05	0.05	0.26	16	18	14

Note: The economic cycles are dated from trough to trough.

Sources: U.S. Department of Commerce, Bureau of Economic Analysis (personal income, earnings by place of residence, and GDP implicit price deflator) and U.S. Department of Labor, Bureau of Labor Statistics (nonfarm wage and salary employment).

national average was barely positive and the state's rank slipped further, to between 14th and 18th across the three measures.

Economic Summary

Until recently, aggregate economic growth rates in Arizona were among the national leaders in the post-World War II period. However, economic development is not about maximizing aggregate growth rates. Instead, the goal of economic development is to raise productivity and prosperity. In the period after World War II, prosperity measures in Arizona relative to the national average first advanced, then declined, then advanced again, reaching a level in the early 1970s slightly higher than that at the end of the war and not far below the U.S. average (likely about average if the figures could be adjusted for the cost of living). Measures of productivity were equal to, or greater than, the national average in the early 1970s. Since then, however, all measures of productivity and prosperity have dropped significantly relative to the nation, with most measures at all-time lows in recent years.

THE RELATIONSHIP BETWEEN GOVERNMENT FINANCE, EDUCATIONAL ATTAINMENT, AND ECONOMIC PERFORMANCE

In 2015, Arizona was considerably below the national average on measures of public finance, educational attainment, and productivity/prosperity, with the indicators expressed in dollars adjusted for the cost of living. The differentials were as follows:

- Between 21-and-28 percent on the per capita measures of public finance.
- Between 32-and-36 percent on per student K-12 revenues and expenditures as reported by the Census Bureau and between 28-and-32 percent as reported by the NCES.
- By 19 percent on per FTE student state and local government appropriations for higher education reported by the SHEEO, with the differential rising to 27 percent in FY 2016.
- By 8 percent on the proportion of the adult population who had earned at least a bachelor's degree, rising to 12 percent on the share with a professional or doctoral degree.
- Between 14-and-20 percent on measures of prosperity, and by 8-to-9 percent on productivity measures.

Arizona has declined relative to the national average on all of these measures over the last 50 years. The magnitude of decline follows:

- Between 30-and-37 percentage points between FYs 1967 and 2015 in per capita revenues and expenditures.
- Between 23-and-34 percentage points between FYs 1966 and 2015 in K-12 revenues and expenditures per student, using data from the NCES.
- Between 32-and-34 percentage points between FYs 1987 and 2016 in K-12 revenues per student, using data from the Census Bureau.
- Between 21-and-29 percentage points between FYs 1978 and 2016 in K-12 expenditures per student, using data from the Census Bureau.
- By 20 percentage points between FYs 1980 and 2017 in state and local government appropriations for higher education per FTE student, using data from the SHEEO. Due to a large relative increase in tuition, total revenue per FTE student was largely steady.
- By 26 percentage points between 1970 and 2016 in the share of the adult population with at least a bachelor's degree. The decrease was 12 percentage points based on those with at least a high school diploma.
- Between 14-and-19 percentage points between 1971 and 2017 in prosperity measures and between 11-and-15 percentage points over this period in productivity measures.

Correlations in Recent Years

Correlation coefficients for a large number of pairs of indicators have been calculated across the 50 states and the District of Columbia. The greatest number of indicators are available for 2015, but correlations were also calculated using 2016 data for the available indicators and using 2012 data, in order to include the Tax Foundation's tax burden measure.

In calculating the correlation coefficients, no attempt was made to exclude outliers, which would improve the coefficients. In some states, unique or unusual conditions can have a large effect on one or more of the indicators. For example, Alaska's tax burden is low because of its revenue from the oil industry.

On a per capita basis, state and local government finance indicators are positively correlated with educational attainment, economic productivity, and prosperity indicators. That is, those states with higher levels of government revenue and spending per person (adjusted for the cost of living) tend to have greater educational attainment and productivity/prosperity and vice versa.

Adjusted by personal income rather than by population, the government finance indicators are substantially less highly correlated with educational attainment and economic performance. This provides evidence of the importance of not limiting public revenue to the ability of residents to pay taxes and fees.

