THE ECONOMIC ROLE OF OKLAHOMA'S PUBLIC COLLEGES AND UNIVERSITIES

JANUARY 2019

Prepared for

REGIONTRACK
Regional Economic Forecasting and Analysis

STATE CHAMBER RESEARCH FOUNDATION

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Key Findings

1. Oklahoma's higher education system supported $8.21 billion in total economic output in FY2016. These effects can be partitioned into direct, indirect, and induced spillover effects. The System generated 9.4 dollars in economic output for each dollar of revenue from state appropriations. Individual ratios of economic output to appropriations by individual institution are detailed within the report.
2. On an inflation-adjusted basis, total state appropriations in FY2016 were 36 percent below the recent peak level in FY2008. In the longer-term, total state appropriations on an inflation-adjusted basis are at levels last experienced in the mid-1990s.
3. Research findings continue to point toward increased education as an underlying source of economic growth, both in the U.S. and internationally. These findings also reinforce the existence of a strong empirical link between education and economic growth at the state level.
4. Relative to the nation, Oklahoma's ongoing higher education dilemma is best characterized as a large surplus of workers who have either completed high school or completed some college but not attained a degree and a large deficit in the number of degree holders across all degree types.
5. Measured in terms of the percentage increase in degrees necessary to match the nation, Oklahoma would need to increase the total number of associate degrees conferred in the state by 10.6 percent, increase bachelor's degrees by 20.5 percent, and increase master's degrees by 48.0 percent. The number of professional degrees and doctorates would have to roughly double to reach the national share.
6. Measured by years of schooling, only eight Oklahoma counties – Payne, Cleveland, Canadian, Tulsa, Oklahoma, Washington, Rogers, and Logan – exceed the national level of educational attainment.
7. State residents who completed some college or earned an associate degree reported median annual earnings that are 17 percent higher than high-school completers in 2016. Residents with a bachelor's degree reported median earnings 60 percent higher than high school graduates. At the top of the attainment scale, Oklahoma residents with a graduate or professional degree earned more than double the median income of high school graduates in 2016.
8. Achieving educational attainment equal to the nation would simultaneously contribute to greater overall employment participation.
9. A 50-state economic growth model scenario of attaining a national-like education level in the state suggests other policy implications. First, the rise would likely push the state employment-population ratio from 58.1 percent to 60.6 percent, exceeding the 59.9 percent national rate. The projected shift would equate to a rise in state employment of approximately 57,000 additional wage and salary or self-employed workers, holding population constant.
10. Estimated net new expenditures by nonresident students in the state totaled an estimated $452.8 million in FY2016. Measured across each local institution, a total of $1.01 billion in student spending is treated as net new nonlocal spending from outside the region where the institutions operate.
11. The University of Oklahoma Health Sciences Center supported the greatest amount of local economic activity among all institutions and constituent agencies. The facility supports approximately $1.85 billion in total economic activity, 10,700 jobs, and $1.1 billion in employee compensation in the Oklahoma City region.

12. A final dimension of the employment role played by higher education is that many employees of the System are among the most skilled workers in the state. Most faculty members hold either an advanced degree or a terminal degree in their field. Many work in scientific and technology-related fields and engage in much of the research and development activity undertaken by the System. As a result, communities where public universities and colleges are located tend to have much higher average levels of educational attainment.
13. Job demand will continue to reinforce the trends toward higher degrees going forward. Bureau of Labor Statistics forecasts suggest that the rate of growth in employment in the next decade will be significantly higher for those with the highest levels of education.
14. One of the key accompanying economic benefits of increased education is a rise in the likelihood of active participation in the workforce. Currently, 75.1 percent of the U.S. population with a bachelor's degree participates in the workforce, compared to 58.9 percent with only a high school diploma.
15. Given state income per capita of $45,682 in 2016, the predicted outcome from a 50-state growth model of national-like educational attainment in Oklahoma is an increase of $7,081 per person to $52,763, a 15.5 percent gain. The state would move from a 7.8 percent shortfall relative to the nation to a 6.4 percent premium in per capita income. Oklahoma would rank 13th in per capita income, just ahead of Minnesota but trailing Washington and the major energy-producing states of Wyoming and North Dakota.

Introduction and Executive Summary

Oklahoma's system of public colleges and universities plays a large and increasingly important role in the state's ongoing economic development efforts. Higher education has developed into a cornerstone institution that is tasked with fostering an increasingly skilled and competitive state labor force.

The goal of this report is to help state policymakers and the public better understand the various economic contributions of the System as it is currently structured, as well as the role it plays within the state-level economic development strategies that are currently in place.

The analysis is structured around five core questions concerning the economic role of the System:

1. *What are the various activities and contributions of the current System, and what do they cost?*
2. *How competitive is the Oklahoma labor force, and is the state making progress relative to the nation and peer states?*
3. *Are there sufficient economic returns to students to justify the cost of higher education?*
4. *To what degree can increased levels of education contribute to broader state economic growth? and*
5. *How large is the economic contribution of the operations of the System to the state and the local economies where System facilities are located?*

From a public policy perspective, these questions are believed to address several of the most important aspects of the economic role of the System.

STUDIES OF THE SYSTEM

The report is the third in a series of research works supported by the State Chamber of Oklahoma Research Foundation to examine the economic contribution of the state's public colleges and universities. The two prior reports (REMI, 2008 and Battelle, 2013) take much different approaches to examining the economic contribution of the state's higher education system. The REMI (2008) report produces long-run economic forecasts for the state of Oklahoma and provides estimates of the expected future contributions of System employment and spending, student and visitor spending, and graduate earnings and productivity to the state's long-run outlook. The Battelle (2013) report provides an analysis of the structure of the System, estimates of expenditure-based economic impacts for the System, and a detailed evaluation of the research and outreach activities of the System.

The common thread running through this report and the prior works is that the state's public higher education institutions contribute to the state economy through four primary economic channels:

1. Increased human capital and future earnings of students through education and instruction at the highest levels;

2. Enhanced statewide economic growth opportunities through increased worker wages, productivity, and availability;
3. Increased localized economic activity in areas where higher education entities are located and operated across the state; and
4. Knowledge spillovers through research, outreach, and stakeholder engagement.

The focus of the current report is the first three economic channels. Major sections of the report are devoted to examining the ongoing changes in educational attainment and earnings across the state labor force; estimating the potential contribution of increased education to statewide income growth; and measuring the contribution of the operations of the system to state and local economic activity. The Battelle (2013) report provides a detailed overview of the fourth channel, knowledge spillovers produced by the system.

The current report differs in other important ways. The primary difference is that it examines the state's public colleges and universities largely from a labor force perspective. The principal activity of the System remains teaching and instruction and its primary intended outcome is an increasingly skilled state labor force. Given the increased focus of regional economic development on worker skills, the state's higher education system will play an increasingly important role in the state's economic development efforts going forward.

The report is organized into five sections, with each addressing one of the fundamental questions concerning the economic role of the state' public colleges and universities: The first section evaluates the current size, structure, and activities of the System, including trends in enrollment, degree completion, and operating costs.

The report then examines the ongoing changes and progress made in raising educational attainment at all education levels in Oklahoma and the performance of the state relative to the nation and other peer states.

The third section examines current private returns to education nationally and in Oklahoma, particularly cost-of-living adjusted wage gains relative to the nation across various education levels.

The fourth section provides an analysis of economic growth effects from increased education at the state level and provides model-based estimates of the potential economic gains from matching the nation in educational attainment.

The final section provides estimates of the gross economic impacts generated by the operation and expenditures of the System statewide and in the local regions where institutions and constituent agencies are operated.

The key findings from each section of the report are reviewed below.

SYSTEM SIZE, STRUCTURE, AND ACTIVITIES

The Oklahoma State System of Higher Education (System) has developed over more than 75 years to offer comprehensive education and training at the highest levels. The System currently comprises 25 colleges and universities, 11 constituent agencies, and 2 independent university centers.

The core of the System remains the state's two comprehensive research universities. In addition, ten regional universities, one public liberal arts university, and twelve two-year community colleges provide statewide access to extensive undergraduate and graduate instruction.

Other constituent agencies provide medical and legal training and serve specialized research and outreach functions. The System also operates several self-funded auxiliary enterprises that provide services such as student housing, on-campus food services, athletic programs, and college stores.

In FY2016, state institutions served approximately 132,000 full-time equivalent (FTE) students (226,500 on an unduplicated headcount basis). Approximately 74 percent of enrolled students originate from Oklahoma, 19 percent from other states, and 7 percent from countries other than the U.S.

Total enrollment at the state's public colleges and unversities has followed a slight long-term uptrend the past two decades but lags far behind the significant enrollment gains that continue to be made at the national level and in most states. Despite weak enrollment growth, Oklahoma is making consistent progress in raising the number of students completing degrees at all levels. Students completed more than 36,000 degrees and certificates at Oklahoma's public institutions in FY2016, rising 25 percent the past decade.

Funding for higher education in Oklahoma, as in most states, remains one of shared burden and benefit. The overall System received $4.51 billion in total operating income through a variety of sources in FY2016. Educational institutions accounted for $3.03 billion (two-thirds) of total income, while constituent agencies generated $1.49 billion.

Higher education funding in Oklahoma has undergone a distinct structural shift toward greater use of non-appropriated revenue sources the past decade. A long-run increasing trend in state appropriations peaked in FY2008 and has since trended downward under pressure from restricted budgets at the state level. On an inflation-adjusted basis, total appropriations in FY2017 are 36 percent below the recent peak in FY2008. Inflation-adjusted appropriations per FTE student in FY2017 are 37 percent below the recent peak in FY2008. In the longer-term, state appropriations on an inflation-adjusted basis are at levels last experienced in the mid-1990s.

The overall economic role played by the Oklahoma System of Higher Education is traced in part to its large size as an operating business entity. Expenditures to operate the state's 25 colleges and universities and 11 constituent agencies totaled $4.54 billion in FY2016. State appropriations were only 37.9 percent of the primary teaching, research, and outreach budget of the System,

down from a recent peak of 61.8 percent in FY2008. Measured more broadly as a share of total systemwide expenditures, state appropriations accounted for only 19.6 percent of total System spending in FY2016, down almost 15 percentage points from the recent peak in FY2008.

Budgeted capital expenditures of the System totaled $592.5 million in FY2016. Combined, capital spending and budgeted operating expenditures totaled $5.05 billion, the most comprehensive measure of total direct expenditures by the overall System.

During FY2016, the System employed an average of 49,230 total employees, or 32,870 workers on an FTE basis. Employees of the System earned total compensation of $2.53 billion in FY2016. Compensation comprised approximately 56 percent of total System budgeted expenditures in FY2016 and underlies much of the direct economic contribution of the System in areas of the state where facilities are located.

EDUCATIONAL ATTAINMENT IN OKLAHOMA

Relative to the nation, the state's ongoing higher education dilemma is best characterized as a large *surplus* of workers who have either completed high school or completed some college but not attained a degree and a large *deficit* in the number of degree holders across all degree types.

To shift enough state workers out of the two surplus categories to match the national shares at the higher levels of the attainment range, approximately 250,000 state residents (162,900 who have completed high school and more than 86,800 who have completed some college beyond high school but not received a degree) would have to complete a degree path at the associate degree level or higher.

Measured in terms of the percentage increase in degrees necessary to match the nation, Oklahoma would need to increase the total number of associate degrees conferred in the state by 10.6 percent, increase bachelor's degrees by 20.5 percent, and increase master's degrees by 48.0 percent. The number of professional degrees and doctorates would have to roughly double to reach the national share. The needed gains translate into an additional 25,000 associate degrees, 91,500 bachelor's degrees, 78,000 master's degrees, 20,000 professional degrees, and 23,300 doctorate degrees.

The state's weak attainment at the upper education levels can be measured as an overall deficit in average years of schooling relative to the nation. For Oklahoma, average years of schooling reached 13.15 years in 2016, trailing the 13.33 years of average attainment at the national level. In other words, Oklahoma residents ages 25 and over have attained slightly more than one year (1.15 years) of education beyond high school on average. Across all fifty states, the unweighted average years of schooling is 13.40 years. This suggests that Oklahoma currently has an overall education gap relative to the nation of about 0.20-0.25 years, which reflects roughly five years of recent education gains in most states.

Over the more than 45-year period since 1970, Oklahoma has closely tracked the national education path with a slight gap that has widened since 2010. Ranked relative to the other states,

Oklahoma has fallen steadily from 31st to 39th in overall educational attainment since 1970. Nine states have surpassed Oklahoma in the rankings since 1970 while Oklahoma has surpassed only two.

It is important to note that there has been a distinct slowing over time in the overall rate of increase in educational attainment at the national level and in most states, including Oklahoma. Progress in the decade of the 2000s (+0.39 years) was less than half the gain posted in the 1970s (+0.87 years). This slowing is due in part to states continuing to exhaust the potential gains from raising high school completion rates. This suggests that future education gains in most states, including Oklahoma, will become increasingly tied to progress made at the top of the education hierarchy, particularly bachelor's degrees and higher.

While the share of the state workforce with a bachelor's degree or higher has increased steadily the past decade, the gap relative to the nation widened to more than 6 percentage points in 2016. The shortage of higher degrees also plays a key factor in the relatively low educational attainment across the state's rural regions. Measured by years of schooling, only eight Oklahoma counties – Payne, Cleveland, Canadian, Tulsa, Oklahoma, Washington, Rogers, and Logan – exceed the national level of educational attainment. The top eight counties have an average of 13.39 years of schooling, only 0.06 years above the nation. In contrast, the remaining 69 counties average only 12.67 years and trail well behind the 12.87 years of schooling in Mississippi, the lowest ranked state. The 30 counties in the state with the lowest attainment average only 12.42 years of schooling.

The low overall share of state residents ages 18 to 24 who are enrolled either as an undergraduate in college or in graduate or professional school continues to hamper the state's long-run progress in raising overall educational attainment. Oklahoma's 36.4 percent enrollment share in 2016 ranks 46th among the states and is approximately 6 percent below the 42.3 percent national share.

A range of state policy efforts are currently targeted at increasing educational opportunity and improving outcomes for state residents at all levels of the education continuum. In terms of converting these efforts into incremental increases in economic growth, research continues to illustrate that a more highly educated state labor force is needed only to the degree that state employers can effectively absorb more skilled workers. In short, an increasingly skilled state workforce must have increasingly deeper labor markets that can absorb more highly specialized skills. Hence, the state's pursuit of a more educated labor force must proceed simultaneously with broader efforts to stimulate growth in industries that support high-skill workers, particularly in the more rural and lower educational attainment counties of the state.

EDUCATION AND THE LABOR FORCE

Empirical research continues to demonstrate strong net private returns to students from completing education beyond high school. It is these large earnings premiums that underlie the

economic development efforts ongoing in most states to raise the share of the workforce with a bachelor's degree or higher.

Recent Census earnings surveys find that U.S. workers who completed some college but did not receive a degree earned an average of 13 percent ($5,186) more annually than those completing only high school, with 45 percent earning more than $40,000 per year. Those completing an associate degree earned 22 percent ($7,009) more than high school completers, with half earning more than $40,000 annually. Average earnings reached $69,617 for a bachelor's degree, $83,012 for a master's degree, $135,459 for a professional degree, and $125,876 for those with a doctorate. While completion of a bachelor's degree does not guarantee a high income, almost half earned $60,000 or more annually, and nearly 20 percent earned $100,000 or more annually. Nearly half of those who completed either a professional degree or a doctorate earned $100,000 or more annually.

Recent empirical research suggests an overall return to education ranging from 5.5 percent to 12.1 percent, with returns higher for higher levels of education. The realized returns to the student remain positive on average despite both declining taxpayer subsidization of higher education and rising direct costs to students in the form of higher tuition and fees. This does not, however, suggest that poor individual economic outcomes are not possible for those completing additional education. Other key economic benefits of increased education to both students and the broader state economy include a rise in the likelihood of active participation in the workforce and a greatly reduced likelihood of unemployment.

Large wage premiums from education continue to be reported in Oklahoma as well. State residents who completed some college or earned an associate degree reported median annual earnings that are 17 percent higher than high-school completers in 2016. Residents with a bachelor's degree reported median earnings 60 percent higher than high school graduates. At the top of the attainment scale, Oklahoma residents with a graduate or professional degree earned more than double the median income of high school graduates in 2016.

The overall gain in median income over the decade was much stronger in the state than at the national level and exceeded national gains for all categories of education in the period. Overall, state median wages posted a 7.3 percent gain the past decade versus a 0.85 percent gain nationally.

Cost-of-living adjustments suggest that Oklahoma median earnings have fared quite well relative to the nation at all levels of education the past decade. Across all education levels, the relative earnings of state workers on a cost-of-living-adjusted basis increased from 95.5 percent of the nation in 2006 to 101.6 percent in 2016, a more than 5 percentage point gain. Over the full decade, the median earnings of Oklahoma workers averaged 99.1 percent of national median earnings on a cost-of-living-adjusted basis. The state also experienced rising cost-of-living-adjusted wages relative to the nation at every level of educational attainment.

However, both bachelor's degree holders and workers with a graduate or professional degree in Oklahoma continue to slightly trail the nation on a cost-of-living-adjusted basis. Those with a bachelor's degree earned 96.8 percent of the adjusted median earnings for all bachelor's degree holders nationally in 2016. State workers with a graduate or professional degree currently earn only 91.1 percent of national median earnings, but the share is up substantially from 88.7 percent a decade ago. The state continues to slowly make progress in closing these long-standing gaps.

There is little suggestive evidence in the wage and unemployment data the past decade of an oversupply of degree holders in Oklahoma. Wage gains to Oklahoma workers have increased at all education levels the past decade, despite a national recession and an oil and gas-induced statewide recession. The past decade of data also suggests that wage gains for degree recipients in the state are instead improving relative to the nation over time. We find no evidence that the payoff to education beyond high school has shifted in any meaningful way the past decade, either nationally or at the state level.

Oklahoma has also fared well relative to the nation and most states in terms of the share of state residents who stay in-state when seeking their first degree or certificate. Oklahoma residents entering a college or university for their first degree or certificate are much less likely to leave the state relative to other states. Oklahoma also continues to attract a significant number of out-of-state students, far more than the number of state residents attending school outside the state.

ECONOMIC GROWTH EFFECTS OF HIGHER EDUCATION

Research findings continue to point toward increased education as an underlying source of economic growth, both in the U.S. and internationally. These findings also reinforce the existence of a strong empirical link between education and economic growth at the state level.

States with the highest average education levels have long had the highest incomes on average. One additional year of schooling is associated with approximately $17,935 in higher annual personal income per capita on average across the states. Viewed over time, one additional year of educational attainment between 1970 and 2016 is associated with 0.45 percent higher annual growth in income per capita across the states.

Based on the historical relationship measured across the fifty states, Oklahoma's actual level of average income is higher than expected. Oklahoma's 13.15 years of schooling in 2016 ranks 39th among the states while state per capita income of $45,682 ranks 28th at 92.2 percent of national income. Adjusted for the state's low average education level relative to other states, Oklahoma's income per capita is expected to total only $42,321, or 7.4 percent lower than actual income and 14.6 percent below the nation. In other words, Oklahoma's income level exceeds its expected level based solely on the state's average level of educational attainment.

The systematic influence of the oil and gas industry on the overall state economy is believed to have exerted considerable influence on overall growth in personal income in the state in recent years. The concern for education is that the availability of high-wage job opportunties in the oil

and gas industry for high school completers may contribute to a slowing in overall educational attainment in some energy-producing states during periods of high commodity prices. A recent emprical study of oil and gas regions finds that strong labor force opportunities in the short-run can lead to reduced accumulation of education in the longer term.

To illustrate the potential economic effects of increased educational attainment in Oklahoma, a long-run economic growth model linking income to educational attainment is constructed for the fifty states. Along with educational attainment, the contribution of three other well-known factors affecting regional economic growth are included: labor force participation, capital investment, and traded activity (or openness).

The findings indicate that a one percent increase in the number of years of schooling produces an estimated 11.35 percent average increase in personal income per capita across the states in the sample period. The size of the average response of wages to education in the model is consistent with, but generally smaller than, findings in other recent research.

The model also suggests that income per capita in Oklahoma in 2015 was approximately 17.7 percent higher than predicted based solely on years of schooling. The recent period of income outperformance relative to education gains coincides closely with the resumption of strength in the state's oil and gas sector beginning in 2003. State income gains outstripped gains at the national level as the state made up considerable ground on a per capita basis. A similar period of outperformance relative to education gains was present in the 1980 to 1982 period at the height of the Oil Boom.

The growth model is then used to approximate the potential effect on state income of raising the state's current average years of schooling from 13.15 to the national average of 13.33, an increase of 0.18 years. The predicted outcome suggests an increase in personal income of $7,081 per person to $52,763, a 15.5 percent gain. The state would move from a 7.8 percent shortfall relative to the nation to a 6.4 percent premium in per capita income, ranking 13th among the states. Total personal income would increase $27.8 billion, with Oklahoma rising from 28th to 24th among the states in total personal income.

The growth model scenario of attaining a national-like education level in the state suggests other policy implications. First, the rise would likely push the state employment-population ratio from 58.1 percent to 60.6 percent, exceeding the 59.9 percent national rate. The projected shift would equate to a rise in state employment of approximately 57,000 additional wage and salary or self-employed workers, holding population constant. Second, the growth model's large predicted error for state income based on years of schooling suggests that the strong performance of the state economy the past decade has been concealing the moderate net progress being made on overall education attainment. The estimated error for 2015 suggests that the level of personal income per capita in the state was 17.7 percent above the long-run level expected based on educational attainment alone. This presents a substantial risk factor for the state economy if other factors propelling state income (e.g. oil and gas activity) weaken considerably.

ECONOMIC CONTRIBUTION OF HIGHER EDUCATION OPERATIONS

The final economic channel reviewed in the report is the influence of the operations and expenditures of the state's public colleges and universities on economic activity at the state and local level. The System is a large service-based enterprise whose operations exert tremendous economic and financial influence on both the state economy and the local regions in which they operate.

These 'demand-side' effects traced to the ongoing operations and expenditures of the system create measurable spillover activity within the state economy. In FY2016, approximately $5.05 billion was spent directly on general budgetary expenditures and capital projects across all institutions and constituent agencies of the System.

Operating expenditures totaled $4.54 billion in FY2016. Compensation paid to employees is the largest single expenditure of the System and totaled $2.53 billion. Purchases of a broad array of goods and services required for the operations of the System totaled $1.92 billion.

Expenditures on goods and services are divided into four subgroups for modeling purposes. First, traditional education and administrative expenditures of the System (net of compensation) totaled $1.49 billion in FY2016. These items include professional services, travel, utilities, supplies, equipment, library materials, and other operating expenses. Second, spending on goods and services related to sponsored research and programs (net of compensation) totaled $195.6 million in FY2016. Third, System spending on goods and services (net of compensation) related to intercollegiate athletics totaled an estimated $122.6 million in FY2016. Fourth, health care operations expenditures tied to the OU and OSU medical teaching hospitals totaled $109.6 million (net of compensation) in FY2016.

Capital spending is another recurring source of economic activity generated by the operations of the System and totaled $592.5 million in FY2016. These expenditures typically are used to fund either construction projects or purchases of manufactured goods.

A share of spending by students is also included as a net increase in economic activity. For the state-level analysis, net new spending for room, board, and personal expenses by students originating from outside the state is included. At the local level, net new activity includes spending by students originating from outside the state as well as spending by students originating from in-state but outside the local region of the institution.

Estimated net new expenditures by nonresident students in the state total an estimated $452.8 million in FY2016. Measured across each local institution, a total of $1.01 billion in student spending is treated as net new nonlocal spending from outside the region where the institutions operate.

Gross direct and spillover impacts resulting from System and student expenditures are provided for employment, employee compensation, and economic output supported statewide by the state's public colleges and universities.

In total, the System supported an estimated 78,500 jobs, $3.78 billion in employee compensation, and $8.21 billion in economic output in FY2016. These effects can be partitioned into direct, indirect, and induced spillover effects.

For total output, the *direct* effect includes $5.05 billion in direct economic output generated by the System. The direct output of the System in turn supports an incremental $3.16 billion in indirect and induced output in other industries statewide. In other words, each dollar of direct output within the System supports an additional $0.63 in estimated output statewide.

The total impact of $3.78 billion in employee compensation supported by the System's activities and expenditures can also be partitioned into direct, indirect, and induced effects. The *direct* effect includes $2.53 billion in compensation paid to System employees and an estimated $233.2 million in compensation paid to workers engaged in capital projects. The direct compensation earned within the System supports an incremental $1.02 billion in indirect and induced compensation earned by workers in other industries statewide. In total, each dollar of direct compensation earned by System employees supports an additional $0.45 of compensation earned statewide.

Measured by direct employment, 54,127 employees worked within the System or were engaged in work related to capital projects. This employment supports an additional 24,407 jobs statewide through estimated indirect and induced effects. Each direct job within the System supports approximately one-half (0.45) of an additional job statewide.

Measured by total estimated economic output, the state's two research universities and health-related constituent agencies exerted the greatest overall economic influence on their local regional economies in FY2016. The University of Oklahoma Health Sciences Center supported the greatest amount of local economic activity among all institutions and constituent agencies. The facility supports approximately $1.85 billion in total economic activity, 10,700 jobs, and $1.1 billion in employee compensation in the Oklahoma City region. The University of Oklahoma campus in Norman follows closely behind, supporting a total of $1.83 billion in economic output, 20,400 jobs, and $761 million in employee compensation in the Oklahoma City region. Oklahoma State University's main campus in Stillwater ranks third, supporting $1.75 billion in economic output, 19,900 jobs, and $709 million in employee compensation in the local area. Among other constituent agencies, the OSU Center for Health Sciences supports more than $366 million in total economic output, 800 jobs, and $74 million in employee compensation.

The University of Central Oklahoma has the largest impact among regional universities, supporting approximately $685 million in economic output, 4,900 jobs, and $170 million in employee compensation in the Oklahoma City region.

Tulsa Community College ($251 million and 3,300 jobs) and Oklahoma City Community College ($145 million in output and 2,600 jobs) supported far larger amounts of total economic output and employment than the remaining two-year institutions in FY2016.

Among other constituent agencies, OSU-Oklahoma City supported total economic output of $133 million in FY2016, while OSU Institute of Technology in Okmulgee was responsible for $88 million in total output. Among the research university's satellite campuses in Tulsa, OSU-Tulsa supported a total of $42 million in economic activity while OU-Tulsa supported $28 million.

I. Oklahoma System of Higher Education

STRUCTURE OF THE SYSTEM

Oklahoma's current system of public colleges and universities traces its origin back more than 75 years to a vote of the people to establish a statewide system of education beyond secondary school. The Oklahoma State System of Higher Education (or System) was formally established in 1941 through an amendment to the state's constitution.[1]

The structure of the System has evolved considerably since its formation and is now comprehensive in its offerings. It is tasked with serving the general labor force needs of the state and providing specialized education and training at the highest levels.

The System currently comprises 25 colleges and universities, 11 constituent agencies, and 2 independent university centers (**Figure 1**). The core of the System remains the state's two comprehensive research universities – Oklahoma State University (OSU) and University of Oklahoma (OU) – which have broad mandates for instruction, research, and public service. Beyond their main campuses, both research universities offer a full range of degree options at satellite campuses in Tulsa. OSU also maintains a campus in Oklahoma City and operates the OSU Institute of Technology in Okmulgee.

Ten regional universities and one public liberal arts university provide statewide access to extensive undergraduate and graduate instruction. The state's twelve two-year community colleges provide ready access to associate degree programs, preparation for bachelor's degree programs, and other courses of instruction. Student instruction remains the primary mission of the state's regional

Figure 1. Oklahoma Higher Education

Research Universities
Oklahoma State University
University of Oklahoma

Regional Universities
Cameron University
East Central University
Langston University
Northeastern State University
Northwestern Oklahoma State University
Oklahoma Panhandle State University
Rogers State University
Southeastern Oklahoma State University
Southwestern Oklahoma State University
University of Central Oklahoma

Public Liberal Arts University
University of Science and Arts of Oklahoma

Community Colleges
Carl Albert State College
Connors State College
Eastern Oklahoma State College
Murray State College
Northeastern Oklahoma A&M College
Northern Oklahoma College
Oklahoma City Community College
Redlands Community College
Rose State College
Seminole State College
Tulsa Community College
Western Oklahoma State College

Constituent Agencies
OSU Agricultural Experiment Station
OSU Center for Health Sciences
OSU Center for Veterinary Health **Sciences**
OSU Cooperative Extension Service
OSU Institute of Technology, Okmulgee
OSU-Oklahoma City
OSU-Tulsa
OU Geological Survey
OU Health Sciences Center
OU Law Center
OU-Tulsa

Higher Education Programs/Sites
Langston University, Oklahoma City
Northern Oklahoma College, Stillwater
University Center at Ponca City
University Center of Southern Oklahoma

Source: OSRHE

universities and community colleges, with both having a more limited focus on research and public service.

Through constituent agencies, the System provides highly specialized professional education opportunities. Two avenues to comprehensive medical training for physicians and other health specialists are available through the OU Health Sciences Center and the OSU Center for Health Sciences. Legal training is available through the OU Law Center, while the OSU Center for Veterinary Health Sciences trains veterinarians for animal care.

Specialized education and research activities tied to the traditional role of agricultural and mining in the state economy are undertaken at the OSU Agricultural Experiment Station and OU Geological Survey. The OSU Cooperative Extension Service similarly focuses on transferring the expertise of the agricultural components of the university to the state economy.

While the footprint of the system covers most areas of the state, course content is increasingly available through electronic delivery, both to overcome geographic limitations and to meet increasing demand for curriculum flexibility. Access to multiple degree programs from state institutions is available from remote learning sites at University Center at Ponca City and University Center of Southern Oklahoma (Duncan). Langston University maintains a presence in the Oklahoma City region in fulfilling its urban mission, while Northern Oklahoma College has a presence in Stillwater as a primary gateway institution to Oklahoma State University.

The overall System is coordinated by the Oklahoma State Regents for Higher Education (OSRHE or State Regents). The State Regents prescribe academic standards, determine functions and courses of study at state colleges and universities, grant degrees, prescribe standards of education, and allocate funds appropriated by the Oklahoma Legislature. The State Regents also establish tuition and fees within the limits set by the Legislature. While the State Regents is the coordinating board of control for all institutions in the State System of Higher Education, governing boards of regents[2] and boards of trustees are responsible for the operation and management of each institution within the System.

ENROLLMENT SIZE AND TRENDS

The large economic role played by Oklahoma's public college and universities is traced in part to the high share of the state's population the System serves on a continual basis. In FY2016, state institutions served approximately 226,500 students on a unduplicated (or total) headcount basis, or more than 132,000 full-time equivalent (FTE) students (**Figure 2**).[3] Total ongoing enrollment equates to approximately 7.5 percent of the roughly 3 million state residents ages 18 and over.

Total enrollment by type of institution includes approximately 65,000 students at the state's research universities, 65,000 at regional universities, and 95,000 at community colleges. Research and regional universities tend to serve more full-time students, while two-year colleges have a much higher share of part-time enrollments. On an FTE basis, approximately 54,000 students are enrolled at research universities (including consitutuent agencies), 42,000 at

regional universities, and 36,000 at two-year institutions. FTE enrollment the past decade for the individual institutions and constituent agencies is detailed in **Appendix 1**.

Course delivery is increasingly in electronic format, which is only indirectly tied to a particular physical campus. Approximately 110,000 students enrolled in online courses from Oklahoma colleges and universities in FY2017, with more than half (57 percent) of all enrolled students taking at least one online course.[4]

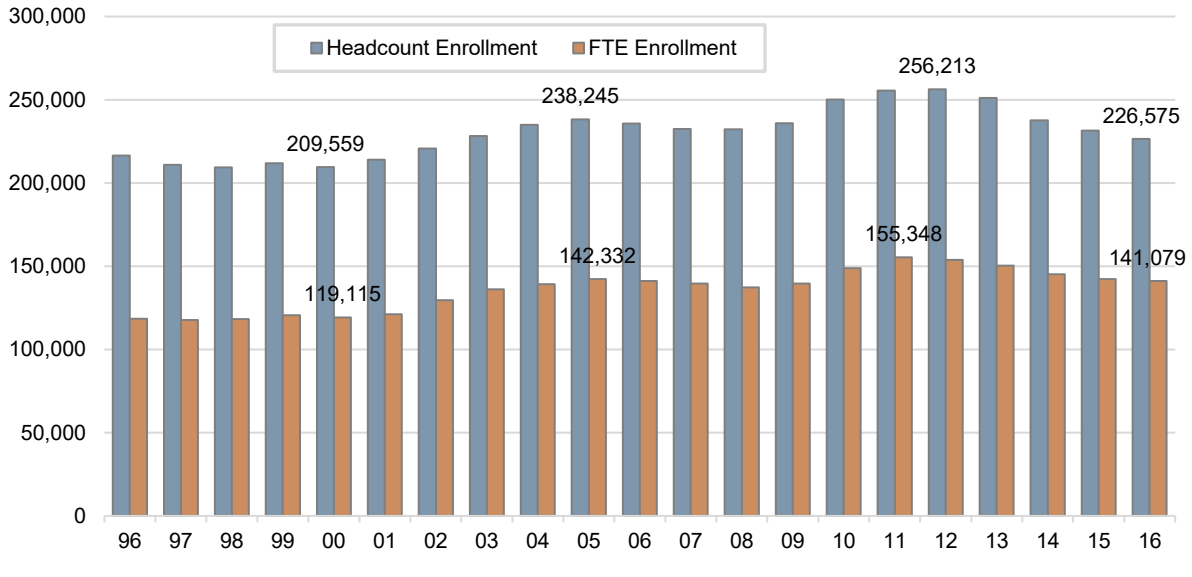
The state's public colleges and universities remain the primary source of education beyond high school in Oklahoma, accounting for 85 percent of total higher education enrollment in the state. Private degree-granting institutions in Oklahoma reported nearly 32,000 students enrolled in FY2015, or the remaining 15 percent of higher education enrollments statewide.[5]

The System also serves a substantial number of high school students participating in concurrent enrollment programs. In FY2016, 11,722 Oklahoma high school students participated in concurrent enrollment at one of the state's colleges and universities, with 99 percent enrolled at a public institution.[6]

Students from around the U.S. and abroad attend the state's public institutions. In FY2015, approximately 74 percent of enrolled students were from Oklahoma, 19 percent from other states, and 7 percent from countries other than the U.S.[7] These nonresident students serve an added economic role through the payment of higher tuition rates and added personal spending in the state.

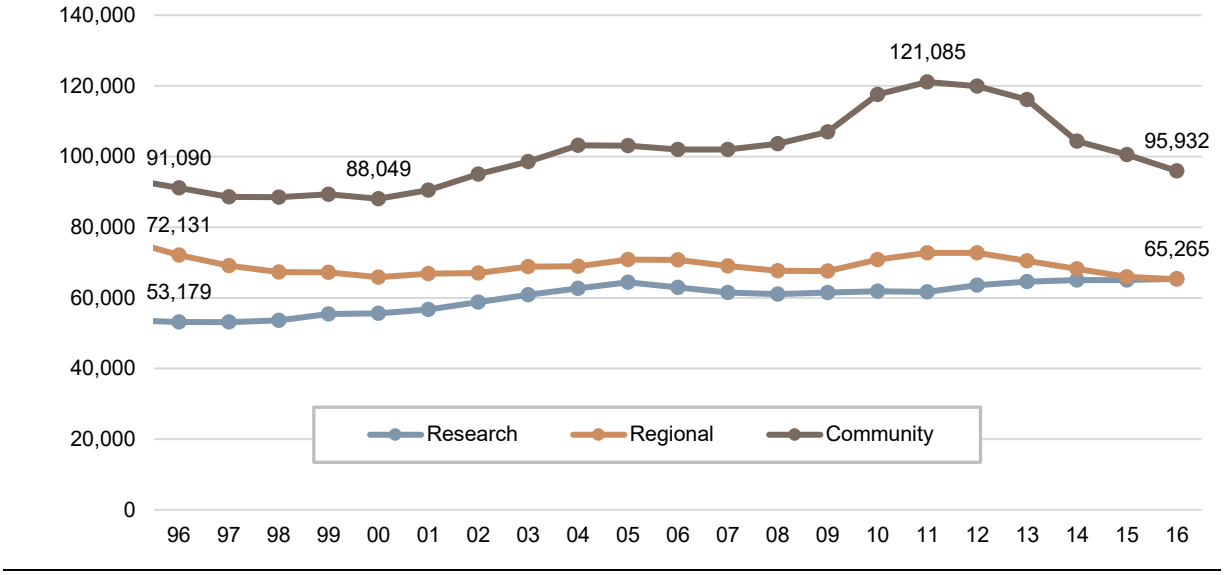
Enrollment Trends. Total enrollment at the state's public colleges and unversities has followed a slight long-term uptrend the past two decades with frequent cycles in student counts (**Figure 2**).

Figure 2. Enrollment at Oklahoma's Public Colleges and Universities



Source: OSRHE

Figure 3. Oklahoma Headcount Enrollment by Public Institution Type



Source: OSRHE

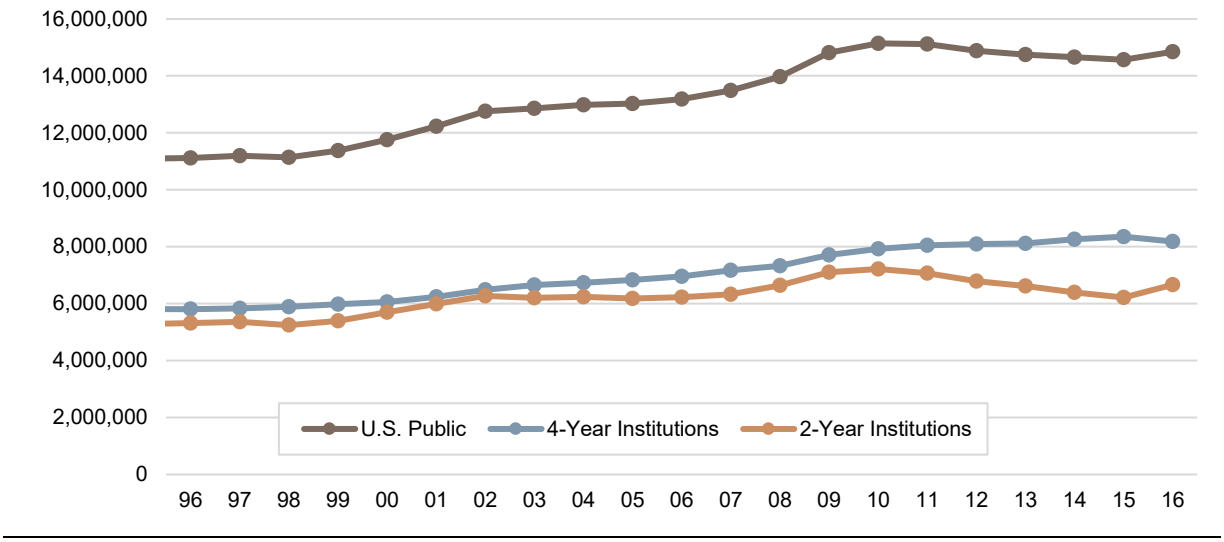
While many factors affect enrollment trends – e.g. recruitment efforts, availability of financial aid, retention rates, and other factors – student counts have historically moved countercyclical relative to state and national economic conditions. More students tend to enroll as labor market conditions weaken and fewer enroll as hiring conditions strengthen.

Enrollment at state public institutions experienced a surge in growth following both the 2001 and 2008-09 national recessions. In the full period between FY2000 and FY2012, enrollment increased by nearly one-fourth (22 percent or 50,000 students) on an unduplicated headcount basis and more than one-third (34 percent or 40,000 students) on an FTE basis (**Figure 2**). The gains in Oklahoma closely match the 30 percent increase in national enrollment by headcount at all public universities in the same period (**Figure 4**).

The surge in enrollment between FY2000 and FY2012 placed tremendous financial pressure on the state's public institutions to accommodate rising enrollment, particularly in the challening state budget environment following the recent national recession. The gain in the period, both in Oklahoma and at the national level, is traced largely to rising two-year institution enrollments (**Figures 3 and 4**). During the depths of the national recession in 2008 and 2009, two-year colleges absorbed nearly all the increased demand for higher education both in Oklahoma and nationally. In contrast, the state's regional universities posted only a slight uptick in enrollment while the state's research universities experienced relatively flat enrollment.

Since reaching an enrollment peak in FY2012, total enrollment at the state's public colleges and universities has subsequently declined by 12 percent (9 percent for FTEs) through FY2016. National enrollment at public institutions declined similarly in the period. The state's community colleges again experienced the bulk of the enrollment change, falling by more than 20 percent (25,000 students). Regional university enrollments have declined by 10 percent since FY2012,

Figure 4. U.S. Headcount Enrollment at Public Institutions by Type

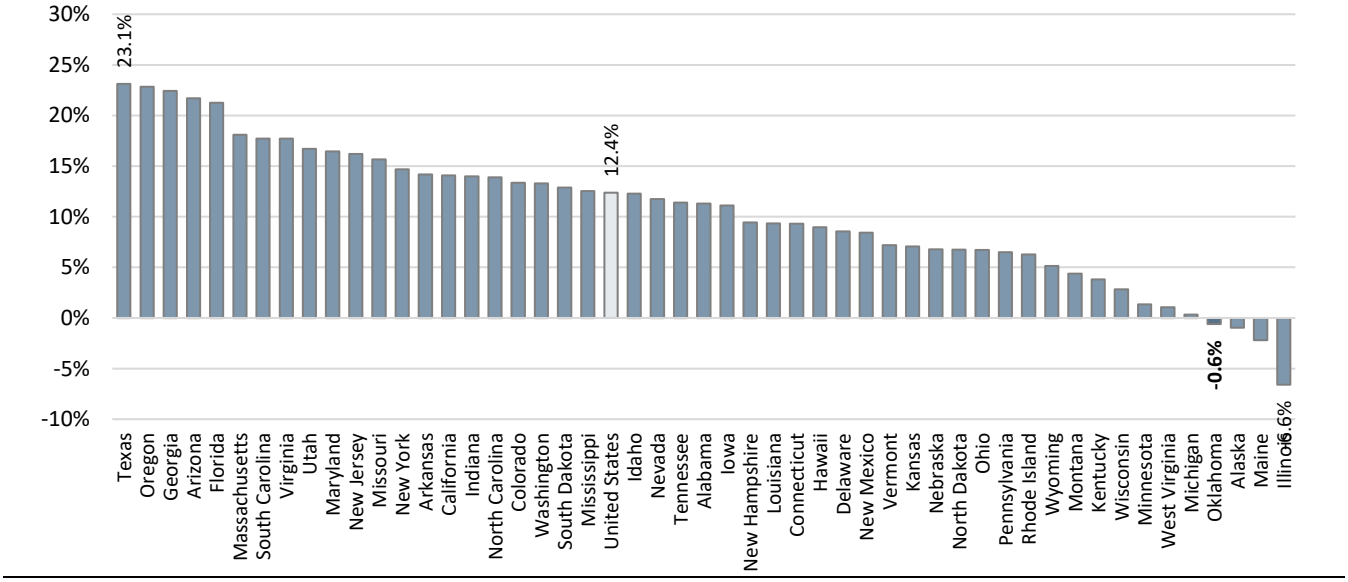


Source: U.S. Department of Education, NCES
Notes: 2016 values are NCES projections

half the percentage decline at community colleges. In contrast, the state's research universities posted slow, consistent growth from FY2010 through FY2016 to reach an all-time high in enrollment of more than 65,000 students.

Weak Overall Enrollment Growth. When viewed over the longer term, Oklahoma lags far behind the significant enrollment gains that continue to be made at the national level and in most states (**Figure 5**). Between Fall 2005 and Fall 2015, the most recent decade of data available, Oklahoma posted a 0.6 percent decline (47th among the states) in FTE enrollment based on standardized state-level data from the National Center for Education Statistics. This trails far behind both the

Figure 5. Change in Public University FTE Enrollment by State – Fall 2005 to Fall 2015



Source: National Center for Education Statistics

12.4 percent increase at the national level and the 11.2 percent gain for the median states. Neighboring Texas leads all states with a 23.1 percent gain. The top five states – Texas, Oregon, Georgia, Arizona, and Florida – are all experiencing rapid population growth and posted 20 percent or larger gains in public institution enrollment. However, slower growing and neighboring Missouri and Arkansas both posted roughly 15 percent enrollment gains the past decade. Other slower-growing neighboring states including Kansas, New Mexico, and Louisiana posted enrollment gains in the 7-10 percent range.

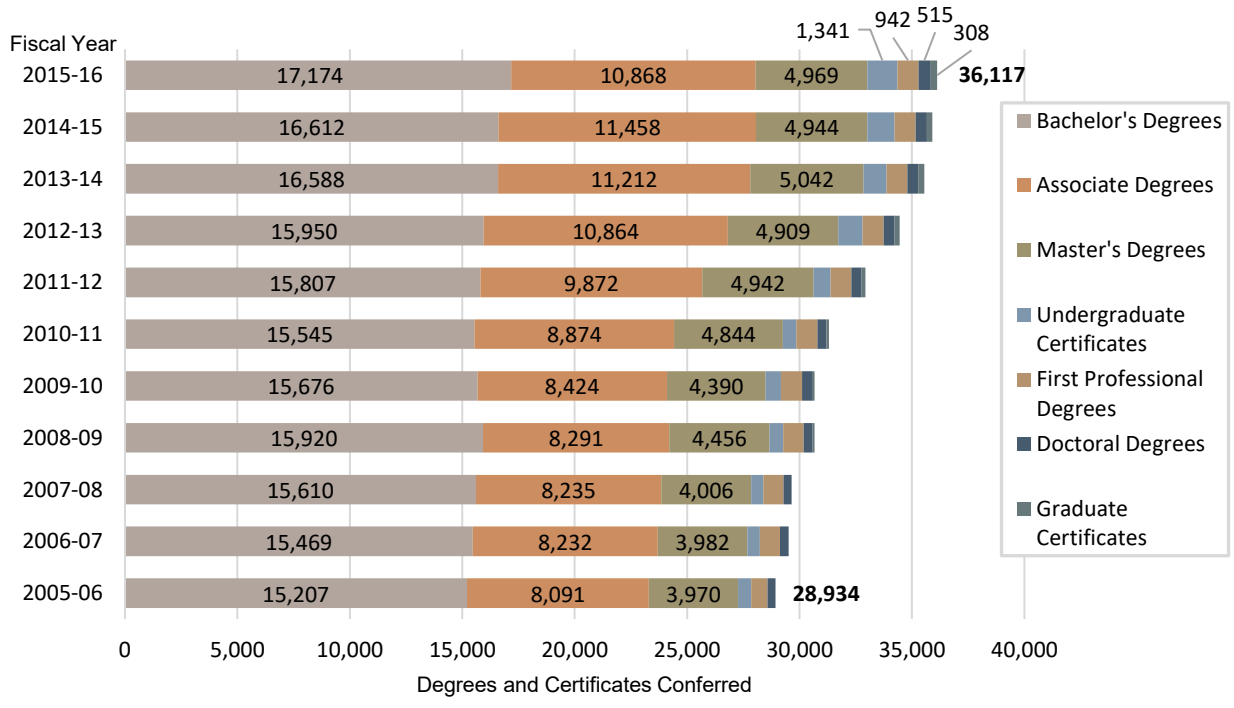
Weak enrollment growth in recent years presents a long-run economic development policy concern for the state. Efforts to increase the overall educational attainment of the state labor force relative to the nation will likely be impeded as long as overall enrollment growth lags behind competing states.

DEGREE COMPLETION TRENDS

The state's public colleges and universities have offset the effects of slow long-run enrollment growth with a steadily rising number of degree completers. Students completed more than 36,000 degrees and certificates at Oklahoma's public institutions in FY2016, rising 25 percent the past decade (**Figure 6**).

The focus of the System remains the production of traditional associate, bachelor's, and master's degrees. Bachelor's degrees (17,174 awarded) remain the largest single category and represent

Figure 6. Oklahoma Public Institution Degree Awards by Type



Source: OSRHE

almost half (48 percent) of all degrees granted in FY2016. Over the past decade, Oklahoma's public institutions awarded more than 175,000 bachelor's degrees.

Associate degrees (10,868 awarded) are the second largest category and comprise roughly 30 percent of total awards. Master's degrees (4,969 awarded) make up almost 15 percent of total degrees conferred, while professional and doctoral degrees jointly comprise only about 4 percent. Certificates (1,649 awarded) represent a rapidly rising share of all awards but were only about 5 percent of total awards in FY2016. More than 80 percent of certificates were issued to undergraduate students.

Oklahoma is making consistent progress in raising the number of students completing degrees at all levels. By number of degrees and certificates issued the past decade, the state's public colleges and universities increased total awards by about 7,200 annually, a 25 percent gain across the period. Gains occurred in all categories of degrees and certificates. Increases in the number issued annually include approximately 2,000 bachelor's degrees, 2,800 associate degrees, 1,000 master's degrees, 400 professional and doctoral degrees, and 1,000 certificates.