Correlation coefficients of selected indicators in 2015 are shown in Table 13. Correlations between the indicators of public finance range from moderate to high, as do the correlations among the measures of productivity and prosperity. In contrast, the correlation between educational attainment measured as high school or more and bachelor's degree or more is weaker.

Public Finance and Educational Attainment

Correlations between the overall public finance indicators and the various measures of educational attainment are positive. In 2015, the strongest correlations of between 0.50 and 0.59 were between the Census Bureau's measure of per capita state and local government taxes and each of the educational attainment measures of those earning at least an associate's degree. Correlations are insignificant between educational attainment and the tax measures produced by the District of Columbia and Ernst & Young. Using 2012 data, the he Tax Foundation's tax burden is positively and significantly correlated to the measures of educational attainment of those earning at least an associate's degree, with correlations ranging from 0.30 to 0.49.

Using the per student K-12 finance data — whether from the Census Bureau or the NCES — correlations with educational attainment also are positive. The highest correlations are between per student state and local government appropriations for education, followed closely by total educational revenue, and each of the educational attainment measures of those earning at least an associate's degree, with correlations ranging between 0.50 and 0.59.

Correlations are positive but generally insignificant between the various measures of higher education finance per FTE student and the measures of educational attainment. The strongest correlation of 0.33 was between state and local government appropriations per FTE student reported by the NCES and the proportion with a professional or doctoral degree.

Public Finance and Productivity/Prosperity

Correlations between public finance and productivity/prosperity are somewhat stronger than those between public finance and educational attainment. Among the public finance indicators, correlations again are highest with per capita taxes, but are not substantially lower with the Census Bureau's other per capita categories of public finance. In 2015, the correlations between per capita taxes and the three prosperity measures were approximately 0.7. The correlations with the productivity measures were between 0.40 and 0.54. Similar correlations were measured between the various K-12 revenue and expenditure per student indicators and the productivity and prosperity measures.

TABLE 13
CORRELATION COEFFICIENTS OF SELECTED INDICATORS, 2015

	Public Finance				Educational Attainment		Prosperity and Productivity			
	PC Tax	PC N Exp	PS Appr	PS Exp	HS+	BA+	PC PI	PC Earn	PC GDP	PW Earn
Per Capita Noncapital Expenditures	0.49	-								
Per K-12 Student State & Local Appropriations*	0.69	0.74	-							
Per K-12 Student Expenditures*	0.71	0.81	0.98	-						
Educational Attainment: High School or More	0.29	0.24	0.39	0.37	-					
Educational Attainment: Bachelor's Degree or More	0.53	0.32	0.55	0.51	0.40	-				
Per Capita Personal Income	0.71	0.51	0.70	0.71	0.45	0.61	-			
Per Capita Earnings	0.65	0.43	0.62	0.63	0.43	0.66	0.95	-		
Per Capita Gross Domestic Product	0.67	0.61	0.58	0.64	0.23	0.66	0.71	0.72	-	
Per Worker Earnings	0.53	0.51	0.55	0.59	0.02	0.60	0.72	0.77	0.87	-
Per Worker Gross Domestic Product	0.41	0.51	0.46	0.49	-0.07	0.29	0.57	0.59	0.69	0.82

* As measured by the Census Bureau; correlations are similar using the data from the NCES.

Note: The dollar measures have been adjusted for the cost of living.

Sources: U.S. Department of Commerce: Census Bureau (public finance and educational attainment); and Bureau of Economic Analysis (productivity, prosperity, and cost of living).

Of the various measures of higher education finance, the only significant correlations with the prosperity and productivity measures were with state and local government appropriations per FTE student reported by the NCES, with correlations ranging from 0.30 to 0.54.

Educational Attainment and Productivity/Prosperity

Correlations between the various measures of educational attainment and the productivity/prosperity indicators in 2015 were as high as 0.8. For per capita personal income and per capita earnings, the highest correlations of between 0.60 and 0.69 were with the following attainment measures:

- Associate's degree or more
- Bachelor's degree or more
- Mean number of years of education

For the other productivity and prosperity measures, the highest correlations were with the following attainment measures:

- Master's degree or more
- Professional or doctoral degree

Correlations with per worker GDP were low but significant, while the correlations with per capita GDP and per worker earnings were between 0.7 and 0.8.