Growth rates vary widely across the categories of awards the past decade. While bachelor's degrees (12.9 percent growth) remain the largest category, the fastest growth rates in degree attainment are among non-bachelor's degrees (38 percent growth). Associate degrees are up 34 percent the past decade, master's degree awards are up 25 percent, and professional and doctoral degrees increased by a combined 35 percent. Awards of undergraduate and graduate certificates represent the fastest growing segment (181 percent increase) of non-bachelor's awards but remain a relatively small share of overall awards.

SYSTEM INCOME AND EXPENDITURES

The delivery of public higher education remains a costly endeavor for both students, the public, and research and program sponsors. Debate also continues over the ideal mechanism for funding the state's system of public colleges and universities. Is higher education a fundamental right that should be readily available to all through publicly funded means, despite its high and rising cost? Or should the cost be borne primarily by students and their families, the primary beneficiaries of education beyond high school?

The basic resolution to funding higher education in Oklahoma, as in most states, remains one of shared burden and benefit. The shared approach to funding reflects the fact that the benefits accrue to a broad range of parties to higher education. Benefits include income gains to students and their families, workforce improvements realized by public and private sector employers, economic gains to the broader state economy, economic and social returns to taxpayers, economic gains realized by local regions where colleges and universities are located, earnings of faculty and staff working within the institutions, and value realized by public and private recipients of research and outreach services.

System Income. The use of a shared funding model for higher education results in a highly diversified set of income sources for the state's public colleges and universities. **Figure 7** details the various sources of the $4.51 billion in total operating income received by the System in FY2016. Educational institutions accounted for $3.03 billion (two-thirds) of total income, while constituent agencies generated $1.49 billion. Funding allocated to the major categories of educational institutions includes $1.65 billion for research universities, $828.1 million for regional universities, and $544 million for two-year colleges.

Operating income and expenditures are tracked within the Educational and General (E&G) budget of the System. The E&G budget has two major components. Part 1 is the principal operating budget of the System and includes the primary functions of instruction, research, and

Figure 7. Income Sources – All Institutions and Constituent Agencies (FY2016)

Educational & General Part 1	Research Universities	Regional Universities	Two-Year Colleges	All Institutions	All Constituent Agencies	Total State System
Resident and Nonresident Tuition	351,034,853	262,269,680	107,207,491	720,512,024	112,778,361	833,290,385
Mandatory and Academic Service Fees	202,896,302	58,273,512	30,788,033	291,957,847	26,001,636	317,959,483
Tuition and Student Fees	553,931,155	320,543,192	137,995,524	1,012,469,871	138,779,997	1,151,249,868
State Appropriations	224,502,755	199,469,807	127,058,472	551,031,034	198,890,237	749,921,271
Federal Appropriations	0	0	0	0	9,532,379	9,532,379
Gifts, Grants, and Contracts	74,665,000	7,398,506	7,387,032	89,450,538	45,468,754	134,919,292
Sales and Services	24,963,191	1,037,987	2,665	26,003,843	6,773,654	32,777,497
Organized Activities	752,525	497,107	654,177	1,903,809	43,329,327	45,233,136
Other Sources	32,803,864	8,894,703	54,243,796	95,942,363	8,811,021	104,753,384
Total Educational & General Part 1	$911,618,490	$537,841,302	$327,341,666	$1,776,801,458	$451,585,369	$2,228,386,827
Educational & General Part 2	Research Universities	Regional Universities	Two-Year Colleges	All Institutions	All Constituent Agencies	Total State System
Auxiliary Enterprises						
Student Services	193,686,747	75,368,650	49,478,247	318,533,644	9,423,660	327,957,304
Faculty/Staff Services	0	685,264	196,648	881,912	5,585,194	6,467,106
Intercollegiate Athletics	200,053,302	11,645,671	2,315,821	214,014,794	0	214,014,794
Other Operations	56,142,156	37,700,777	26,200,792	120,043,725	47,489,439	167,533,164
Other Self-Supporting Activities	1,558,995	-3,393,452	-422,759	-2,257,216	5,645,251	3,388,035
Mandatory Transfers	0	3,581,743	543,787	4,125,530	0	4,125,530
Total Auxiliary Enterprises	451,441,200	125,588,653	78,312,536	655,342,389	68,143,544	723,485,933
Agency Special						
Hospitals and Clinics	0	0	0	0	657,271,540	657,271,540
Other Agency Special	0	176,309	338,814	515,123	67,697,115	68,212,238
Total Agency Special	0	176,309	338,814	515,123	724,968,655	725,483,778
Student Aid						
Federal Student Aid	45,893,684	88,131,333	83,597,212	217,622,229	12,992,896	230,615,125
Non-Federal Student Aid	43,266,019	37,472,724	31,922,087	112,660,830	2,651,973	115,312,803
Total Student Aid	89,159,703	125,604,057	115,519,299	330,283,059	15,644,869	345,927,928
Sponsored Research & Programs	200,770,210	38,871,328	22,676,125	262,317,663	226,928,724	489,246,387
Total Educational & General Part 2	$741,371,113	$290,240,347	$216,846,774	$1,248,458,234	$1,035,685,792	$2,284,144,026
Total Educational & General	$1,652,989,603	$828,081,649	$544,188,440	$3,025,259,692	$1,487,271,161	$4,512,530,853

Source: OSRHE

public service. E&G Part 1 income totaled $2.23 billion in FY2016 and includes a mix of student tuition and fees, state and Federal appropriations, grants, private gifts, and sponsored research.

Tuition and fees paid by students ($1.15 billion) provide approximately half the income used to fund instruction, research, and outreach activities in Part 1 and comprise 25.5 percent of total income systemwide. State appropriations are the second largest source in Part 1 at $750 million, followed by gifts, grants, and contracts totaling $134.9 million.[8] More than 85 percent of the cost of instruction, research and outreach activities are funded by student tuition and fees and state appropriations.

Part 2 of the E&G budget tracks the income received by auxiliary enterprises operated by the System, constituent agencies, student aid programs, and sponsored research activities. Auxiliary enterprises provide services that are only tangential to the education process such as student housing, on-campus food services, athletic programs, and college stores. Most of these enterprises are self-supporting operations funded through fees charged directly to the recipient of the service.

E&G Part 2 income totaled $2.28 billion in FY2016. Constituent agencies, primarily the hospitals and clinics affiliated with the teaching hospitals operated by both Oklahoma State University and the University of Oklahoma, are the largest single source of income ($725.5 million).

Auxiliary enterprises operated by the System generated a similar amount of income at $723.5 million. Among them, student services (e.g. housing and food service) is the largest single category ($328 million), followed by intercollegiate athletics ($214 million).

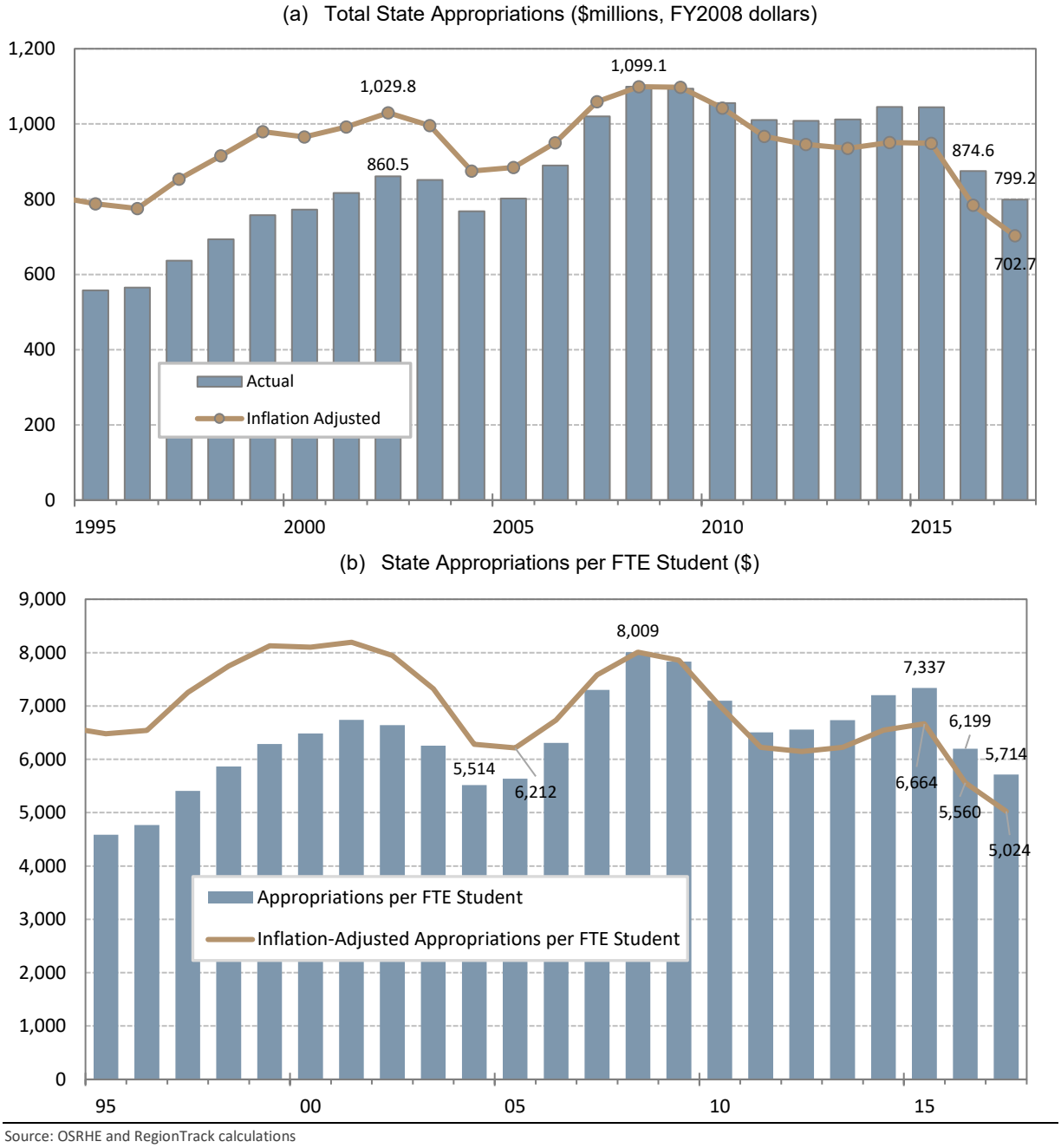
Sponsored research and programs generated $489 million, while total student aid received by the System reached $346 million in FY2016.

State Appropriations. Public funding for higher education has come under increased scrutiny in recent years as education costs continue to rise. State-supported higher education institutions in Oklahoma and around the country are under increasing pressure to diversify their revenue base and reduce their reliance upon public funding.

As a result, higher education funding in Oklahoma has undergone a distinct structural shift toward non-appropriated revenue sources the past decade (**Figure 8a**). A long-run increasing trend in state appropriations peaked in FY2008 at an all-time high of $1.1 billion. Appropriations have since trended downward under pressure from restricted budgets at the state level. State appropriations dropped to $875 million in FY2016 and to $799 billion in FY2017. The 27 percent decline between FY2008 and FY2017 leaves the System with approximately the same level of state appropriations from more than a decade ago.

Appropriations have fallen sharply in both nominal and inflation-adjusted terms. On an inflation-adjusted basis, total appropriations in FY2016 were 36 percent below the recent peak in FY2008. In the longer-term, total state appropriations on an inflation-adjusted basis are at levels last experienced in the mid-1990s.

Figure 8. State Appropriations for Oklahoma System of Higher Education



Source: OSRHE and RegionTrack calculations

Notes: Consumer price index in the base year of 2008 equals 100.0.

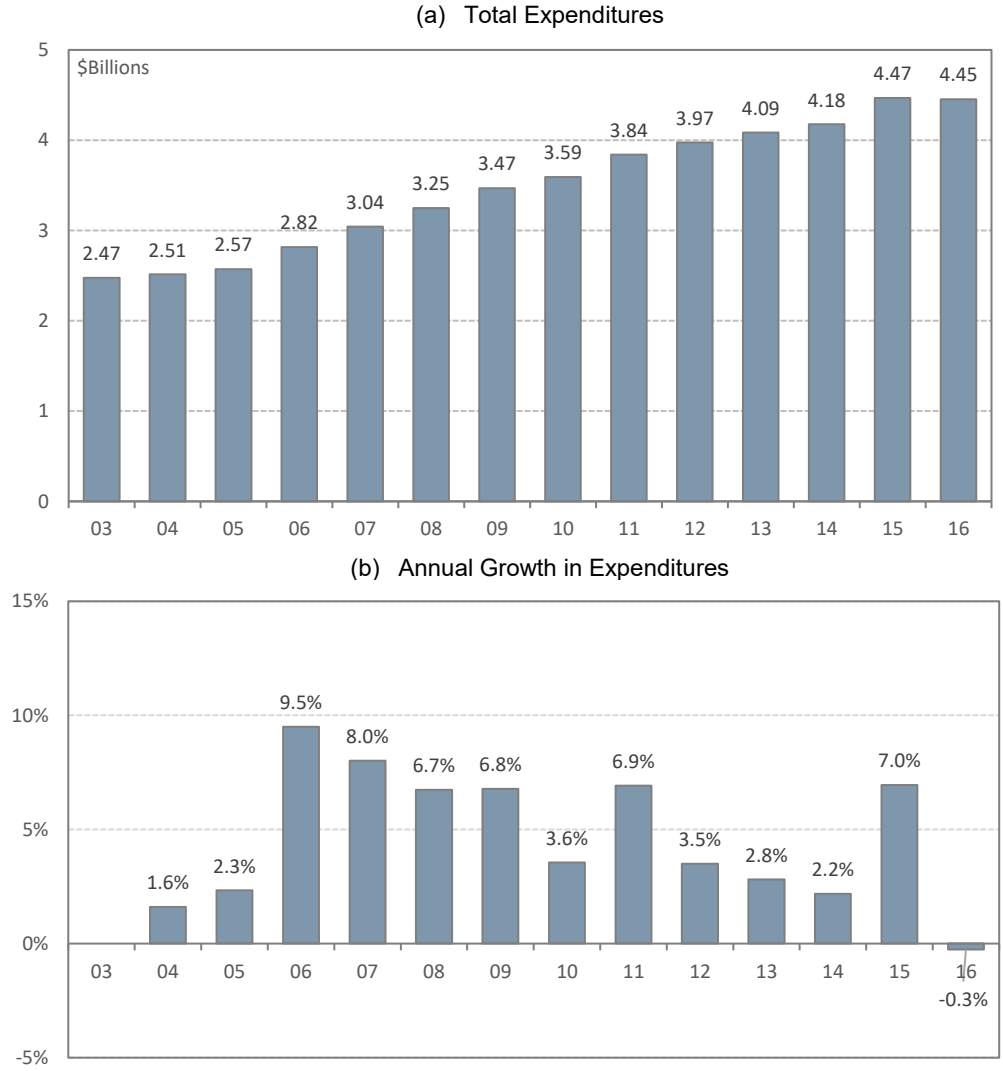
State appropriations are also lower when measured on a per student basis (**Figure 8b**). After reaching a recent peak of $8,009 per full-time-equivalent (FTE) student in FY2008, state appropriations per FTE student dropped sharply following the 2008-09 national recession to only $6,506 by FY2011, a 19 percent decline. Appropriations per FTE student then climbed back to $7,337 in FY2015 as enrollment eased before falling sharply to $6,199 in FY2016 and $5,714 in FY2017. FY2017 appropriations per FTE student declined 22 percent below the recent peak in

FY2015. On an inflation-adjusted basis, state higher education appropriations per FTE student in FY2017 are 24.6 percent below the recent FY2015 peak.

System Expenditures. The overall economic role played by the Oklahoma System of Higher Education is traced in part to its large size as an operating business entity. Expenditures to operate the state's 25 colleges and universities and 11 constituent agencies totaled $4.54 billion in FY2016 (**Figure 9a**), closely matching total income as detailed in the prior section of the report. Income received by the System is generally budgeted in full, with some carryover across budget years.

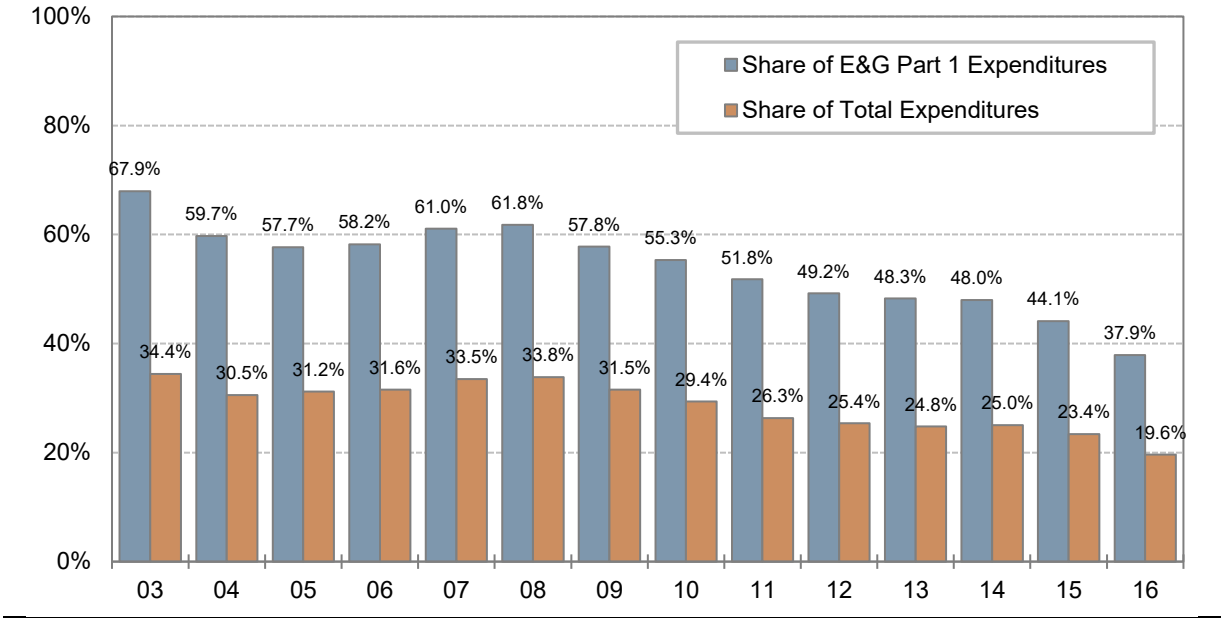
The spending of the System exerts considerable economic influence on the state economy and the regions of the state in which it operates. The majority of System spending occur within the state and makes a large direct contribution to the broader state economy.

Figure 9. Total Expenditures – Oklahoma System of Higher Education



Source: OSRHE

Figure 10. State Appropriations Share of Higher Education Expenditures



Source: OSRHE

Notes: All expenditures are on a fiscal year basis.

Total expenditures of the System fell slightly in FY2016, marking the first decline in total spending in recent years. Growth in expenditures averaged 4.7 percent annually the past decade but slowed to only 3.0 percent average growth the past five fiscal years (**Figure 9b**).

Appropriations Share of Expenditures. The share of total System expenditures funded with state appropriations has declined steadily since FY2008 (**Figure 10**). In FY2016, state appropriations were only 37.9 percent of the primary teaching, research, and outreach (E&G Part 1) budget, down from a recent peak of 61.8 percent in FY2008. The appropriation share exceeded two-thirds as recently as FY2003.

However, measured more broadly as a share of total systemwide expenditures (both E&G Part 1 and Part 2), state appropriations accounted for only 19.6 percent of total System spending in FY2016. This share is down almost 15 percentage points from a recent high of 33.8 percent in FY2008.

Expenditure Detail. **Figure 11** details expenditures by activity or function for each of the major groups of institutions and constituent agencies in the System. **Figure A2** in the Appendix details expenditures for each of the individual institutions and constituent agencies.

Consistent with income, two-thirds ($2.98 billion) of expenditures are directed toward state colleges and universities while the remaining one-third ($1.48 billion) is devoted to constituent agencies.

Income slightly exceeds expenditures for research universities and constituent agencies but is slightly less than expenditures for regional universities and two-year colleges.

Again, Part 1 of the E&G budget is the principal operating budget of the System and includes the primary functions of instruction, research, and public service. Part 1 E&G expenditures totaled $2.31 billion in FY2016, with approximately half dedicated to instruction, research, and service. These expenditures are funded primarily from a mix of state appropriations, student fees, grants, and contracts.

Figure 11. Higher Education Expenditures by Activity/Function

	Research Universities	Regional Universities	Two-Year Colleges	All Institutions	All Constituent Agencies	System Total
Educational & General Part 1						
Instruction	374,778,592	260,743,561	136,662,128	772,184,281	200,174,524	972,358,805
Research	58,190,512	11,675,522	0	69,866,034	48,516,643	118,382,677
Public Service	23,398,524	3,272,265	1,729,282	28,400,071	54,221,074	82,621,145
Academic Support	171,738,941	40,253,738	34,436,560	246,429,239	47,681,167	294,110,406
Student Services	40,882,081	51,561,720	29,535,849	121,979,650	14,840,291	136,819,941
Institutional Support	48,639,203	52,614,872	41,951,008	143,205,083	46,407,907	189,612,990
Operation of Physical Plant	108,272,862	72,983,243	47,686,787	228,942,892	50,884,563	279,827,455
Scholarships	133,289,863	66,106,559	23,997,688	223,394,110	9,875,604	233,269,714
Total Educational & General Part 1	$959,190,578	$559,211,480	$315,999,302	$1,834,401,360	$472,601,773	$2,307,003,133
	Research Universities	Regional Universities	Two-Year Colleges	All Institutions	All Constituent Agencies	System Total
Educational & General Part 2						
Auxiliary Enterprises						
Student Services	163,627,661	74,796,078	50,829,374	289,253,113	9,537,849	298,790,962
Faculty/Staff Services		938,474	3,315,512	4,253,986	5,188,883	9,442,869
Intercollegiate Athletics	184,719,282	12,868,177	6,701,252	204,288,711	0	204,288,711
Other Operations	21,706,086	27,122,630	16,563,980	65,392,696	35,670,044	101,062,740
Other Self-Supporting Activities	0	0	0	0	0	0
Mandatory Transfers	0	0	611,292	611,292	0	611,292
Total Auxiliary Enterprises	370,053,029	115,725,359	78,021,410	563,799,798	50,396,776	614,196,574
Agency Special						
Hospital and Teaching Clinics	0	0	0	0	642,145,534	642,145,534
Other Agency Special	0	176,750	136,627	313,377	64,762,978	65,076,355
Student Aid						
Scholarships, Fellowships, & Grants	43,466,013	33,728,584	32,323,032	109,517,629	18,264,361	127,781,990
Other Student Aid	45,898,062	89,519,915	73,460,978	208,878,955	0	208,878,955
Sponsored Research & Programs	200,770,210	38,687,076	22,659,739	262,117,025	226,928,724	489,045,749
Total Educational & General Part 2	$660,187,314	$277,837,684	$206,601,786	$1,144,626,784	$1,002,498,373	$2,147,125,157
Total Expenditures	$1,619,377,892	$837,049,164	$522,601,088	$2,979,028,144	$1,475,100,146	$4,454,128,290

Source: OSRHE

Part 2 of the E&G budget tracks the expenditures of auxiliary enterprises, constituent agencies, student aid, and sponsored research and totaled $2.15 billion in FY2016. Auxiliary enterprise expenditures totaled $614 million in the provision of services such as student housing, on-campus food services, athletic programs, and college stores. Intercollegiate athletics-based auxiliary enterprises incurred expenditures of $185 but reported net positive revenue of nearly $10 million in FY2016. Spending on sponsored research and programs funded by external sources totaled $489 million. Expenditures by hospitals and teaching clinics operated by the System totaled $642 million.

Capital Spending. A separate capital budget covers spending for construction of new facilities, major repairs or renovations of existing facilities, and major purchases of equipment across the System. Budgeted capital expenditures totaled $592.5 million in FY2016. Capital spending for each of the individual institutions and constituent agencies in the FY2014 to FY2018 period is detailed in **Figure A3** in the Appendix.

Much like E&G budget expenditures, capital expenditures play a key economic role in the communities where the System's institutions and constituent agencies are located. Capital expenditures are funded from revenue bond proceeds, special appropriations, dedicated monies, and major private gifts.

The capital spending of the System combined with budgeted E&G expenditures totaled $5.05 billion in FY2016. From an economic perspective, this provides the most comprehensive measure available of total direct expenditures by the overall System.

SYSTEM EMPLOYMENT AND COMPENSATION

The higher education System is one of the state's largest employers with a substantial payroll impact on the state and local regions where the individual institutions operate.[9]

During FY2016, the System employed an average of 49,230 total employees, or 32,870 workers on an FTE basis. Slightly more than half of all workers (25,583) are full-time employees, with the remainder working part-time (23,647). Many workers are also enrolled as students at an institution.

Figure 12. Oklahoma Higher Education Employment and Earnings

	Full-Time	Part-Time	Total	FTE
Employment	25,583	23,647	49,230	32,870
Wage and Salary Earnings			$1,884,321,382	
Fringe Benefits			$649,576,718	
Total Compensation			$2,533,898,099	
Total Compensation per Worker			$51,471	$77,089

Source: State of Oklahoma Office of Management and Enterprise Services and OSRHE

The state's two research universities and related constituent agencies employed approximately 30,500 workers (21,380 FTE), or 62 percent of all workers in FY2016. Approximately 11,000 workers (6,733 FTE) were employed at regional four-year universities, while 7,350 employees (4,758 FTE) worked at two-year institutions.[10]

Employee compensation comprised approximately 56 percent of total System budgeted expenditures in FY2016 and underlies much of the direct economic contribution from operations. Employees of the System earned total compensation of $2.53 billion in FY2016 ($1.88 billion in wages and salaries and $650 million in fringe benefits).

Average annual compensation reached $51,471 across all System workers, or $77,089 on an FTE basis. This is slightly below statewide average compensation per worker of $55,735 in 2016, which largely reflects the high share of part-time workers in the System. Average wages are generally highest at the research universities and the health-related constituent agencies. Nearly all expenditures on compensation are believed to be paid to employees living within Oklahoma.

A final dimension of the employment role played by higher education is that many employees of the System are among the most skilled workers in the state. Most faculty members hold either an advanced degree or a terminal degree in their field. Many work in scientific and technology-related fields and engage in much of the research and development activity undertaken by the System. As a result, communities where public universities and colleges are located also tend to have much higher average levels of educational attainment.

II. Educational Attainment in Oklahoma

This section provides an evaluation of the changing educational attainment level of the Oklahoma labor force with an emphasis on the role played by the state's public colleges and universities. The Oklahoma labor force continues to trail the nation on overall attainment and ranks relatively low across all degree types, particularly professional and advanced degrees.

The major implications for policymakers of lagging educational levels are lower average wages, less vibrant labor markets, and a job mix in the state requiring less-skilled workers.

Stakeholders in both the public and private sectors in Oklahoma have embraced efforts to systematically raise the educational attainment level of the state's labor force, particularly at the upper categories of education. This objective underlies the state's ongoing efforts to raise college-going rates, increase the share of college graduates and graduates with advanced degrees, and raise education levels in the rural areas of the state.

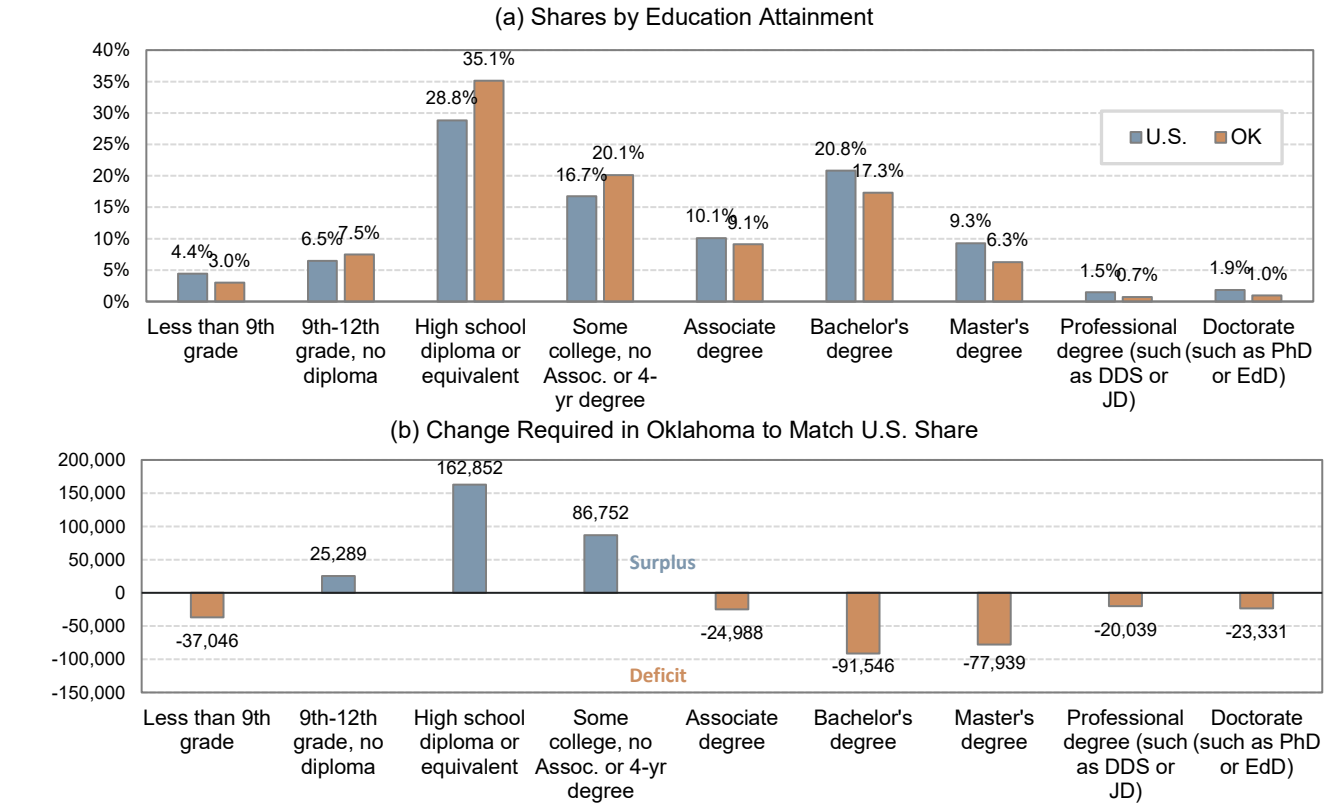
LAGGING EDUCATIONAL ATTAINMENT IN OKLAHOMA

Raising the level of educational attainment in Oklahoma remains a key state policy priority. **Figure 13** provides estimates of the share of the Oklahoma and U.S. populations ages 25 and over by education level, as well as the change that would be necessary for the state to match the national share in each category. The estimates are derived from the most recently available Current Population Survey of detailed educational attainment by age group.[11]

At lower education levels, Oklahoma's comparatively low 10.5 percent share of residents who have not completed high school fares well relative to the nation (10.9 percent). However, the state's higher education dilemma is illustrated in **Figure 13b** by a large *surplus* in the number of workers who have either completed high school or completed some college but not attained a degree and by a large *deficit* in the number of degree holders across all degree types. The deficit at the upper end of the education hierarchy runs sharply counter to research that demonstrates the fundamental economic value of added education to workers. Most importantly, degreed workers earn higher incomes, are more likely to actively participate in the labor force, and are less subject to periods of unemployment than are non-degree completers.

Attaining national-like shares of degree holders in the state would require change at every level of the education pipeline feeding the state's higher education system. To shift enough state workers out of the two surplus categories to match the national shares at higher levels of the attainment range, approximately 250,000 state residents (162,900 who have completed high school and more than 86,800 who have completed some college beyond high school but not received a degree) would have to complete a degree path at the associate degree level or higher. This is a considerable feat that represents approximately 10 percent of the state's 2.6 million residents ages 25 and over in 2016.

Figure 13. Oklahoma Educational Attainment Shares Relative to the U.S. for Ages 25+ (2016)



Source: U.S. Census Bureau - Current Population Survey, Annual Social and Economic Supplement

Some progress remains to be made at the lower levels of education as well. Oklahoma already has a relatively high share of students completing high school at 83 percent, equaling the national share.[12] However, while Oklahoma has managed to reduce the share of the population with less than a 9th grade education to only 3.0 percent (versus 4.4 percent nationally), the state exceeds the national rate for the share of residents with only 9 to 12 years of schooling by 1 percentage point (7.5 percent versus 6.5 percent). Among those with 9 to 12 years of schooling, nearly half (44 percent) are of the relatively young work life ages of 25 to 44 years.

The overall progress made on reducing the number of high school non-completers has increasingly shifted the state's education focus to the deficit at the upper end of the education system. Beginning at the associate degree level in **Figure 13**, Oklahoma faces a consistent education gap relative to the nation, with the deficit generally more significant the higher the degree level. Measured by share of degree holders, Oklahoma trails the nation by 1.0 percent for associate degrees, 3.5 percent for bachelor's degrees, 3.0 percent for master's degrees, 0.8 percent for professional degrees, and nearly 1 percent for doctorates.

Measured in terms of the percentage increase in degrees necessary to match the nation, Oklahoma would need to increase the total number of associate degrees conferred in the state by 10.6 percent, increase bachelor's degrees by 20.5 percent, and increase master's degrees by 48.0 percent. The number of professional degrees and doctorates would have to roughly double to

reach the national share. The needed gains translate into an additional 25,000 associate degrees, 91,500 bachelor's degrees, 78,000 master's degrees, 20,000 professional degrees, and 23,300 doctorate degrees.

The shortages across each degree category illustrate the vastly different education structure of the Oklahoma labor force relative to the nation and many other states. At the current annual rate of degree awards by the state's public colleges and universities (**Figure 6**), the shortage represents 2.3 years of associate degrees, 5.4 years of bachelor's degrees, 15.6 years of master's degrees, 20 years of professional degrees, and 46 years of doctorates.

Simply raising the number of degree recipients represents only half the education dilemma. The state's employers must be capable of effectively utilizing more highly skilled workers. The underweighting of the share of state workers at the upper end of the educational spectrum reflects the ongoing interrelationship between the labor needs of existing state firms (labor demand) and the level of education and skill set of existing state workers (labor supply). A more highly educated state labor force is needed only to the degree that state employers can effectively absorb them. Efforts to raise the educational attainment of the state labor force and expand the number of high skilled jobs produced across the state must be pursued in concert.

The labor force trends already in place in many of the highest-education states (e.g. Colorado, Connecticut, Maryland, Massachusetts, Minnesota, and Virginia), both in terms of educational attainment and economic growth, provide a glimpse of the competitive future facing the state's labor force. These trends suggest that much higher average education levels will be needed in Oklahoma to compete with the top states. Many states have already achieved a 35 to 40 percent share of the workforce with a bachelor's degree or higher, versus only about 25 percent in Oklahoma currently.

RAISING OVERALL STATE EDUCATIONAL ATTAINMENT

Educational attainment in the state is best characterized as high concentrations at the lower and middle tiers coupled with weak attainment levels across the top tiers. Reversing the state's low ranking on degree attainment is increasingly viewed as the primary avenue to raising the overall education level of the state relative to competing states. As the potential gains from raising high school completion rates are exhausted over time, higher education becomes the primary source of increased overall education by default.

Average Years of Schooling. A commonly used measure of overall educational attainment within a region is the average number of years of schooling completed. In calculating years of schooling, we follow the widely-adopted approach used by United Nations Educational, Scientific, and Cultural Organization (UNESCO) in forming comparative measures of education across countries.[13] This methodology is derived from the pioneering work of Barro and Lee (2010) on comparative measures of educational attainment at the international level.[14] The result is a standardized measure of overall attainment that adjust a region's various education levels to a common unit (average number of years) yet allows for comparison across the various education

categories to reflect the unique education pattern within a state or region. It adopts equally well to comparing individual states as well as smaller regions such as cities, counties, and metropolitan areas.

In the remainder of the report, average years of schooling is calculated for the population ages 25 years and older using a weighted average of the various categories of educational attainment as reported by the U.S. Census Bureau. The four primary categories of educational attainment used in this section and the respective weights for each group are as follows:

1. less than a high school completer (8 years),
2. high school completer (12 years),
3. beyond high school but less than a bachelor's degree (14 years), and
4. bachelor's degree or higher (16 years).

Average years of schooling can capture a state's progress across all levels of education, as well as the individual contribution of the four categories of attainment. The two highest education categories provide insight into the contribution of Oklahoma's public colleges and universities.

Trends in Overall Educational Attainment. Continuous time series data for annual state-level educational attainment are only available since 2005. We estimate an extended historical time series for the states using Census point estimates for 1970, 1980, 1990, and 2000, along with annual estimates from the American Community Survey in the 2005 to 2016 period. Interpolation techniques are then used to estimate the intervening (or missing) years between decennial Census surveys.[15] These estimates are believed to provide a very good proxy given that educational attainment changes only slowly over time and is a highly smooth data series both at the national and state levels. The use of actual data at Census intervals anchors any long-run estimates of the change in attainment derived from the extended series.

Figure 14 illustrates the average years of schooling across the states in ten-year intervals from 1970 to 2010, along with the most recent annual estimate for 2016. For Oklahoma, average years of schooling reached 13.15 years in 2016, slightly trailing the 13.33 years of average attainment at the national level. In other words, Oklahoma residents ages 25 and over have attained slightly more than one year (1.15 years) of education beyond high school on average. Across all states, the unweighted average years of schooling is 13.40 years. This suggests that Oklahoma currently has an overall education gap relative to the nation of about 0.20-0.25 years. This remains a sizeable gap that is equivalent to approximately five years of recent education gains in most states.

Oklahoma has made considerable progress in increasing educational attainment since 1970. Average years of schooling increased 2.45 years, from 10.70 years to 13.15 years, in the period. However, the state has not kept pace with the nation, with gains slightly trailing in most decades. Ranked relative to the other states, Oklahoma has fallen steadily from 31st to 39th in overall educational attainment since 1970.

Figure 14. Average Years of Schooling By State

	Average Years of Schooling						State Rank						Change in Average Years of Schooling				
State	1970	1980	1990	2000	2010	2016	1970	1980	1990	2000	2010	2016	1970-80	1980-90	1990-00	2000-10	2010-16
United States	10.85	11.72	12.32	12.74	13.13	13.33							0.87	0.60	0.42	0.39	0.20
50-State Average	10.78	11.67	12.36	12.80	13.19	13.40							0.90	0.68	0.44	0.40	0.21
Alabama	10.10	11.00	11.73	12.29	12.74	12.99	45	43	46	45	45	45	0.90	0.73	0.56	0.45	0.25
Alaska	11.53	12.61	13.08	13.23	13.50	13.62	2	1	2	5	7	11	1.08	0.47	0.15	0.27	0.12
Arizona	11.11	11.99	12.59	12.83	13.15	13.30	10	13	15	26	29	33	0.88	0.60	0.24	0.32	0.15
Arkansas	10.02	10.88	11.59	12.17	12.66	12.92	49	48	47	47	46	47	0.86	0.71	0.58	0.49	0.26
California	11.37	12.16	12.59	12.72	13.03	13.20	4	7	15	30	36	37	0.79	0.43	0.13	0.31	0.17
Colorado	11.44	12.50	13.09	13.40	13.65	13.84	3	2	1	1	1	1	1.06	0.59	0.31	0.25	0.19
Connecticut	11.01	11.96	12.71	13.10	13.45	13.65	15	14	9	10	11	9	0.95	0.75	0.39	0.35	0.20
Delaware	10.90	11.76	12.42	12.81	13.16	13.34	22	22	22	27	28	29	0.86	0.66	0.39	0.35	0.18
Florida	10.75	11.60	12.23	12.65	13.05	13.24	27	32	33	34	35	35	0.85	0.63	0.42	0.40	0.19
Georgia	10.17	11.11	12.05	12.63	13.03	13.24	42	41	41	36	36	35	0.94	0.94	0.58	0.40	0.21
Hawaii	11.28	12.13	12.69	13.03	13.40	13.60	7	8	11	16	16	14	0.85	0.56	0.34	0.37	0.20
Idaho	11.09	12.01	12.54	12.96	13.21	13.42	12	10	19	17	25	26	0.92	0.53	0.42	0.25	0.21
Illinois	10.72	11.61	12.39	12.85	13.26	13.49	30	30	25	24	23	20	0.89	0.78	0.46	0.41	0.23
Indiana	10.62	11.39	12.10	12.57	12.97	13.14	35	37	39	40	39	40	0.77	0.71	0.47	0.40	0.17
Iowa	10.93	11.71	12.37	12.87	13.25	13.45	21	23	27	21	24	24	0.78	0.66	0.50	0.38	0.20
Kansas	11.11	11.95	12.63	13.08	13.39	13.57	10	17	14	14	18	17	0.84	0.68	0.45	0.31	0.18
Kentucky	9.97	10.78	11.51	12.12	12.62	12.96	50	50	49	48	49	46	0.81	0.73	0.61	0.50	0.34
Louisiana	10.22	11.11	11.79	12.21	12.65	12.85	41	41	44	46	47	49	0.89	0.68	0.42	0.44	0.20
Maine	10.75	11.62	12.38	12.86	13.27	13.48	27	29	26	22	20	21	0.87	0.76	0.48	0.41	0.21
Maryland	10.85	11.82	12.67	13.12	13.48	13.69	23	20	12	8	9	7	0.97	0.85	0.45	0.36	0.21
Massachusetts	11.06	12.00	12.74	13.21	13.60	13.79	14	11	6	7	2	2	0.94	0.74	0.47	0.39	0.19
Michigan	10.68	11.61	12.31	12.81	13.21	13.40	33	30	31	27	25	27	0.93	0.70	0.50	0.40	0.19
Minnesota	10.99	11.96	12.72	13.25	13.60	13.77	17	14	7	4	2	3	0.97	0.76	0.53	0.35	0.17
Mississippi	10.14	10.95	11.59	12.12	12.64	12.87	44	46	47	48	48	48	0.81	0.64	0.53	0.52	0.23
Missouri	10.51	11.36	12.13	12.66	13.07	13.33	38	38	38	33	32	30	0.85	0.77	0.53	0.41	0.26
Montana	11.08	12.07	12.59	13.09	13.48	13.61	13	9	15	12	9	12	0.99	0.52	0.50	0.39	0.13
Nebraska	10.99	11.90	12.59	13.04	13.42	13.55	17	19	15	15	13	18	0.91	0.69	0.45	0.38	0.13
Nevada	11.35	12.00	12.40	12.62	12.93	13.05	5	11	23	37	42	43	0.65	0.40	0.22	0.31	0.12
New Hampshire	10.99	11.96	12.79	13.23	13.56	13.76	17	14	5	5	4	4	0.97	0.83	0.44	0.33	0.20
New Jersey	10.74	11.69	12.48	12.93	13.40	13.58	29	24	20	19	16	16	0.95	0.79	0.45	0.47	0.18
New Mexico	10.97	11.79	12.33	12.67	12.97	13.14	20	21	29	32	39	40	0.82	0.54	0.34	0.30	0.17
New York	10.78	11.65	12.36	12.74	13.19	13.37	24	26	28	29	27	28	0.87	0.71	0.38	0.45	0.18
North Carolina	10.06	11.00	11.97	12.57	13.06	13.33	47	43	42	40	34	30	0.94	0.97	0.60	0.49	0.27
North Dakota	10.63	11.65	12.40	12.92	13.43	13.59	34	26	23	20	12	15	1.02	0.75	0.52	0.51	0.16
Ohio	10.69	11.48	12.16	12.68	13.07	13.29	32	36	37	31	32	34	0.79	0.68	0.52	0.39	0.22
Oklahoma	10.70	11.57	12.22	12.61	12.99	13.15	31	33	34	38	38	39	0.87	0.65	0.39	0.38	0.16
Oregon	11.15	12.17	12.72	13.10	13.41	13.61	9	6	7	10	15	12	1.02	0.55	0.38	0.31	0.20
Pennsylvania	10.50	11.35	12.07	12.60	13.11	13.32	39	39	40	39	30	32	0.85	0.72	0.53	0.51	0.21
Rhode Island	10.39	11.32	12.17	12.64	13.09	13.44	40	40	36	35	31	25	0.93	0.85	0.47	0.45	0.35
South Carolina	10.05	10.95	11.84	12.39	12.94	13.16	48	46	43	43	41	38	0.90	0.89	0.55	0.55	0.22
South Dakota	10.76	11.64	12.30	12.85	13.27	13.47	26	28	32	24	20	23	0.88	0.66	0.55	0.42	0.20
Tennessee	10.15	10.99	11.75	12.33	12.80	13.09	43	45	45	44	44	42	0.84	0.76	0.58	0.47	0.29
Texas	10.56	11.53	12.22	12.50	12.83	13.05	37	35	34	42	43	43	0.97	0.69	0.28	0.33	0.22
Utah	11.60	12.49	13.02	13.29	13.53	13.70	1	3	3	2	5	6	0.89	0.53	0.27	0.24	0.17
Vermont	11.00	11.91	12.64	13.12	13.49	13.67	16	18	13	8	8	8	0.91	0.73	0.48	0.37	0.18
Virginia	10.61	11.56	12.46	12.96	13.37	13.64	36	34	21	17	19	10	0.95	0.90	0.50	0.41	0.27
Washington	11.33	12.30	12.93	13.27	13.52	13.71	6	4	4	3	6	5	0.97	0.63	0.34	0.25	0.19
West Virginia	10.09	10.86	11.46	12.02	12.51	12.78	46	49	50	50	50	50	0.77	0.60	0.56	0.49	0.27
Wisconsin	10.77	11.66	12.33	12.86	13.27	13.48	25	25	29	22	20	21	0.89	0.67	0.53	0.41	0.21
Wyoming	11.27	12.23	12.71	13.09	13.42	13.55	8	5	9	12	13	18	0.96	0.48	0.38	0.33	0.13

Source: U.S. Census Bureau and RegionTrack calculations

The variation in the level of overall attainment across the states is substantial. The lowest attainment is in Mississippi at 12.80 years and highest in Colorado at 13.82 years. While a range of roughly one year of schooling separates the top state from the bottom state, a one-year gap is considerable and equates to the 25-year gain made at the national level between 1990 and 2015.

Nine states have surpassed Oklahoma in the overall educational attainment rankings since 1970. These states include Georgia, Indiana, Michigan, Missouri, Ohio, Pennsylvania, Rhode Island, South Carolina, and Virginia. Only Georgia, South Carolina, and Virginia are considered high-growth states based on population gains.

Oklahoma has surpassed only two states - Nevada and New Mexico. The neighboring energy states of Texas (13.05 years) and Louisiana (12.85 years) continue to trail Oklahoma in years of schooling and similarly lost ground relative to the nation since 1970. States that were ranked among the leaders in 1970 but have since lost considerable ground include Arizona (10th to 33rd), California (4th to 37th), and Nevada (5th to 43rd).

It is important to note that there has been a distinct slowing over time in the overall rate of increase in educational attainment at the national level and in most states, including Oklahoma. Progress in the decade of the 2000s (+0.39 years) was less than half the gain posted in the 1970s (+0.87 years). This slowing is due in part to states continuing to exhaust the potential gains from rising high school completion rates.

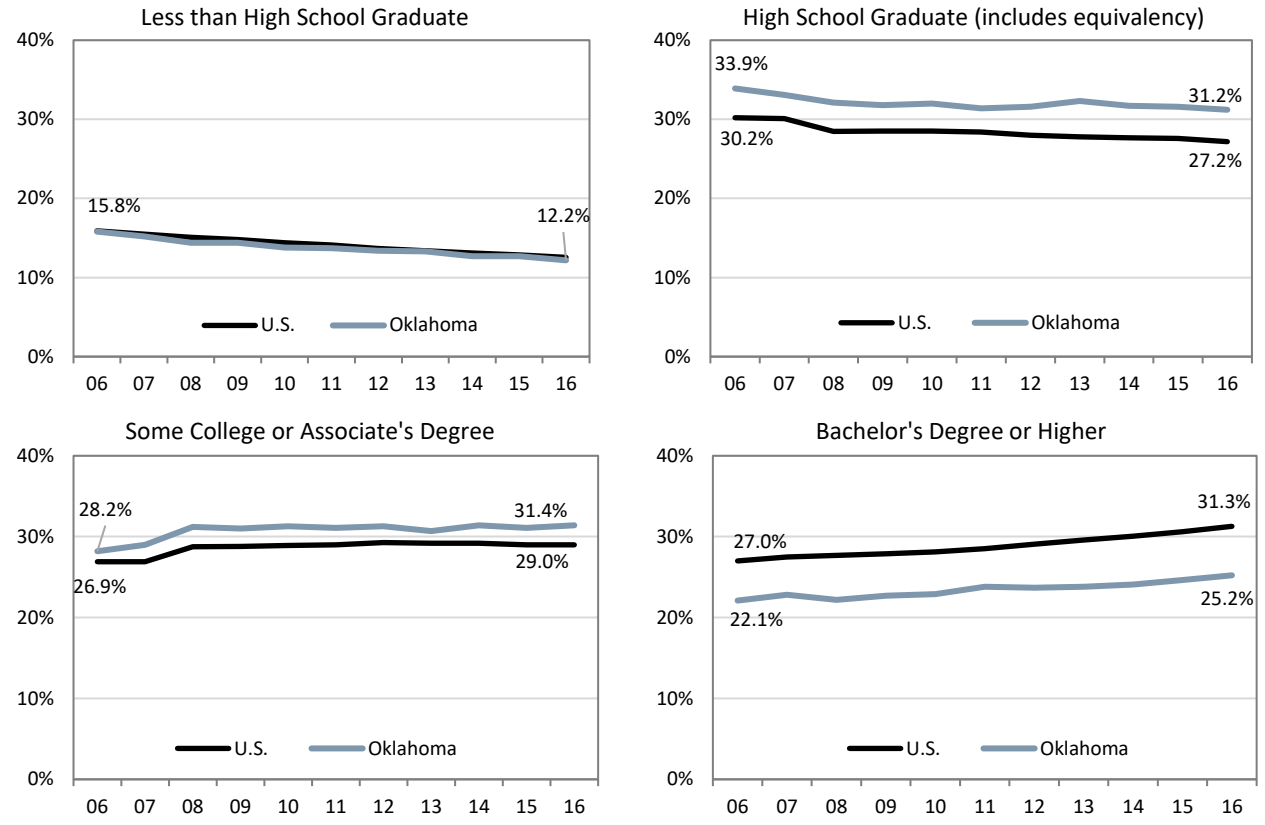
The slowing also suggests that future education gains in most states, including Oklahoma, should slow further and become increasingly concentrated in the top education categories, particularly bachelor's degrees and higher. Between 2010 and 2016, states with the highest levels of education also generally achieved the smallest total gains in attainment.