Correlations Over Time

Examining correlations in the change over time of various indicators is challenging. First, it may take time for relationships to take effect. For example, one would not expect an immediate effect between a change in government expenditures and a change in educational attainment of the adult population, each expressed relative to the national average, but the length of any lag is not known a priori. In this particular relationship, the length of any lag cannot be ascertained since until recently educational attainment data by state were available only once every 10 years. Second, the relationships in the change over time may shift with time.

Four means of examining the correlations in the changes were employed:

- 10-year changes with no lags. Since the government finance data are for fiscal years and the attainment and economic data are for calendar years, effectively a six-month lag is implicit in the correlations.
- 10-year changes with a 10-year lag (for example, the change between 1960 and 1970 in per capita taxes and the change between 1970 and 1980 in the percentage earning at least a high school diploma).
- The cumulative change (for example between 1960 and 2016) with no lags.
- The cumulative change with a 10 -year lag (for example, the change between 1940 and 2016 in K-12 revenue per student and the change between 1950 and 2016 in the share earning at least a bachelor's degree).

Public Finance and Educational Attainment

Correlations were examined between four indicators of public finance — per capita taxes, per capita noncapital expenditures, per student K-12 state and local government appropriations, and per student state and local government total expenditures for K-12 — and two indicators of educational attainment: the percentage of those 25 and older with at least a high school diploma

and with at least a bachelor's degree. All of the indicators were expressed relative to the national average.

While a positive relationship exists between the 10-year change in the public finance indicators and the 10-year change in the educational attainment measures, the average over the decades of the correlation coefficients are not significant. However, some of the correlations in some of the decades were significant, particularly measured as the changes between 1980 and 1990 and between 1990 and 2000. All of the correlation coefficients drop when the educational attainment measures are lagged a decade.

Some of the correlations are somewhat stronger when the cumulative changes are used. The highest average correlation over the decades is 0.4 between per capita taxes and the percentage earning a bachelor's degree. Lagging the educational attainment indicators has little effect on these correlations.

The decline in educational attainment in Arizona relative to the national average began shortly after the decline in public revenue and spending ensued after 1966. As revenues and expenditures have continued to decline in Arizona relative to the nation, so has the educational attainment of Arizona's population relative to the national average. While this is suggestive of a link between public finance and educational attainment in Arizona, cause and effect has not been proven.

Educational Attainment and Economic Measures

The change in the two indicators of educational attainment specified above were correlated with the change in each of eight economic indicators: the three measures of prosperity, the two measures of productivity, and the three measures of aggregate economic growth.

Moderate correlations were measured between the change in the percentage earning a bachelor's degree and the change in some of the measures of prosperity and productivity. Correlations over the decades averaged between 0.4 and 0.49 between the following indicators:

- The 10-year change in the share with a bachelor's degree and the 10-year change in per capita personal income and per capita earnings.
- The cumulative change in the share with a bachelor's degree and the cumulative change in per capita personal income, per capita earnings, per capita GDP, and per worker GDP.

All of the other correlations between the educational attainment and productivity/prosperity indicators were positive as well. Correlations generally were weaker when the productivity and prosperity measures were lagged.

In contrast to the positive correlations between changes in indicators of educational attainment and productivity/prosperity, correlations were nonexistent or negative between changes in educational attainment and changes in aggregate economic growth rates, whether measured as a 10-year change or as a cumulative change, and regardless of whether the economic measures were lagged. The correlations in the cumulative changes generally were between -0.3 and -0.39 and therefore statistically significant. Rather than suggesting that a relative improvement in educational attainment results in a slowing of aggregate growth, the negative correlations likely reflect that rapidly growing states in the South and West have had subpar gains in educational

attainment. This would occur if job growth disproportionately consisted of positions not requiring high educational attainment.

Public Finance and Economic Measures

The same public finance and economic indicators specified in the previous subsections were used in this set of correlations. Most of the correlation coefficients were moderate to strongly positive between the public finance and productivity/prosperity measures, with the correlations in the cumulative changes generally slightly higher than the correlations of the decadal changes. Lagging the productivity/prosperity measures lowered the 10-year change correlations in every case.