Are Oklahoma's Education Trends Improving? **Figure 15** highlights the ongoing trend in educational attainment in Oklahoma relative to the nation the past decade for the four groups of workers ages 25 and over. The key finding is that educational attainment in Oklahoma is improving steadily at every level of education but is only keeping pace with the nation. The historical deficit in education relative to the nation has remained firmly entrenched the past decade.

Among residents with less than a high school education, the state continues to match the nation in near lockstep as the share continues to ease lower from more than 15 percent a decade ago to only about 12 percent currently. Among workers completing high school as their highest level of educational attainment, the state has maintained a consistent surplus above the nation the past decade of about 3-4 percentage points. Similarly, the share of state residents completing some college or an associate degree has long remained about 2-3 percentage points above the nation.

Unfortunately, the state's strength among the middle groups corresponds to a substantial deficit relative to the nation at the highest levels of education. While the share of the state workforce with a bachelor's degree or higher has increased steadily the past decade, the gap relative to the nation widened to more than 6 percentage points in 2016. Despite consistent and significant progress made on increasing the number of degree holders in the state, the gap in the state's share of degree completers relative to the nation has proved highly persistent and widened slightly the past decade.

Figure 15. Oklahoma Educational Attainment by Major Group – Ages 25 and Over



Source: U.S. Census Bureau - American Community Survey (1-year estimates)

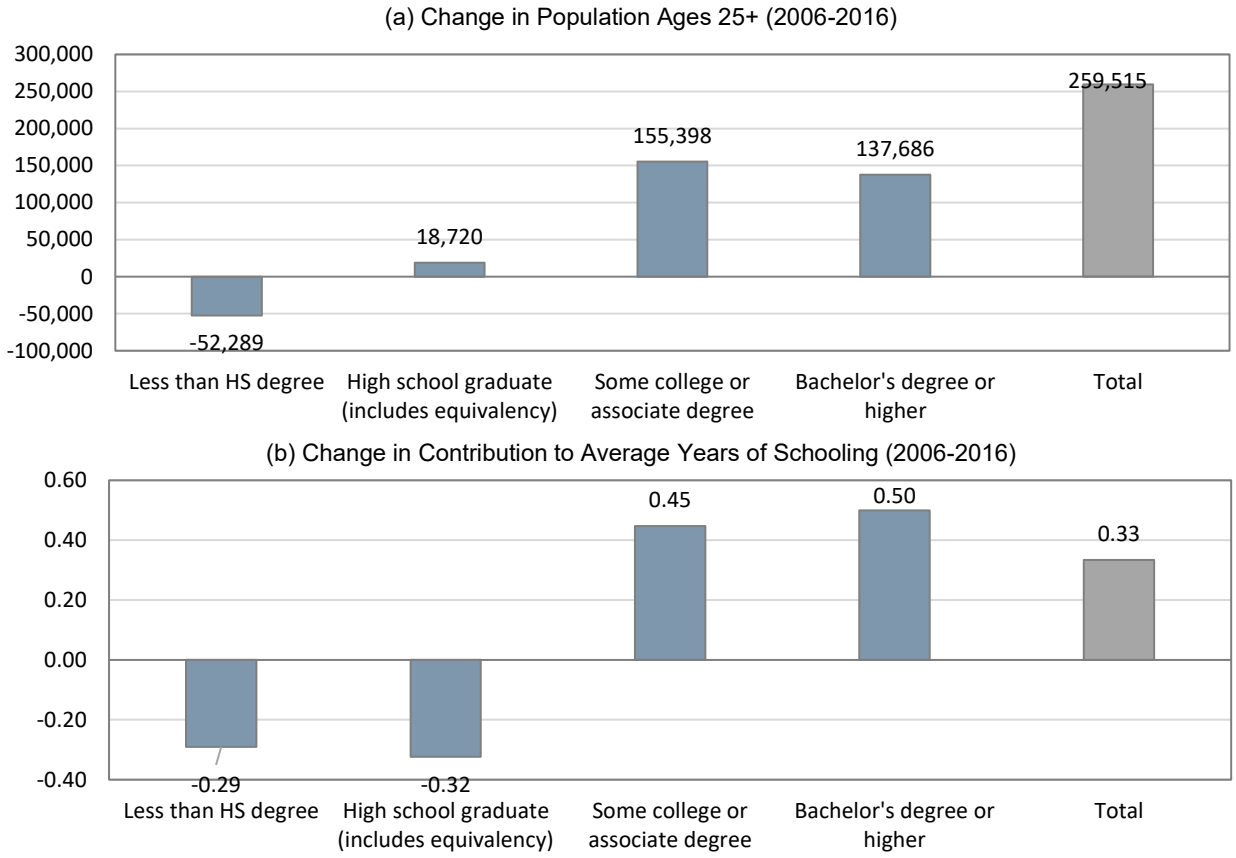
Increased Contribution of Higher Education. The relative contribution of the various levels of education to years of schooling is shifting, with education at the upper levels now having the largest net effect on the overall education profile of the state. **Figure 16** details the change in Oklahoma's education profile in the decade between 2006 and 2016 based on the contribution of each category of educational attainment to average years of schooling.

The state added approximately 259,500 new residents ages 25 and over (**Figure 16a**) in the period. The shift in the state's education mix reflects a large decline of 52,300 persons with less than a high school diploma and a small increase of 18,700 high school completers the past decade. This compares with an increase of 155,400 residents with some college or an associate degree and an increase of 137,700 with a bachelor's degree or higher.

In measuring the state's overall progress the past decade, it is the net gains at the highest end of the educational range that are now more than offsetting the diminishing share of residents who have completed a high school degree or less. **Figure 16b** illustrates the resulting change in average years of schooling attributed to each education group between 2006 and 2016.

The 0.33 years increase in overall average years of schooling at the state level reflects a continued shift toward reducing both the number and share of residents with a high school degree or less

Figure 16. Change in Oklahoma Educational Attainment Shares



Source: U.S. Census Bureau - Current Population Survey, Annual Social and Economic Supplement

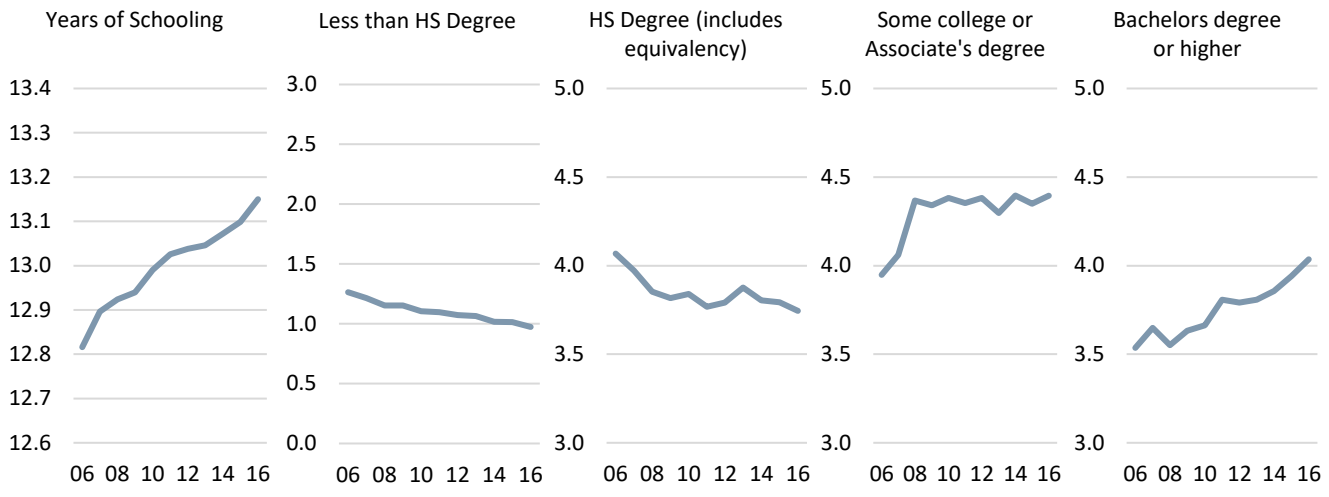
and a rising share of workers with education beyond high school. The increase of nearly 138,000 bachelor's degree holders had the largest influence (+0.50) on average years of schooling, followed closely by an increase of 155,400 state residents with some college or an associate degree (+0.45). The combined absolute value of these gains far exceeds the reduced contribution of both high school non-completers (-0.29) and high school graduates (-0.32).

Figure 17 illustrates the trends within each major component of educational attainment the past decade. In terms of total contribution to years of schooling, workers with some college or an associate degree now comprise the largest single contributing category (4.4 years). The contribution of those with some college or an associate degree moved up sharply between 2006 and 2008, surpassing high school graduates as the largest component, but has remained relatively flat since.

Conversely, the influence of those with a high school degree or less continues to diminish on a slow, steady path. The long-run progress made in reducing the share of high school graduates has slowed considerably since 2011 but continues over time.

Again, the greatest change in contribution (+0.50) the past decade has been bachelor's degrees or higher, which surpassed high school graduates in 2014 to become the second largest contributor

Figure 17. Contribution to Average Years of Schooling by Education for Ages 25+ (2016)



Source: U.S. Census Bureau - Current Population Survey, Annual Social and Economic Supplement

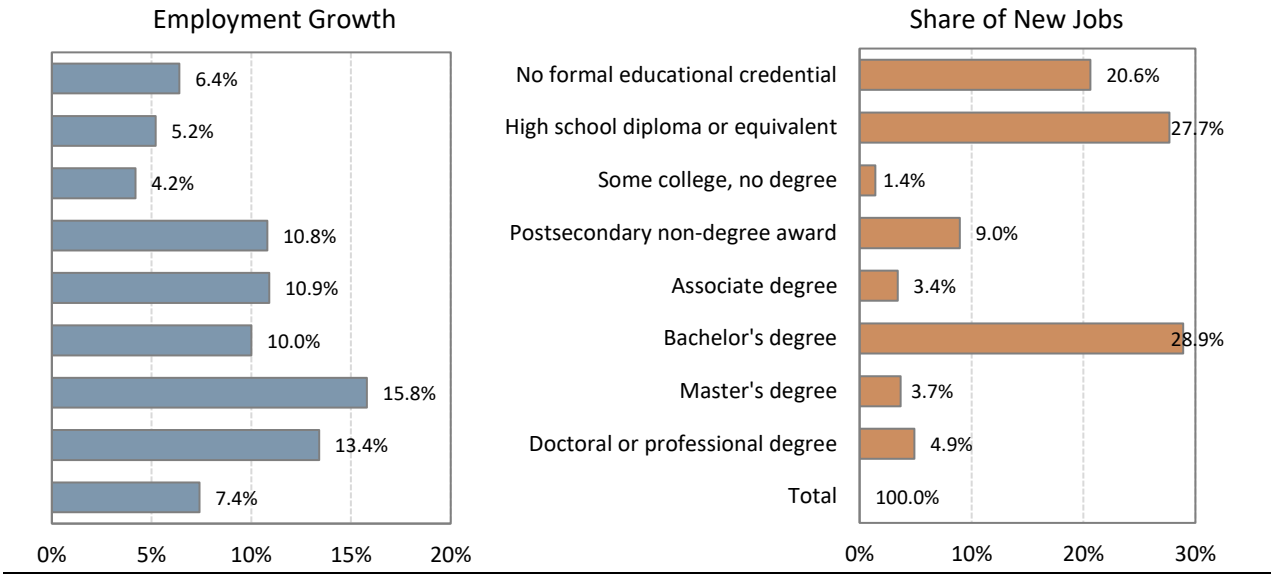
to average years of schooling. Higher degrees are now the largest contributing category to growth in the average level of educational attainment in the state and remain in a steady uptrend. If overall trends persist, workers with a bachelor's degree or higher will likely become the largest component of years of schooling among the four groups within a decade.

Job Growth Projections. Employment projections suggest that patterns in future job demand will continue to reinforce the trends toward higher degrees going forward. Bureau of Labor Statistics forecasts (**Figure 18)** suggest that the rate of growth in employment in the next decade will be significantly higher for those with the highest levels of education. Job growth over the decade is projected in the 4 to 6 percent range for the group of workers not completing a degree. This is less than half the 10 to 16 percent growth projected for those who have earned either a degree or certificate (non-degree award) and the 13 to 16 percent growth for workers with a master's, doctoral, or professional degree.

In addition to the growth rate, projections suggest that the *share* of all new jobs created will also be influenced by level of education (**Figure 18)**. The share of all new jobs going to workers with a bachelor's degree is projected to increase by 28.9 percent, the highest share among all groups. Jobs filled by those with master's, doctoral, and professional degrees are projected to offer the fastest growth in hiring, but, because they are limited in number, will comprise only a combined 8.6 percent of total new jobs created through 2026. All forms of degrees combined are projected to account for 41 percent of all new jobs created in the next decade.

Despite higher projected employment growth rates for workers with higher levels of education, low-skilled jobs are projected to remain a large portion of all new employment created in the U.S. in the coming decade. Measured by the share of new jobs, forecasts suggest that nearly half (48.3 percent) of all new jobs will require a high school degree or less.

Figure 18. Projected Employment Change (2016-2026) by Educational Attainment – U.S.



Source: Bureau of Labor Statistics – Employment Projections Program (2016-2026)

OKLAHOMA EDUCATION RELATIVE TO PEER STATES. The competitive pressure on the state's labor force relative to nearby and other competing states is intense. **Figure 19** compares Oklahoma and a group of nine nearby peer states across seven levels of educational attainment and on overall attainment. Oklahoma's attainment of 13.15 years in 2016 ranks 39th among the states and 7th among the ten states in the peer group. Oklahoma is nearly 0.2 years behind the nation (13.33 years) but about 0.1 years ahead of neighboring Texas (13.05 years).

The peer state rankings illustrate the influence of degree completion, and higher education in general, in determining the overall ranking of the states by education. Because degrees carry such large weight, a state's overall ranking on average years of schooling is typically closely approximated by its ranking on the three upper categories of degree completion.

For example, the two lowest education states in the peer group based on overall average years of schooling – Arkansas (47th) and Louisiana (49th) – also have among the lowest share of population completing a college degree. Conversely, overall national leader Colorado has made considerably more progress in degree completion, ranking 23rd in the share of associate degrees, 1st in the share of bachelor's degrees, and 7th in the share of the population with a graduate or professional degree.

Relative to Colorado, Oklahoma remains nearly 0.7 years behind in educational attainment. For perspective on the size of this gap, average years of schooling in Oklahoma increased 0.68 years between 1995 and 2015, or the progress realized over the past two decades.

Oklahoma's relatively low overall ranking is traced largely to a gap at the top of the education hierarchy. Oklahoma ranks 34th in the share of associate degrees, 40th in the share of bachelor's

Figure 19. Peer State Educational Attainment Shares and Ranks (2016)

Educational Attainment	AZ	AR	CO	KS	LA	MO	NE	NM	OK	TX	U.S.
Share of Population Ages 25 and Over											
Less than 9th grade	5.7%	5.0%	3.4%	3.6%	5.2%	3.3%	4.1%	6.1%	4.0%	8.6%	5.4%
9th-12th grade, no diploma	7.5%	9.0%	5.1%	5.8%	10.4%	7.1%	5.0%	8.5%	8.2%	8.5%	7.2%
High school diploma or equivalent	23.9%	34.3%	22.0%	26.2%	34.0%	30.7%	26.4%	26.6%	31.2%	25.2%	27.2%
Some college, no degree	25.5%	22.6%	21.0%	23.2%	21.0%	22.5%	22.6%	23.2%	23.5%	21.8%	20.6%
Associate degree	8.4%	6.7%	8.6%	8.3%	6.0%	7.9%	10.4%	8.4%	7.9%	7.1%	8.4%
Bachelor's degree	18.1%	14.2%	24.9%	20.7%	15.2%	17.7%	21.1%	15.5%	16.8%	18.9%	19.3%
Graduate or professional degree	10.8%	8.2%	14.9%	12.2%	8.2%	10.8%	10.4%	11.7%	8.4%	10.0%	11.9%
Average years of schooling	13.30	12.92	13.84	13.57	12.85	13.33	13.55	13.14	13.15	13.05	13.33
State Rank (50 States)											
Less than 9th grade	6	12	32	31	10	34	23	5	26	2	-
9th-12th grade, no diploma	17	5	41	31	2	22	46	9	12	10	-
High school diploma or equivalent	45	3	49	36	4	15	35	34	11	42	-
Some college, no degree	5	15	30	13	31	16	14	12	11	20	-
Associate degree	28	47	23	30	50	35	8	29	34	46	-
Bachelor's degree	34	47	1	17	46	35	13	43	40	27	-
Graduate or professional degree	25	47	7	16	48	26	30	20	44	34	-
Average years of schooling	33	47	1	17	49	31	18	41	39	44	-

Source: Census Bureau, American Community Survey (1-year estimates)

degrees, and 44th in the share of the population with a graduate or professional degree. For comparison, Texas ranks 46th in the share of associate degrees, 27th in the share of bachelor's degrees, and 34th in the share of graduate and professional degrees.

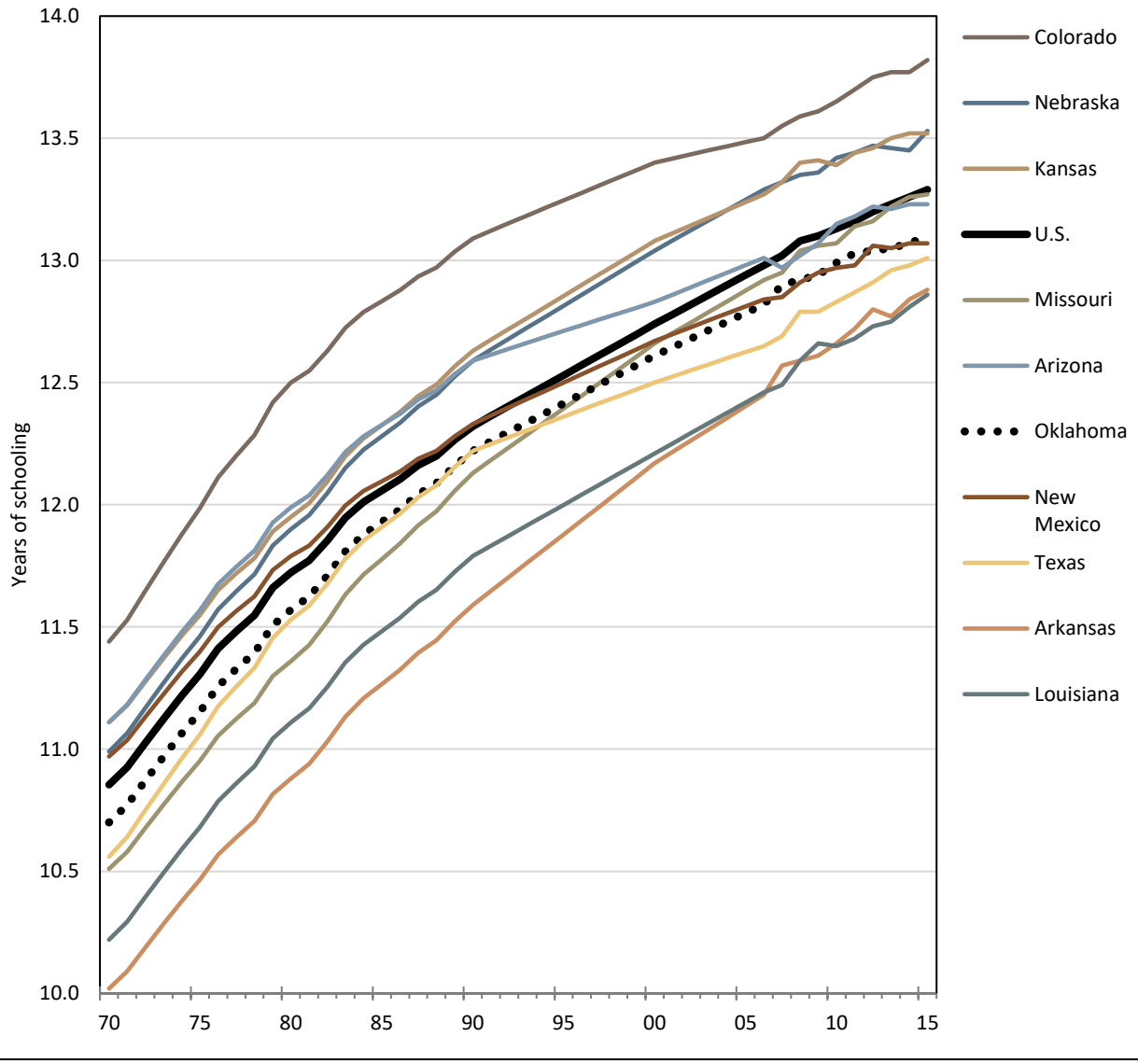
Peer group leaders Colorado (13.84 years), Kansas (13.57 years), and Nebraska (13.55 years) are all states which historically have education levels above the nation and have relatively high concentrations of the state population with a degree. They also have historically higher income per capita relative to Oklahoma.

Long-Run Path. **Figure 20** illustrates the state-level variation in the long-run path of overall education gains among the group of ten peer states. Over the more than 45-year period since 1970, Oklahoma has closely tracked the national path with a slight gap that has widened slightly since 2010.

Bordering states with similar economies often follow similar education paths over time. For example, Oklahoma and Texas have tracked very closely in the full period, with Oklahoma maintaining a slight gap over Texas since the early 1990s. Oklahoma has also tracked the same relative path as New Mexico since 2000 and experienced the same weakness relative to the nation in the period.

Arkansas and Louisiana have tracked each other closely in the long-term and have moved in near lockstep since 2000. Nebraska and Kansas both have educational attainment above the nation and have moved in lockstep since 1970.

Figure 20. State Educational Attainment Relative to the U.S. For Ages 25+ (2016)



Source: U.S. Census Bureau - Current Population Survey, Annual Social and Economic Supplement

Colorado and Arizona were the leaders among the peer group in 1970 but have taken much different paths in the interim. Colorado emerged as the national leader, although its lead has shrunk considerably relative to most states since 1995. In contrast, Arizona has regressed from having education levels well above the nation in 1970 to slightly trailing the nation in 2015.

Shifts in Progress. Based on total gain in years of schooling since 1970, Oklahoma has outpaced only Colorado (+2.40 years), Arizona (+2.19 years), and New Mexico (+2.17 years) among the peer states. Although Colorado has a much higher average level of education, it has made slightly less net progress (+2.38 years) than Oklahoma since 1970. Relative to the two peer states with the lowest average years of education, Oklahoma remains well ahead of both Arkansas (12.92

years) and Louisiana (12.85 years). These states are currently roughly in line with the overall educational attainment in Oklahoma from one decade ago. However, both states have made much more progress than Oklahoma since 1970. Arkansas, which currently has the second lowest education level among the peer group, leads all peer states since 1970 with an increase of 2.90 years of schooling, the 9th best performance among all states. Similarly, Louisiana, which has the lowest average education among the peer group, produced the third largest gain (+2.63 years) among the group since 1970. These results reflect both the increasingly difficult task of pushing average education levels higher and higher over time, and the ongoing convergence over time between the highest- and lowest-education states.

Rural Influence on Oklahoma Higher Education. Clear regional patterns across the state underlie the lagging educational attainment of Oklahoma relative to the nation, differences which are traced largely to education beyond high school.

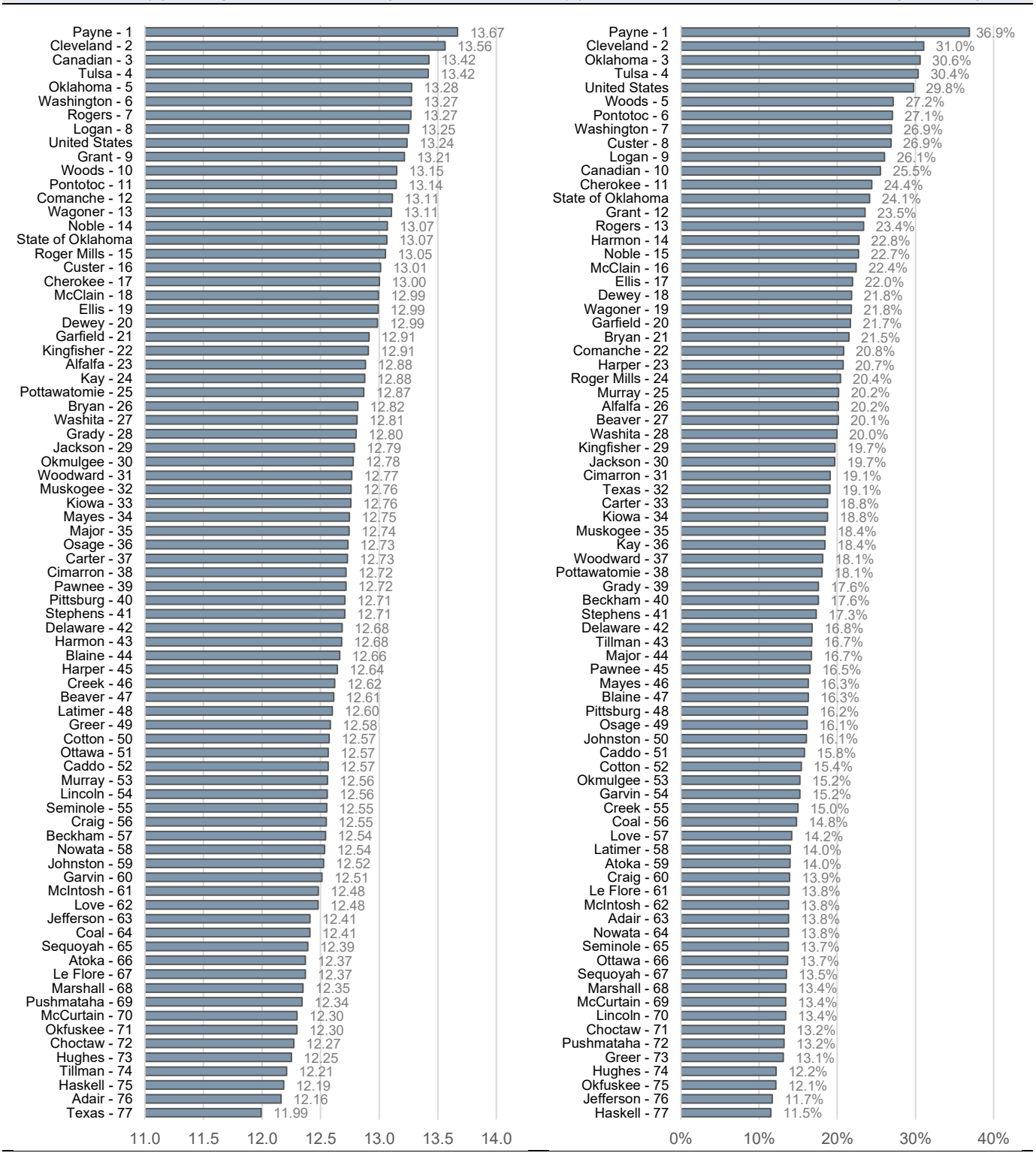
Figure 21 illustrates both the average years of schooling and the share of the population with a bachelor's degree or higher for each Oklahoma county in 2016. Measured by years of schooling, only eight Oklahoma counties – Payne, Cleveland, Canadian, Tulsa, Oklahoma, Washington, Rogers, and Logan – exceed the national level of educational attainment. These eight counties have an average of 13.39 years of schooling. In contrast, the remaining 69 counties average only 12.67 years and trail well behind the 12.87 years of schooling in Mississippi, the lowest ranked state. The 30 counties in the state with the lowest attainment have an average of only 12.42 years of schooling.

The two highest ranked counties – Payne (13.67 years) and Cleveland (13.56 years) – are home to the state's two research universities which both employ large numbers of highly educated workers. Both counties exceed the national average of 13.33 years and have attainment levels similar to the highest-ranking states. The state's two largest counties – Oklahoma (13.28 years) and Tulsa (13.42 years) – are highly national-like as well and far exceed the state average of 13.15 years.

The relatively high education levels in the state's largest counties is consistent with national trends whereby larger regions tend to attract workers with higher levels of education. Employers who require the most skilled workers generally seek areas with the largest available labor pools and other amenities offered by larger cities. Other high-ranking counties, including Canadian and Logan, are part of the Oklahoma City metropolitan area, while Rogers is part of the Tulsa metropolitan area.

Higher education plays a key role in this rural dynamic as illustrated by the close correlation between overall years of schooling and the share of bachelor's degrees and higher held by residents (**Figure 21b**). Only four Oklahoma counties – Payne, Cleveland, Oklahoma, and Tulsa – have a share of residents with a bachelor's degree or higher that exceeds the nation. Again, these four include the state's two largest counties and the two counties hosting the state's research

Figure 21. Oklahoma Educational Attainment by County (2016)



Source: Census Bureau - American Community Survey.

Notes: Share of bachelor's degree or higher is a 5-year average

universities. Forty-nine counties have less than 20 percent of the population with a bachelor's degree or higher; 22 counties have less than a 15 percent share, or roughly half the national rate.

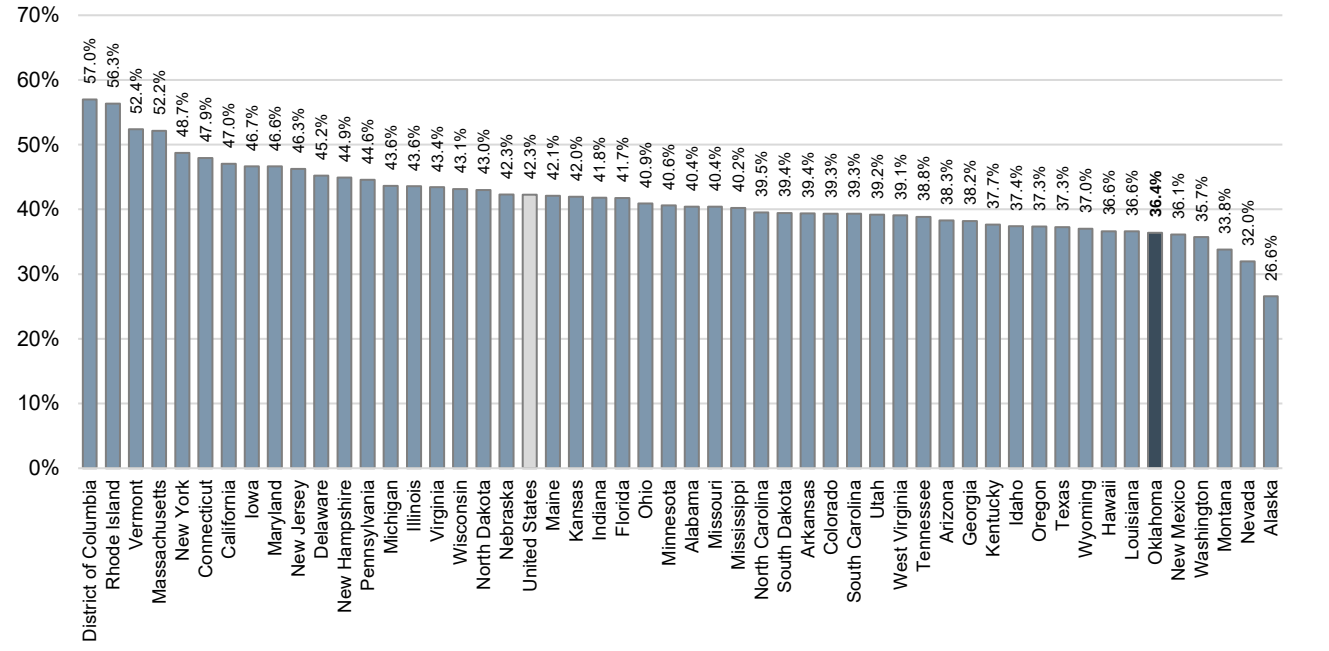
From a rural perspective, one of the fundamental risks of pursuing a policy goal of added degree holders remains the ability of rural regions to absorb more highly educated workers into the local labor force. The policy dilemma is traced to the ongoing trend among firms in industries requiring highly educated workers to concentrate in the metropolitan areas of Oklahoma and other states. Students completing degrees in rural areas must often migrate to larger regions with deeper labor markets. As a result, the direct returns to publicly funded higher education in these rural economies is likely to be lower in regions where the industry mix cannot support additional hiring of highly trained and educated workers.

In short, an increasingly skilled state workforce must have increasingly deeper labor markets that can absorb more specialized skills. Hence, the state's pursuit of a more educated labor force must proceed simultaneously with broader efforts to stimulate growth in industries that support high-skill workers, particularly in the more rural and lower educational attainment counties of the state.

Higher Education Enrollment Rates in Oklahoma

A structural factor hampering the state's long-run progress in raising overall educational attainment is the low overall rate of enrollment of state residents in higher education. Enrollment rates ultimately determine the supply of potential degree completers and can act as a constraint in the process of jumpstarting degree expansion in a state.

Figure 22. Share of Population 18-24 Years Enrolled in College or Graduate School



Source: U.S. Census Bureau - Current Population Survey, Annual Social and Economic Supplement

The state's enrollment concern is particularly acute when viewed by the share of traditional college age students who are enrolled in higher education. The Census Bureau's American Community Survey provides an annual estimate of the share of the state's resident population ages 18 to 24 who are enrolled as either an undergraduate in college or in graduate or professional school.[16] Oklahoma's 36.4 percent enrollment share in 2016 ranks 46th among the states and is approximately 6 percent below the 42.3 percent national share (**Figure 22**).

Oklahoma's college age enrollment share trails well behind the nation among both men and women, with a slightly larger percentage gap for men. Only 31.6 percent of college-age men in Oklahoma are enrolled versus 38.2 percent nationally; 41.6 percent of college-age women in the state are enrolled versus 46.5 percent nationally.

The leading states based on college-aged student enrollment tend to be clustered largely in the Northeast or Midwest and include most of the traditional leading education states. These states tend to have 45 percent or more of all college age residents enrolled in higher education.

To match the national enrollment share, approximately 23,100 additional Oklahoma residents ages 18-24 would need to enroll in higher education. This increase is quite large given that only approximately 37,500 students graduate from Oklahoma public high schools annually, and only about 25,000 students annually enroll for the first time in a public or private college or university in Oklahoma.

STATE POLICY TOWARD HIGHER EDUCATION

A range of state policy efforts are currently targeted at increasing educational opportunity and improving outcomes for state residents at all levels of the education continuum. Many of the efforts aimed at increasing educational attainment must be implemented through the state's public colleges and universities as the primary source of education beyond high school in Oklahoma.

As early as 1999, State Regents launched Brain Gain 2010 to jumpstart efforts to raise the number of degrees held by Oklahoma residents. The plan's objective called for Oklahoma to meet or exceed the national average for the proportion of its population ages 25 and older holding associate degrees or higher by 2010. Three strategies were established to increase the proportion of Oklahomans with an associate or bachelor's degree: 1) increase the number of Oklahomans who earn a college degree; 2) develop ways to keep more Oklahoma college graduates in the state; and 3) attract college-degree holders from outside the state.

The state is currently an active participant in Complete College America (CCA). The goal of CCA is to increase the number of degrees and certificates earned in Oklahoma by 67 percent by 2023 to meet our state's workforce needs and keep Oklahoma competitive in a global economy. Oklahoma's five-point plan to increase degree and certificate completion has led CCA to name Oklahoma a national model for efforts to increase degree completion. The state plan focuses on promoting college readiness, transforming remediation, strengthening pathways to certificates

and degrees, expanding adult degree completion efforts, and rewarding performance and completion.

Oklahoma's Reach Higher program targets degree completion for working adults who have already earned at least 18 hours of college credit and want to finish an associate degree.

Recognizing the hurdle that high college costs pose for many students, Oklahoma's Promise provides tuition scholarships to qualified state students with family income below $50,000 per year. Oklahoma's Promise was originally designated as the Oklahoma Higher Learning Access Program. Students must also meet academic and conduct requirements in high school. Nearly 20,000 students have received scholarships in recent years, for a total of $65 million in FY2016, or $3,568 per student.

Most recently, the Governor directed the Oklahoma Works Leadership Team through an executive order to implement an educational attainment goal for the State of Oklahoma called Launch Oklahoma. The overarching goal of the initiative is to reach a seventy percent share of state residents 25-64 years of age who have education and training beyond high school by the year 2025.

These higher education policy efforts are appropriately targeted at an aspect of the state economy where it is operating at a clear and distinct disadvantage relative to the nation and many competing states.

III. Role of Higher Education in Labor Force Development

EDUCATION AND THE LABOR FORCE

This section of the report examines the income effects traced to rising educational attainment, both nationally and in Oklahoma. The key economic benefits from increased education remain future wage gains accruing to students and the subsequent contribution of increased individual earnings to total income earned in the broader economy.

Research findings continue to lend support to workforce development efforts that seek to raise the level of education in a state. This basic economic development strategy is actively pursued in Oklahoma and nearly all other states to stimulate future economic growth.

Research on Returns to Education. Education receives the greatest attention of all possible economic growth factors in the research literature beginning with the pioneering work of Becker (1964). Higher levels of training and education, often referred to as human or intellectual capital, are generally believed to lead to higher productivity and earnings over time and across regions. Positive student outcomes have become even more important in view of recent increases in tuition and fees to attend a college or university in the U.S. and associated rises in student loan debt often undertaken to finance a college education over the long-term.

The exact process by which education raises income levels remains an area of intense academic debate, with several conduits proposed. Suggested channels include the positive effects that higher levels of education exert on worker productivity (Delong et al. 2003); entrepreneurial activity and creativity (Glaeser and Saiz, 2004); ability to innovate new ideas and processes or adopt them elsewhere (Benhabib and Speigel, 1994; Barro, 1997); and degree of worker adaptability to transfer skills and knowledge across industries (Bauer et al. 2006). Regardless of the precise source, the historical link from education to income remains strong both in theory and empirically.

Empirical research continues to find strong net private returns to students from completing education beyond high school. Barro and Lee (2010) report that cross-country models suggest an overall return to education ranging from 5.5 percent to 12.1 percent with returns higher for higher levels of education. Returns are estimated at 10.0 percent for secondary school education, while they rise to 17.9 percent for education beyond high school. In a recent multi-country study, Montenegro and Patrinos (2014) similarly find consistent positive returns to schooling across 131 economies, with private returns higher for higher levels of schooling.

Harmon (2011) provides an overview of the range of findings from the research literature on the state of knowledge concerning the economic returns to education. The discussion highlights the difficulty inherent in assigning a single estimate of the return from education within a given regional economy, particularly for a single subgroup of the population. Estimates of the returns to education also vary significantly based on the dataset used, time period examined, and modeling approach employed.

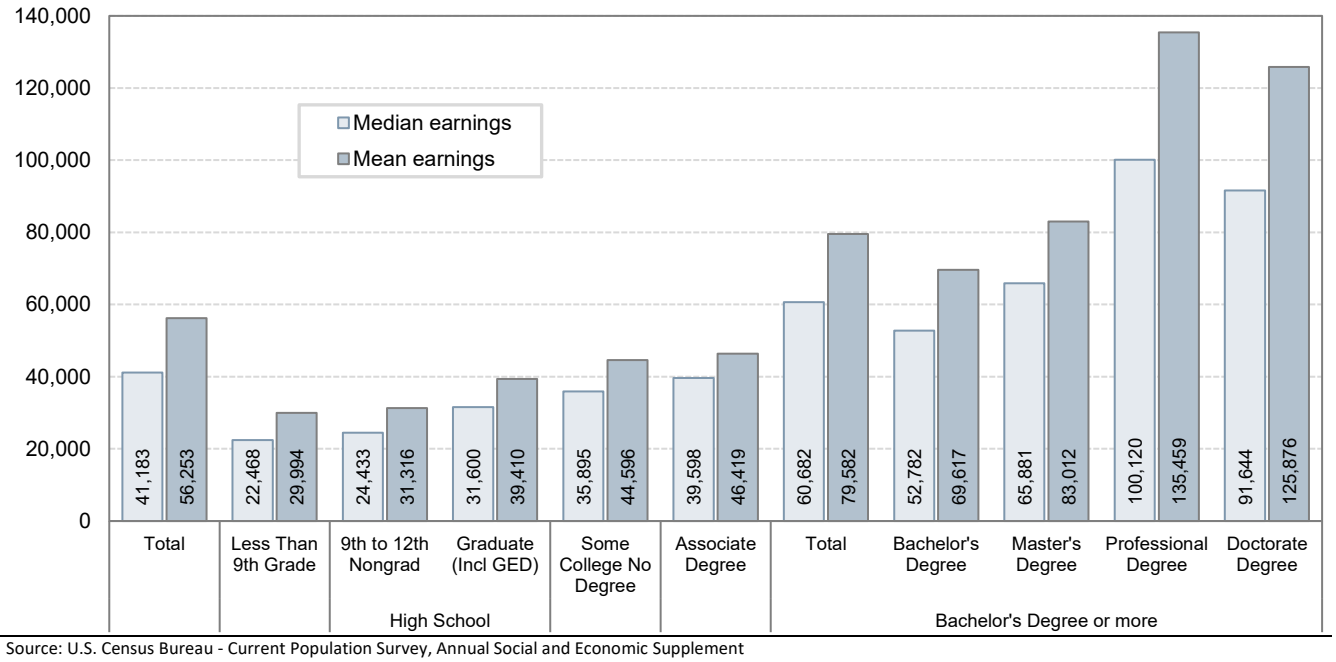
Nevertheless, the realized returns to the student remain positive on average despite both declining taxpayer subsidization of higher education and rising direct costs to students in the form of higher tuition and fees. This does not suggest that poor individual economic outcomes are not possible for students who attend highly costly colleges and universities or who choose fields of study that provide limited employment prospects. Returns are also generally lower for students who complete college credit but do not receive a degree.

U.S. Distribution of Income by Educational Attainment. The continued high earnings of students pursuing education beyond high school remain the most important signal that increased education continues to serve as a viable economic development tool. While the income of individuals can vary greatly across all levels of education, average income in the U.S. and across the states remains closely correlated with educational attainment.

Figure 23 provides a snapshot of recent Census survey data detailing the mean and median earnings of all U.S. residents ages 25 and over by their highest level of education attainment in 2016.[17] **Figure 24** provides a distribution of earnings by educational attainment for the same population group.

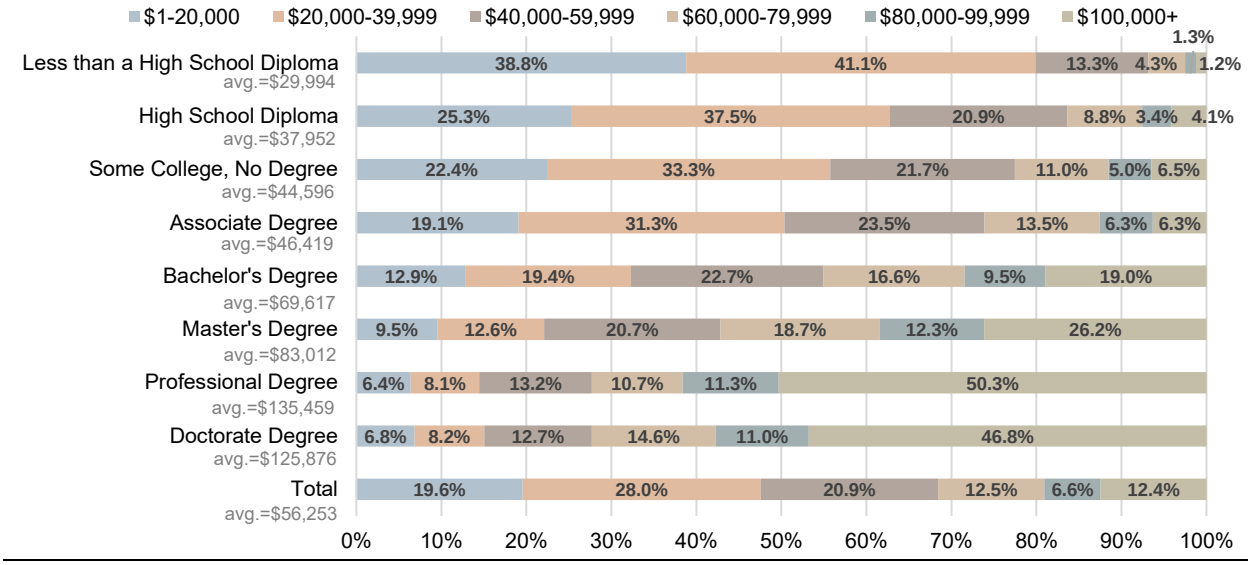
The reported earnings clearly illustrate the comparatively low median and mean earnings of workers in the U.S. who have attained the least amount of education, particularly those who have not completed high school. Workers completing less than the ninth grade earned an average of only $29,994 annually, 31 percent less than those completing high school ($39,410) and approximately half the overall average ($56,253) across all education levels. Those completing

Figure 23. U.S. Earnings by Educational Attainment Ages 25+ (2016)



Source: U.S. Census Bureau - Current Population Survey, Annual Social and Economic Supplement

Figure 24. Distribution of U.S. Earnings by Educational Attainment Ages 25+ (2016)



Source: U.S. Census Bureau - Current Population Survey, Annual Social and Economic Supplement

ninth through twelfth grade without graduating earned an average of $31,316 annually, 26 percent less than high school completers.

Workers not completing high school are also much more likely to be near the bottom of the overall income distribution. Approximately 80 percent of U.S. workers with less than a high school diploma earned less than $40,000 per year (**Figure 24**). For workers who completed high school, 63 percent earned less than $40,000 annually.

It is also relatively unlikely that workers in the U.S. with a high school diploma or less move toward the top brackets of the earnings distribution. Only 7 percent of those who have not completed high school and 16.5 percent of those with a high school diploma earned more than $60,000 annually.

Labor market outcomes improve markedly for workers who have completed education beyond high school. Workers who completed some college but did not receive a degree earned an average of 13 percent ($5,186) more annually than those completing only high school, with 45 percent earning more than $40,000 per year. In comparison, those completing an associate degree earned 22 percent ($7,009) more than high school completers, with half earning more than $40,000 annually.

For those completing a bachelor's degree or higher, a much larger premium relative to high school is reflected in earnings. Average earnings in the U.S. in 2016 reached $69,617 for a bachelor's degree, $83,012 for a master's degree, $135,459 for a professional degree, and $125,876 for those with a doctorate. It is these large earnings premiums from higher degrees that underlie the economic development efforts ongoing in most states to raise the share of the workforce with a bachelor's degree or higher.

Bachelor's degree holders earn almost 85 percent more than high school completers on average. In addition, less than one-third of bachelor's degree completers in the U.S. earn less than $40,000 annually, including recent graduates and those pursuing further education. While completion of a bachelor's degree does not guarantee a high income, almost half earn $60,000 or more annually, and nearly 20 percent earn $100,000 or more annually.