The strongest correlations of around 0.8 were between the change in per capita taxes and the changes in per capita GDP and per worker GDP. Moderate correlations were present between taxes and the other productivity/prosperity measures. Moderate correlations also were present between the K-12 education finance measures and the productivity/prosperity measures.

In contrast, correlations between the public finance indicators and the aggregate economic growth indicators were insignificant — slightly positive when measured as decadal changes and slightly negative when measured as cumulative changes.

The decline in productivity and prosperity measures in Arizona relative to the national average began shortly after the decline in public revenue and spending ensued after 1966, and coincident with the deterioration in educational attainment relative to the nation. As revenues and expenditures have continued to decline in Arizona relative to the nation, so has the educational attainment of Arizona's population relative to the national average, and measures of productivity and prosperity relative to the nation. While this is suggestive of a link in Arizona between the three, cause and effect has not been proven.

In contrast, aggregate economic growth rates were unaffected by the relative declines in public revenues and expenditures, educational attainment, and productivity and prosperity. It is unclear to what extent the recent decline in aggregate growth rates is related to the earlier declines relative to the nation in public revenues and expenditures, educational attainment, and productivity and prosperity.

Summary of Correlations

Higher levels of per capita state and local government revenues and expenditures (adjusted for living costs) — measured both overall and specific to K-12 education — are associated with stronger educational attainment, greater productivity, and more robust prosperity. The positive relationship is stronger between educational attainment and productivity/prosperity.

When measured as changes over time relative to the national average, correlations between indicators of public finance and educational attainment are positive, but not strong. Correlations are slightly stronger between indicators of educational attainment and productivity/prosperity. Correlations are moderate to strong between indicators of public finance and productivity/prosperity. In contrast, correlations of indicators of both public finance and educational attainment are essentially nonexistent with indicators of aggregate economic growth.

Arizona and Other States

Based on 2015 data, Arizona's average rank on the four public finance indicators used in the correlations is 49th. Its average rank on the five productivity/prosperity indicators is 43rd. Arizona compares a bit more favorably on its share with at least a bachelor's degree, ranking 34th.

Most of the other states with a low average rank on the public finance indicators are located either in the South — Alabama, Florida, Georgia, North Carolina, Oklahoma, and Tennessee — or in the West, but not along the Pacific Coast: Idaho, Nevada, Texas, and Utah. Like Arizona, Alabama, Idaho, and Nevada have low ranks in each category. Most of the other states with a low average rank on the public finance indicators have a low rank on either educational attainment or productivity/prosperity. Among these states, only Utah on educational attainment ranks above the middle of the states.

In contrast, many of the states that rank highest on the public finance indicators are located in the northeastern portion of the country; some are located in the northern Plains. Connecticut, the District of Columbia, Massachusetts and New York rank quite high on both the share with at least a bachelor's degree and the productivity/prosperity indicators. Each of the other states ranking high on the public finance indicators rank high on either educational attainment or productivity/prosperity. The only ranks below the middle of these states are Vermont on productivity/prosperity and Wyoming on educational attainment.

In 1970, Arizona ranked slightly above the middle of the states on the per capita public finance measures and on most of the productivity and prosperity measures. It had the 12th-highest proportion with at least a bachelor's degree. Arizona's list of "peer" states — those with similar ranks — was considerably different from the 2015 list. Instead of comparing to several southern states as in 2015, Arizona outperformed those states in 1970. Among its peers in 1970 were some of the northeastern states and some of the western states, including California, Oregon, and Washington. Arizona is now behind each of these states.

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, specializing in applied economic and demographic research with a geographic emphasis on Arizona and the metropolitan Phoenix area. The Center conducts research projects under sponsorship of private businesses, nonprofit organizations, government entities and other ASU units. In particular, the Center administers both the Productivity and Prosperity Project, and the Office of the University Economist.

CENTER FOR COMPETITIVENESS AND PROSPERITY RESEARCH
L. WILLIAM SEIDMAN RESEARCH INSTITUTE
W. P. CAREY SCHOOL OF BUSINESS
AT ARIZONA STATE UNIVERITY

P. O. Box 874011 – Tempe, AZ 85287-4011
Phone (480) 965-5362 – FAX (480) 965-5458
wpcarey.asu.edu/research/competitiveness-prosperity-research