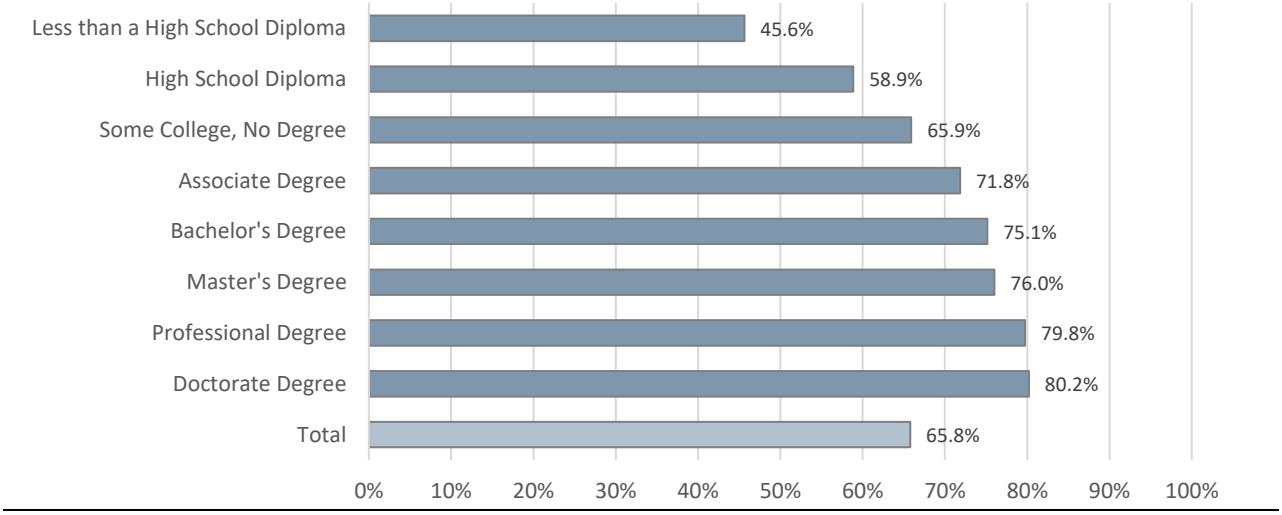
For those with education beyond the bachelor's degree, income is even more likely to be distributed to the upper ranges. Those with a master's degree enjoy a nearly 20 percent earnings premium relative to bachelor's degree holders, with nearly 80 percent earning more than $40,000 annually. Workers with a professional degree earn nearly double that of workers with a bachelor's degree, while doctorate holders earn an 80 percent premium relative to bachelor's degree holders. Nearly half of those who have either a professional degree or a doctorate earn $100,000 or more annually. The economic concern for the state is that Oklahoma's attainment gap among all categories of degrees, in turn, underlies a significant statewide income gap.

Higher Labor Force Participation. One of the key accompanying economic benefits of increased education is a rise in the likelihood of active participation in the workforce (**Figure 25**). The share of labor force participation is also believed to be a key factor underlying differences in the rate of long-run income growth across the states (Aaronson et al. 2014).

Differences in the participation rate across the levels of educational attainment are stark. Among the U.S. population ages 25 and over, fewer than half (45.6 percent) of those with less than a high school diploma and 59 percent of high school completers reported receiving earnings from work in 2016, well below the 65.8 percent share nationally.

The share of those with earnings who have completed some college but not received a degree roughly matches the national rate, while those earning degrees of all types are much more likely to exceed the national share of the population reporting earnings.

Figure 25. Share of U.S. Population Ages 25+ With Earnings (2016)



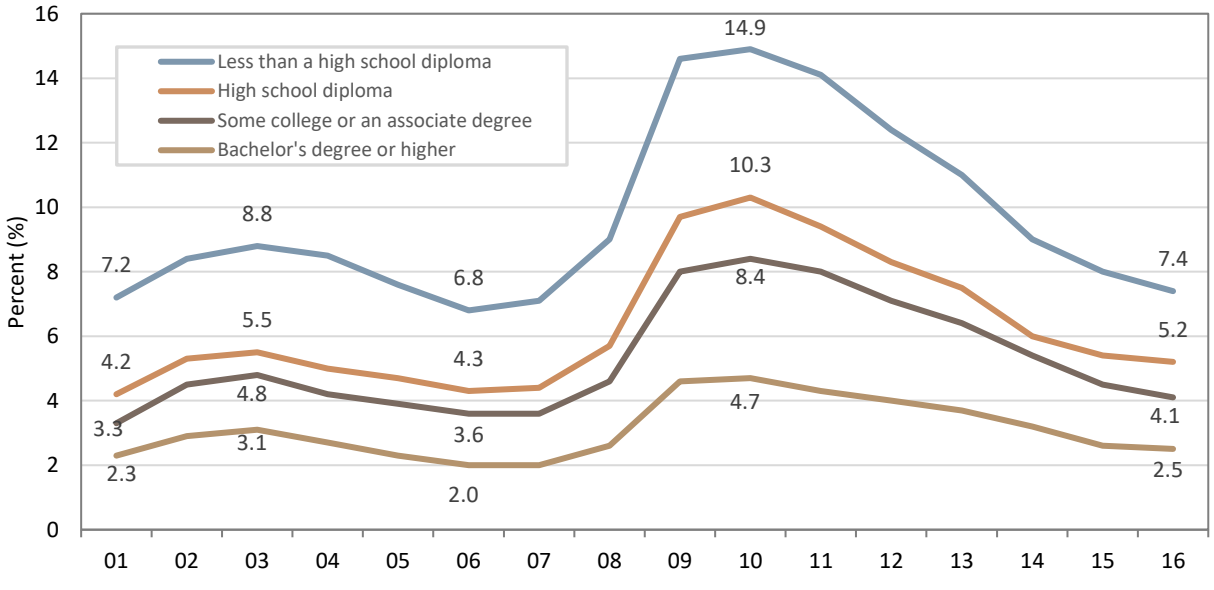
Source: U.S. Census Bureau - Current Population Survey, Annual Social and Economic Supplement

Relative to high school completers, the participation premium is 13 percent for associate degrees, approximately 16 percent for bachelor's and master's degrees, and more than 20 percent for professional and doctorate degrees. At the education extremes, those with an advanced degree are nearly twice as likely to receive earned income relative to those not completing high school. Increasing rates of participation are consistent with increasing returns to work in the form of earnings as educational attainment rises.

Lower Unemployment. Education is also closely correlated with the likelihood that a worker becomes unemployed over time. Workers with higher education levels have long experienced lower overall rates of joblessness and have been affected to a lesser degree during economic downturns. **Figure 26** illustrates changes in the annual unemployment rate for the four major categories of attainment in the past two major U.S. economic cycles. Over most of the period, unemployment rates for workers with less than a high school diploma remained nearly three times higher than for workers with a bachelor's degree or higher.

In the most recent national recession, a historically steep economic downturn with widespread layoffs, the annual unemployment rate peaked at only 4.7 percent for those with a bachelor's degree or higher versus 14.9 percent for those with less than a high school diploma. High school graduates faced a peak annual rate of 10.3 percent, while those with some college or an associate degree experienced a peak rate of only 8.4 percent. The variability in rates also suggests that workers with less education are much more likely to serve as swing capacity in the labor force as economic conditions fluctuate.

Figure 26. U.S. Unemployment Rate by Educational Attainment



Source: Bureau of Labor Statistics

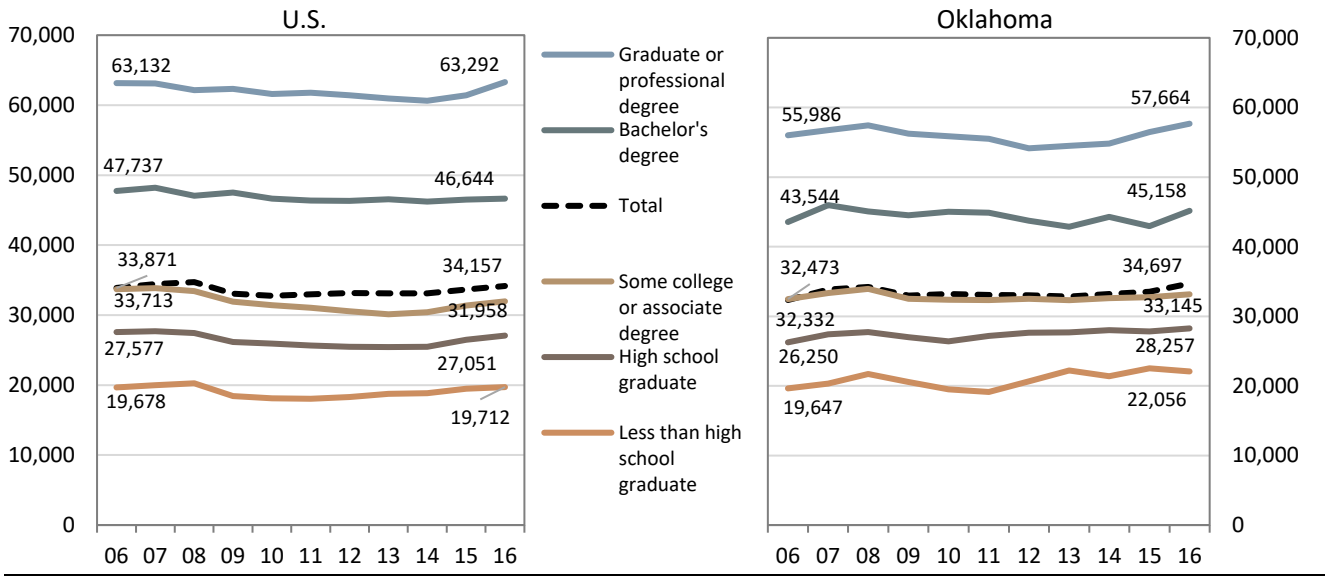
Following the onset of the current expansion in 2010, the unemployment rate for workers with a bachelor's degree or higher fell to a post-recession low of only 2.5 percent by 2016, while jobless rates remained significantly higher for all other education groups.

Oklahoma Earnings by Educational Attainment. An ongoing concern for state policymakers and residents is whether the returns to education observed at the national level are similarly present in Oklahoma. To illustrate the size and persistence of the returns to education beyond high school in the state the past decade, **Figure 27** provides a comparative view of median earnings for five major levels of educational attainment for both the state and nation.[18]

Across the full decade between 2006 and 2016, U.S. median earnings for all workers increased only 0.85 percent, from $33,871 to $34,157. The nation posted declining median earnings for three of the five education groups, primarily those in the middle - bachelor's degree; some college or an associate degree; and high school graduates. These declines were offset by small increases at the top and bottom, or for those with a graduate or professional degree and those not completing high school.

At the national level, earnings initially weakened during the 2008-09 national recession and remained essentially flat through 2014. The weakness in earnings, particularly for degree holders, has been offered by some as evidence of diminishing returns to education. However, the same basic pattern of weak earnings was present at all educational levels at the national level and is not indicative of an overall shift in the returns to higher education. Earnings gains finally resumed in 2015 and 2016 across all education groupings, again suggesting a systematic overall influence on U.S. earnings.

Figure 27. Median Earnings by Educational Attainment – OK and U.S.



Source: U.S. Census Bureau – American Community Survey (1-Year Estimates)

Oklahoma followed a similar pattern the past decade with relatively flat to slightly falling median earnings from 2008 to 2013. However, overall gains in median income across the full decade were much stronger in the state than at the national level and exceeded national gains for all categories of education in the period. Overall state median wages posted a 7.3 percent gain in the decade versus a 0.85 percent gain nationally. And in contrast to the nation, Oklahoma managed to post a rise in median earnings across all five education groups in the decade from 2006 to 2016.

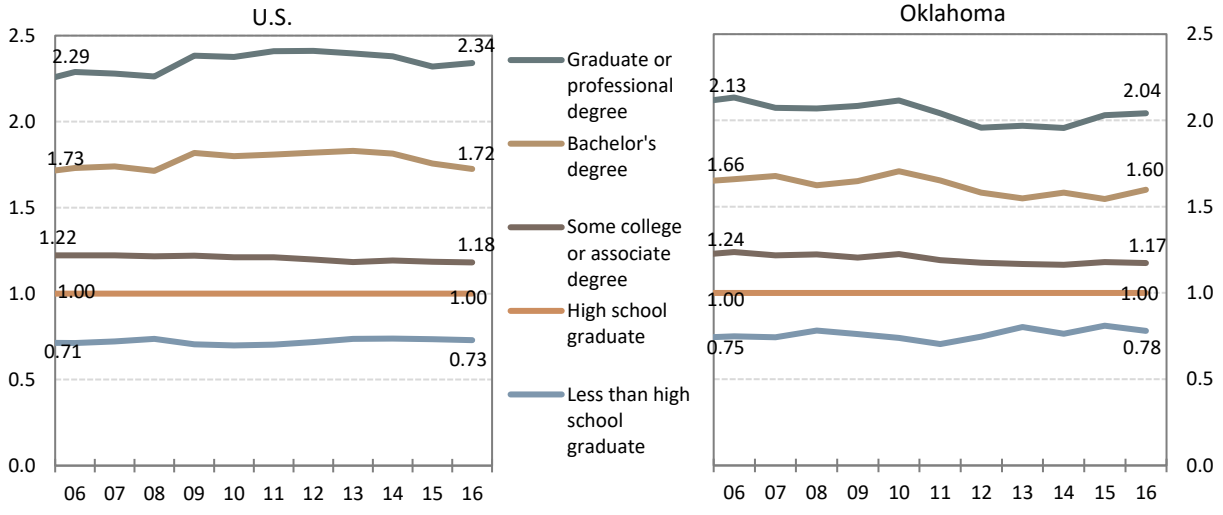
Those with less than a high school education posted the largest percentage gain in median earnings (12.3 percent), followed by high school graduates (7.6 percent). All three categories beyond high school posted gains in the 2-4 percent range the past decade, led by a 3.7 percent gain in median earnings for state workers with a bachelor's degree.

Oklahoma Relative Earnings Ratios. For the state higher education system, an added concern is the expected gain in wages from increasingly higher levels of education, particularly among degree recipients. **Figure 28** compares the ratio of median earnings for each major level of educational attainment relative to high school graduates for both the state and nation the past decade. These ratios provide an estimated earnings payoff to education relative to high school completion for all levels of educational attainment in Oklahoma and the U.S.

For Oklahoma adults ages 25 and over who have not completed high school, the labor market continues to present significant economic challenges, with median earnings reaching only 78 percent of high school graduates in 2016. Nevertheless, state workers with less than a high school degree enjoy a median pay ratio that is 4-5 percent higher than the nation, with the returns trending upward slightly the past decade.

For all categories of education beyond high school in Oklahoma, the earnings premiums remain quite large and have persisted for decades. State residents who completed some college or earned an associate degree reported median annual earnings that are 17 percent above (1.17

Figure 28. Median Earnings Ratios Relative to High School – OK and U.S.



Source: U.S. Census Bureau – American Community Survey (1-Year Estimates) and RegionTrack calculations

times) those of high-school completers in 2016. The earnings premium for this group has also tracked the national ratios closely the past decade, with the ratio falling slightly over time both for the state and nation.

Residents with a bachelor's degree reported median earnings that are 60 percent higher than (1.60 times) high school graduates. The ratio in Oklahoma is slightly lower than the nation but has remained in a narrow range the past decade.

At the top of the attainment scale, Oklahoma residents with a graduate or professional degree earned more than double (2.04 times) the median income of high school graduates in 2016. The earnings premium for the highest attainment group is also slightly below the nation but has similarly remained in a narrow range the past decade.

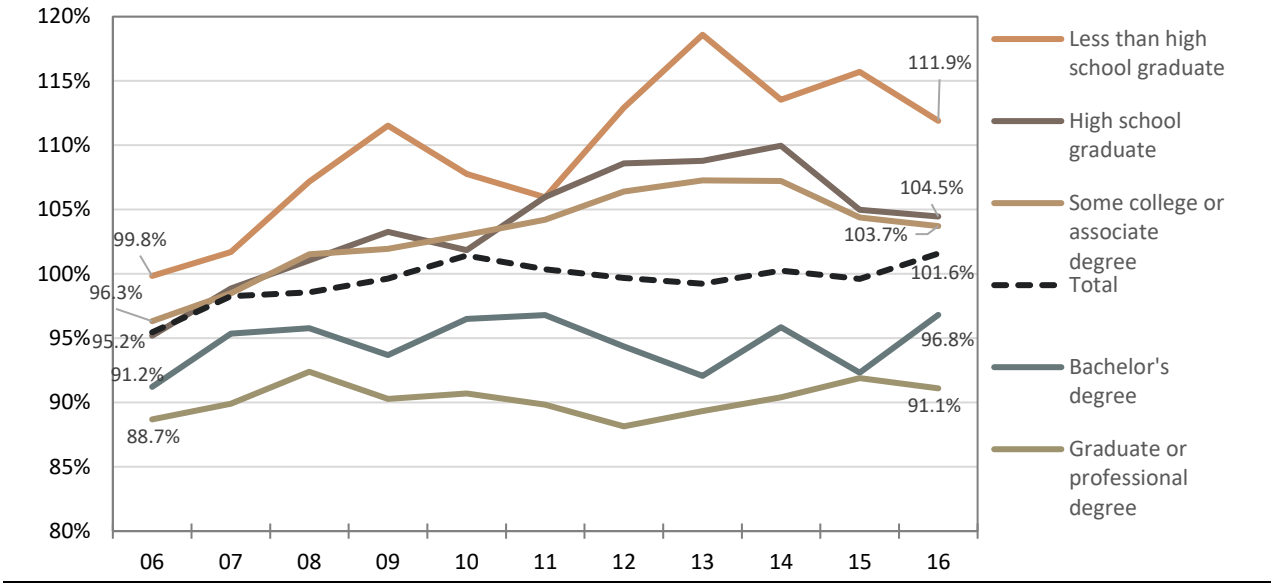
Two points of explanation concerning Oklahoma earnings ratios relative to the nation are warranted. First, it is important to note that while Oklahoma ratios for those with a bachelor's degree or higher generally fall below national ratios, it does not suggest a less significant payoff to higher education in Oklahoma relative to the nation. Instead it reflects the specific payoff of higher education relative to high school completion. In Oklahoma, the smaller ratio relative to the nation reflects the relatively high earnings of workers who have a high school degree or less rather than weakness in higher education earnings in the state. Second, earnings ratios for all levels of education beyond high school have dropped slightly between the recent peak in 2010 and 2016. Again, rather than reflecting weakness in earnings for degree holders, the decline largely reflects strong relative earnings for high school graduates in Oklahoma in the period.

Oklahoma Cost-of-Living-Adjusted Earnings. Median earnings and relative earnings ratios suggest continued strong payoffs to education beyond high school for Oklahoma residents. However, they fail to account for the low cost of living in Oklahoma relative to the nation. Over the past decade, the cost of living in the state has remained approximately 10 percent below the national average, with little variation. It is critical for policymakers to understand how well state residents are compensated at various levels of educational attainment after adjusting for differences in living cost. Without this adjustment, direct comparisons of state earnings to the nation will tend to understate the effective earnings of state residents in real terms.

Figure 29 illustrates the trend in cost-of-living adjusted median earnings in Oklahoma as a share of national earnings by level of educational attainment the past decade. Earnings in Oklahoma are adjusted using state-level regional price parity (RPPs) indexes produced by the Bureau of Economic Analysis.[19] RPP indexes allow for adjustments in earnings based on both differences in cost-of-living at the state level and changes in the overall domestic price level over time.

The cost-of-living adjustments suggest that Oklahoma median earnings have fared well relative to the nation at all levels of education the past decade, with a slightly rising trend overall in the period. Across all education levels, the relative earnings of state workers increased from 95.5 percent of the nation in 2006 to 101.6 percent in 2016, a more than 5 percentage point gain. Over

Figure 29. Oklahoma Cost-of-Living Adjusted Share of U.S. Earnings



Source: U.S. Census Bureau - Current Population Survey, Annual Social and Economic Supplement; Bureau of Economic Analysis; and RegionTrack calculations

the full decade, the median earnings of Oklahoma workers averaged 99.1 percent of national median earnings on a cost-of-living-adjusted basis.

The state has also fared well in income gains at each level of educational attainment in **Figure 29**. However, the earnings performance of the state has become increasingly variable relative to the nation the past decade, with much stronger relative performance at lower levels of education. The improvement is greatest among those who did not complete high school, increasing more than 12 percentage points from 99.8 percent of the national median in 2006 to 111.9 percent in 2016. Adjusted earnings for workers with a high school diploma and those with some college or an associate degree tracked each other closely across the decade, rising from about 96 percent to near 104 percent of the national median.

State workers in all three education categories below a bachelor's degree are now experiencing cost-of-living-adjusted median earnings that are well above the national level. The adjusted median income for Oklahoma workers relative to the nation is currently 11.9 percent higher for those who have not completed high school, 4.5 percent higher for high school completers, and 3.7 percent higher for those who have completed some college or an associate degree.

However, both bachelor's degree holders and workers with a graduate or professional degree in Oklahoma continue to slightly trail the nation on a cost-of-living-adjusted basis. Those with a bachelor's degree earned 96.8 percent of the adjusted median earnings for all bachelor's degree holders nationally in 2016. More importantly, however, is that the state continues to make progress in closing this long-standing gap. The relative cost-of-living-adjusted earnings of Oklahoma bachelor's degree holders has increased almost 5 percentage points relative to the nation since 2006. The earnings gap adjusted for cost-of-living is largest for state workers with a graduate or professional degree who currently earn only 91.1 percent of national median

earnings. However, this share is also up from 88.7 percent a decade ago. These relatively low adjusted income ratios suggest that considerable progress remains in creating a business climate that can more effectively utilize state workers with the highest levels of education.

Overall, the comparison of adjusted state income suggests that returns to education in Oklahoma remain quite high relative to the nation and are improving over the longer-term. The state's performance based on cost-of-living-adjusted earnings has improved relative to the nation for all education groups over the past decade. Earnings are strongest for state workers with the least education. Earnings for those in the state with the highest education levels still slightly trail the nation, but the gap has closed the past decade.

Is Oklahoma (and the U.S.) Producing Too Many Degrees? A common concern with efforts to increase the share of workers with a bachelor's degree or higher is the possibility that the nation and the states may be creating degreed graduates faster than the labor force can efficiently absorb them, thus leading to oversupply at the upper end of the labor market. Reports of extended unemployment among recent college graduates following the 2008-09 national recession and increasing difficulty in repaying student loan debt are often cited as evidence of oversupply.

This type of short-run anecdotal evidence can be highly misleading in gauging the long-run needs of the labor market. Instead, broader measures of the labor market's demand for more highly educated workers provide a better indication of the ability of employers to fully utilize an increasing number of degreed graduates.

While arguments continue that some states are producing too many degreed workers, evidence at the state level suggests that an imbalance is not in place. The top-ranked states based on educational attainment continue to absorb an increasing number of degree holders while producing steady wage growth and low unemployment rates. If the experience of the leading education states reflects the general ability of the U.S. labor market to absorb more workers, Oklahoma's developing industry structure should similarly absorb increasingly skilled workers going forward.

If the nation or an individual state reached the point where too many higher degrees were being awarded and had outstripped the demand by employers for workers with degrees, several fundamental signals of oversupply would likely surface:

1. Relative wage rates for college completers would weaken relative to both high school completers and those in the middle with some college but no degree;
2. Wage growth for degree holders would weaken relative to overall wage growth for non-degreed workers;
3. States with the greatest production of degreed graduates would tend to produce smaller real wage gains relative to the nation.
4. Unemployment rates for degree holders would rise and the gap in the unemployment rate between degree holders and non-degree holders would narrow;

5. States with the highest educational attainment levels would tend to experience the greatest difficulty in employing highly educated workers; and
6. States with overproduction would see a marked out-migration of highly educated workers.

There is little suggestive evidence in the wage and unemployment data the past decade that any of these indicators are signaling an oversupply of degree holders nationally or in Oklahoma. If Oklahoma were experiencing oversupply relative to the nation, the best evidence would be reduced wages for state degree recipients relative to degree recipients nationally. The past decade of data suggests that wage gains for degree recipients in the state are instead improving relative to the nation over time (**Figure 29**). We also find no evidence that the payoffs in the state to seeking education beyond high school have shifted in any meaningful way the past decade. Degreed graduates in the state continue to earn strong premiums over high school completers. The state is also not experiencing smaller real wage gains relative to the nation. More importantly, the state has posted gains in real earnings relative to the nation the past decade at all education levels, not just among degree recipients.

ARE EDUCATION BENEFITS ACCRUING TO RESIDENTS OR IN-MIGRANTS?

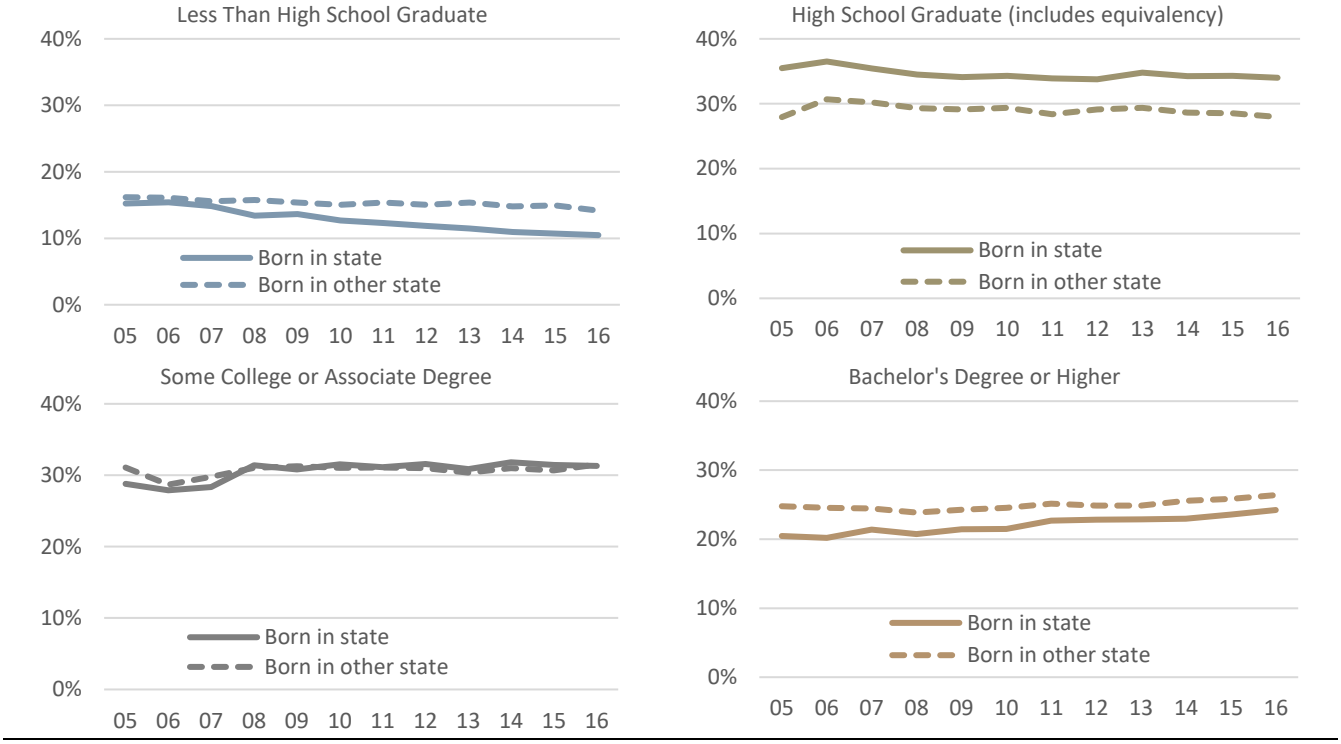
Economic development policy is also concerned with the degree to which existing state residents are benefitting from efforts of the higher education system. Increased educational attainment of the state labor force can result from new in-migrants to the state rather than workers trained by the state's public colleges and universities.

In-migration raises questions concerning whether reported state education gains are coming from improved skills among the native-born population that are generally trained by the state's colleges and universities or whether more educated workers are migrating into the state. Fast-growth states have long taken advantage of the tendency of more highly educated workers to migrate at a greater rate from state-to-state than less educated workers.

Colorado, for example, has attained the highest average education level among the states primarily by attracting large numbers of young degree completers to the state. Oklahoma's higher education system is generally tasked with the more challenging problem of raising the overall education level of existing residents while functioning as a moderate in-migration state. This limits the state's ability to improve the state labor force by attracting new residents to the state and raises the importance of using the state's public colleges and universities to achieve higher educational status primarily through native residents.

Figure 30 provides additional insight into the question of who is benefiting by examining educational attainment for residents born in the state (native) versus those born in another state (non-native). The results suggest that high shares of non-natives residing in the state are most likely to be among those with the most or least education.

Figure 30. Oklahoma Native vs. Non-native Born Educational Attainment



Source: U.S. Census Bureau - American Community Survey (1-Year Estimates)

At the lowest education levels, the share of residents with less than a high school education is higher for non-natives than natives, with a nearly 4 percent gap that is widening over time. This is likely traced in part to the relatively high cost-of-living-adjusted wages earned by workers in Oklahoma with less than a high school education the past decade (**Figure 29**). In short, relatively high wages in the Oklahoma labor market are attracting a relatively greater share of workers with low education levels who were born outside the state.

Conversely, the share of state natives who are high school graduates is well above the rate for non-natives, with a consistent 5 percent gap present the past decade. There is relatively less propensity for workers with a high school education to move to Oklahoma.

There is little reported difference the past decade between the share of the native and non-native populations who completed some college or received an associate degree, with both comprising approximately 31 percent of the total of each group.

However, a slightly higher share of non-natives than natives has completed a bachelor's degree or higher. This suggests some long-term net in-migration has occurred among the most highly educated residents of the state.[20] It also suggests that state employers have long been forced to bring in outside skilled employees to meet their labor force needs. This gap has closed a bit the past decade, falling from about 4 percent a decade ago to only 2 percent currently. The persistence of the historical gap for these workers also runs counter to any suggestion that the state system is overproducing degreed graduates.

STUDENT AND WORKER MOBILITY

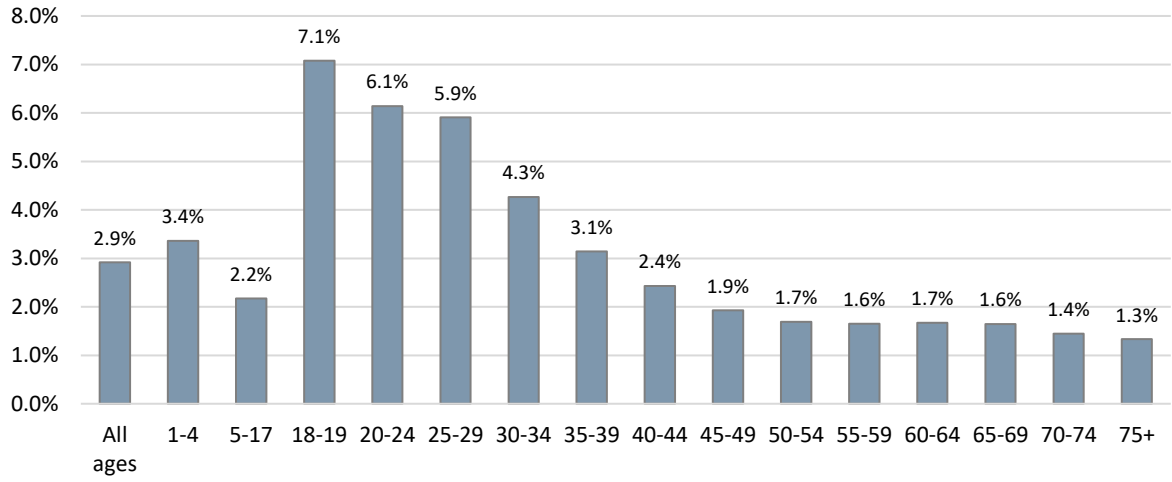
Another channel through which Oklahoma's public colleges and universities shape the overall educational attainment of the state labor force is through the attraction of higher education students to the state. Migrating out of state to attend a college or university is quite common for students in the United States. Nearly one in five (18.2 percent) students enrolling and seeking their first degree or certificate in Fall 2014 enrolled at an institution outside their state of residence.[21]

Efforts are underway in many states to attract young college-aged students and competition remains fierce. The college location decision is critical because state-to-state worker mobility is highest among younger workers, particularly those who are of traditional college-ages. The traditional college-age years also represent the point at which the location decision is typically made by many graduates of colleges and universities to enter the professional ranks each year.

Figure 31 illustrates the overall state-to-state mobility rate in the U.S. for workers by age group in the 2012-2016 period. Mobility for 18- to 29-year-olds is more than double the national average of 2.9 percent and peaks at 7 percent for 18- and 19-year-olds, the typical ages for college entrance. Mobility for those 30-39 years old remains slightly above the national rate and then rapidly falls below 2 percent for all older age groups. The overall likelihood of attracting workers to a new state diminishes rapidly by the time they reach their late-30's.

This pattern of early-work life migration underlies the economic development efforts underway in many states to attract young, mobile workers, particularly those with a college degree or higher. This in-migration of young, college-educated workers underlies much of the success of Colorado in raising its educational attainment level in recent decades. Higher education institutions in Oklahoma play a pivotal role in this process as residents relocate out of the state to attend college or nonresidents migrate into Oklahoma to pursue education.

Figure 31. State-to-State Mobility Rate by Age Group (2012-2016)



Source: U.S. Census Bureau – American Community Survey, 5-Year Estimate

Students Staying in Oklahoma. Oklahoma has fared comparatively well relative to the nation and most states in terms of the share of state residents who stay in-state when seeking their first degree or certificate. Oklahoma residents entering a college or university for the first time are much less likely to leave the state relative to other states. For Fall 2014, the most recent period of comparative state data, 88.5 percent (27,569) of the 31,148 Oklahoma residents enrolled in a college or university and seeking their first degree or certificate were enrolled at an Oklahoma-based institution. This is a nearly 7 percent gap above the 81.8 percent rate nationally.

Among first-time degree or certificate seekers who graduated high school in the previous 12 months, 89.1 percent were enrolled within the state versus 80.6 nationally. Among recent state high school graduates who enrolled at a 4-year degree-granting institution, 86.1 percent were enrolled in an Oklahoma-based institution versus only 73.8 percent nationally. Overall, Oklahoma is faring well relative to the other states in retaining degree seekers in the state (5th among the states), including both recent high school graduates (7th among the states) and those enrolling at 4-year degree granting institutions (6th among the states).

Net Inflow of Nonresident Students. Another dimension of student migration is the attraction of out-of-state students to Oklahoma higher education institutions. Attracting students into the state acts as an export-based service that plays a stimulative economic development role, much like any other service that is exported outside the state. Both out-of-state and foreign students who enroll in a college or university in Oklahoma typically pay higher average tuition rates and bring significant net new spending into the state.

Oklahoma continues to attract a significant number of out-of-state students, far more than the number of state residents attending school outside the state. In Fall 2014, 8,601 non-resident students seeking their first degree or certificate enrolled in higher education institutions in Oklahoma. This represents 23.9 percent of all first-time students enrolled in state-based institutions, three percentage points above the national rate of 20.9 percent in the period and 25th among the states. Overall, a net total of 5,022 students migrated into the state for enrollment in the Fall of 2014. The share of non-resident recent high school graduates seeking their first degree or certificate is slightly higher at 25.7 percent (versus a national rate of 21.3 percent and 23rd among the states) while those enrolled at 4-year institutions increased to 31.9 percent (versus a national rate of 28.5 percent and 26th among the states).

In addition to domestic students from outside the state, approximately 1 million foreign students were enrolled in institutions of higher education in the U.S. in the 2014-15 academic year. These students represent about 5 percent of total U.S. enrollment. Oklahoma's public colleges and universities report enrollment of 11,718 foreign students in FY2015, 6.1 percent of total system enrollment.

Inflows of Nonresidents are Increasing. The net inflow of students from other states (or the number of non-resident students attending college or university in Oklahoma minus the number of Oklahoma residents attending college in other states) has increased steadily since the Fall

2010 survey. The net number of students seeking their first degree or certificate who migrated into Oklahoma to attend college increased from 3,739 in Fall 2010 to 4,903 in Fall 2012. Further improvement to 5,022 students in Fall 2014 reflects both fewer students leaving the state and additional students migrating into Oklahoma. Among total enrollment in FY2015, Oklahoma's public colleges and universities report 28,535 students from other U.S. states or territories, or 16 percent of total enrollment.[22]

IV. Economic Growth Effects of Higher Education

Research findings continue to point toward increased education as an underlying source of economic growth, both in the U.S. and internationally. Research also supports the existence of a strong empirical link between educational attainment and economic growth at the state level.

States with the highest average education levels tend to have the highest incomes on average. The link holds over time as well, with those states experiencing the greatest increases in education experiencing larger gains in income on average.

The expectation for policymakers is that as individuals in the state develop higher and higher levels of education over time, the state experiences rising average income. Gauging the size of the potential economic gains from increased education is complicated by the fact that education, while a key factor in long-run economic growth, is just one of many factors believed to drive the level of income within a state or region. The set of fundamental factors driving economic growth can vary widely across the states and is often influenced by the industry mix in place.

The presence of multiple growth factors presents a challenge to economic development leaders who must choose among alternative strategies but may have only limited empirical evidence on the probable effect each might have on the local economy. Many potential growth factors are also interrelated with education and jointly determine income growth in a region. As a result, evaluations of the expected income gains from education at the state level must be undertaken within the context of a broad model of economic growth.

Hence, the objectives of this section of the report are three-fold:

1. Describe the role played by increased educational attainment in the regional economic growth process;
2. Describe recent advances in long-run economic growth modeling that can help explain the empirical link between education gains and income growth in Oklahoma; and
3. Provide estimates of the expected effect of increased educational attainment (particularly higher education) on future income growth in Oklahoma.

HISTORICAL LINK BETWEEN INCOME AND EDUCATION

Research findings continue to point toward increased education as an underlying source of wealth and prosperity, both in the U.S. and internationally. Focus on the university's role in this process has intensified as several regions of the U.S. – e.g. Silicon Valley, North Carolina's Research Triangle Park, Boston, Austin, Seattle, and Boulder – with highly educated labor forces and strong ties to major research universities continue to experience significant economic growth.

Early works by Holtz-Eakin (1993), Vohra (1996), Garofalo and Yamarik (2002), Bauer et al. (2006), and Yamarik (2006) find that attainment of higher education leads to higher average

incomes at the state level. More recently, Yamarik (2011) examines the relationship between schooling and state-level growth and finds that 20-25 percent of the growth in income across states is traced to increased education. These findings reinforce the existence of a systematic relationship between income and economic activity at the state level.

However, not all observers agree that higher education and regional economic growth are obvious or necessary partners. Again, education is only one of many factors believed to stimulate regional economic growth. Research also questions whether spending more on higher education necessarily provides larger returns for the local economy. Vedder's (2004) work on state-level growth suggests that states with higher spending on colleges and universities often fail to have faster economic growth than states with lower spending, even after controlling for differences in other key variables. This research does not question whether higher education is an important factor in promoting economic growth but does suggest that the returns on public spending for higher education may be limited. Questions also surround the direction of causality between education and earnings. In and Doucouliagos (1997) first suggested evidence of bi-directional causality, whereby education and economic growth are determined jointly over the long-run.[23]

Despite these concerns, ongoing research continues to confirm a strong empirical link between educational attainment and economic growth at the state level.

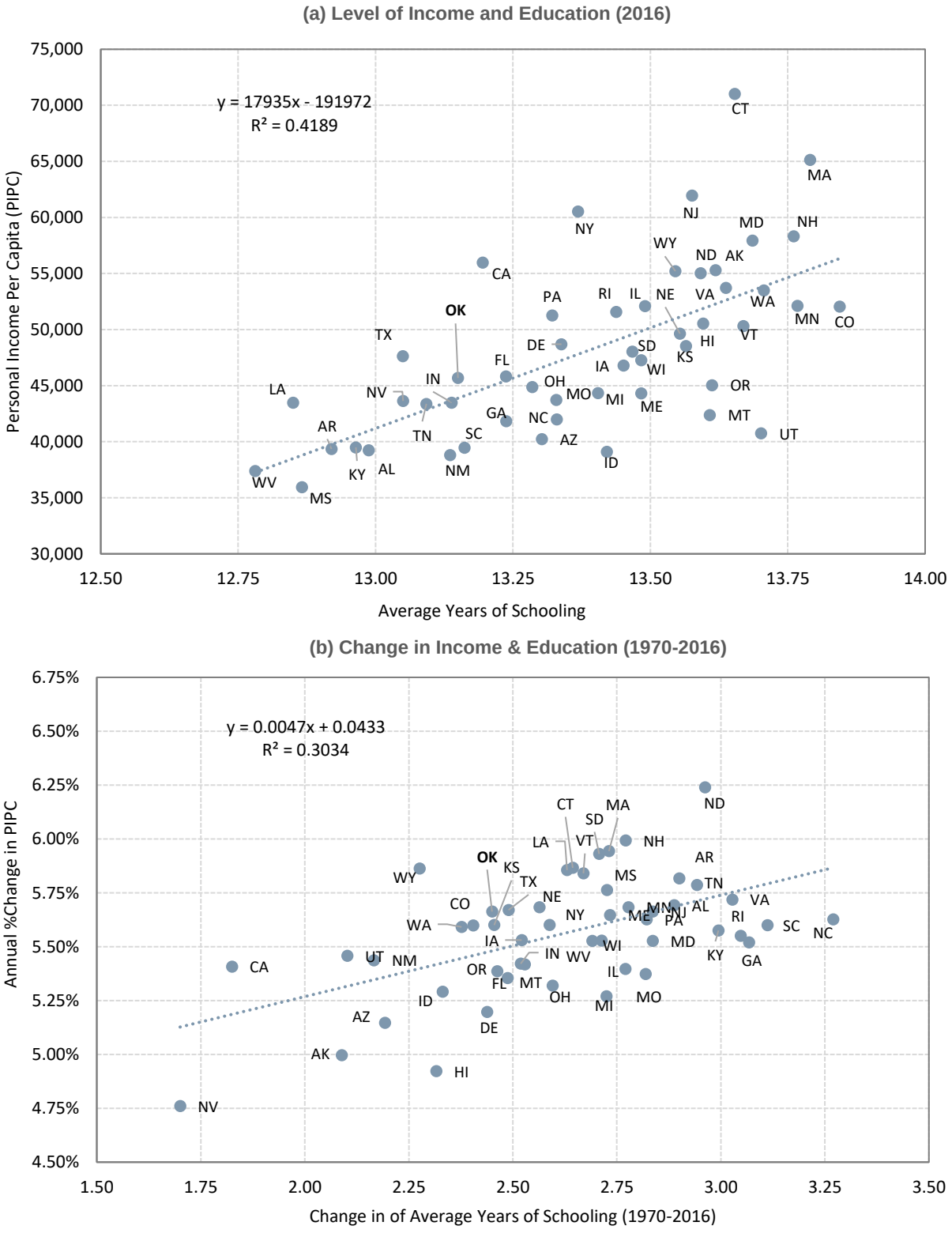
State-Level Income and Education (2016). The current policy focus of raising educational attainment in Oklahoma and other states is largely derived from the strong positive long-run correlation between income and education at the state level. **Figure 32a** illustrates the long-held finding that income levels are generally higher in states where overall education levels are higher.

Education is measured using average years of schooling as described earlier in the report, while income is stated as personal income per capita. Personal income is used because it represents the most comprehensive measure of household income.[24] Personal income is stated on a per capita basis to avoid distortions when comparing income growth across states with differing population growth rates. The relationship between education and income discussed in the remainder of this section is largely unchanged whether using nominal or inflation-adjusted personal income per capita.

Years of schooling in most states falls within a fairly narrow range between 12.75 and 13.75 years, or approximately 1 to 2 years of education beyond high school. Income per capita has greater relative variation than education across the states and ranges from about $35,000 to more than $60,000.

States with the lowest average education levels (i.e. below roughly 13 years of schooling) tend to have personal income per capita of less than $40,000 per year, or below about 80 percent of the national average of $49,571. These states include West Virginia, Mississippi, Arkansas, Alabama, and Kentucky. Conversely, states with the highest average years of schooling tend to have $55,000 or more in income per capita, more than 10 percent above the national average. These higher-

Figure 32. Income and Educational Attainment by State



Source: U.S. Census Bureau and Bureau of Economic Analysis

education states include Colorado, Minnesota, New Hampshire, Maryland, Massachusetts, New Jersey, and Washington.

A simple linear best-fit line and its equation is included in **Figure 32a** to illustrate the strength of the overall relationship across states. The state-level differences in average income by educational attainment are substantial. On average, the equation indicates that one additional year of schooling is associated with approximately $17,935 in higher annual personal income per capita on average across the states. This simple relationship has remained remarkably stable for several decades and is frequently cited as underlying support for policy initiatives that encourage the formation of higher levels of education.

Oklahoma's 13.15 years of schooling in 2016 ranks 39th among the states while state per capita income of $45,682 ranks 28th at 92.2 percent of national income. Oklahoma's position above the best-fit line in **Figure 32a** suggests that the level of state income in 2016 is higher than expected based solely on the state's average years of education. If predicted based on the best-fit relationship across the fifty states, Oklahoma's income per capita would fall to only $42,321, or 7.4 percent lower than actual income and 14.6 percent below the nation.

Most other key energy-producing states fall above the line as well, including Texas, Louisiana, Wyoming, Kansas, Colorado, and North Dakota. Energy states have historically generated average incomes above the level predicted solely by education level alone. They also tend to fall in the lower half of states based on overall educational attainment.

Changes in Income and Education (1970-2016). Part of the policy uncertainty associated with using education as an economic development tool is whether or not states can accelerate economic growth by accelerating the education process within the state. **Figure 32b** captures the long-run relationship at the state level between the change in average years of schooling and the change in income per capita between 1970 and 2016.

When viewed over time, income growth is generally faster in states where education is increasing at a faster pace. The best-fit line for the states suggests that one additional year of increased educational attainment across the period is associated with 0.45 percent in higher annual growth in income per capita. This represents a substantial performance differential given that only about one percentage point in average annual income growth separates the best performing from the worst performing states.

Oklahoma posted an increase in education of 2.45 years (from 10.70 years to 13.15 years) in the period, roughly matching the national gain of 2.47 years (from 10.85 years to 13.33 years). Most states similarly posted gains of between 2 and 3 years in the period. North Carolina posted the largest gain of 3.27 years, while Nevada posted the smallest at 1.70 years. The position of Oklahoma above the best-fit line in **Figure 32b** again suggests that the state's income gain in the period was higher than predicted solely by the change in education. Oklahoma managed to post the 18th largest income gain among the states since 1970 (5.7 percent annually) but only the 38th largest education gain. This suggests that while education may be playing a key role in

determining income in the state, other growth factors were also undoubtedly at work in explaining the long-run path of state income. It also suggests that Oklahoma income gains may have been even larger in the period if more progress had been made on educational attainment.

Other Factors Influence Growth. The lack of an exact relationship between education and income often leads to the criticism that rising education will not necessarily result in rising income within a given state. It is critical for policymakers to recognize that education alone cannot explain all of the variation in income across the states. In fact, not all states with high incomes are ranked among the most highly educated. For example, states like New York have very high nominal incomes but are roughly on par with the nation in terms of educational attainment. However, after adjusting for its high cost-of-living, the relative income in New York falls more in line with its average education level. Other states such as Utah and Montana have relatively high education levels but rank near the bottom in terms of income per capita.

Because of the seeming disconnect between income and education in some regions and across some time periods, other factors beyond education must be considered simulataneously when explaining long-run income growth. For example, mining-boosted Wyoming posted one of the smallest gains in education since 1970 but ranks among the states with the highest and fastest-growing income per capita. The Rust Belt states of Ohio, Illinois, and Michigan have posted very large gains in education since 1970 but experienced some of the weakest income gains in the period as their economies underwent tremendous restructuring tied to the decline of domestic manufacturing. These examples do not, however, suggest that rising education did not aid income growth in these states in the period. Instead, they simply illustrate occassions when factors other than education may outweigh the positive influence of rising education. They also reinforce that income growth in these underperforming states may have been even lower if education gains had been more modest in the period. In short, while education is a key systematic factor in determining the rate of economic growth in a state, it is one of many factors that jointly determine overall performance.

Oil and Gas in Oklahoma. In Oklahoma, the systematic influence of the oil and gas industry on the overall state economy is believed to influence overall growth in personal income, much as it does in Wyoming and other key energy-producing states. The concern for education is that the availability of high-wage job opportunties in the oil and gas industry for high school completers may contribute to a slowing in overall educational attainment in some energy-producing states during periods of high commodity prices.

A recent emprical study of oil and gas regions finds significant reductions in high school and college attainment among these states' initial residents because of shale booms.[25] The findings indicate that strong labor force opportunities in the short-run can lead to reduced accumulation of education in the longer term. Other evidence that this may be playing a factor in Oklahoma educational attainment are the relatively strong wage gains in the state relative to the nation for lower levels of educational attainment the past decade as described in **Figure 29**.

Again, the process of raising educational attainment within Oklahoma cannot proceed without consideration for the broader state economic system and its ability to effectively utilize a more highly skilled labor force. It also suggests that weak economic performance at the state level does not necessarily indicate that education gains are not aiding state growth, nor does strong economic performance necessarily signal that the education gains being made are satisfactory to maintain state income gains in the long-run.

MODELING STATE INCOME GROWTH

The objective in this section is to model the state higher education system's contribution to past and future movements in per capita personal income in Oklahoma. Ongoing advances in economic growth theory and related advances in economic model construction now provide a much richer backdrop for analyzing a regional economy than was available only a decade or so ago. We use some of these modeling techniques to examine the historical link between income growth and education gains in Oklahoma.

One such advance is panel cointegration methods, a time series modeling technique that offers the potential to capture the long-run co-movements in a related set of economic time series. In this case, we are primarily seeking to model the co-movement of education and income across the states over time. *Panel* refers to the simultaneous use of data across multiple regions and time periods – in this case, the fifty states in the 1970-2015 period. The use of multiple regions along with an extended time frame boosts the ability of the model to capture systematic relationships that hold broadly across all state economies. *Cointegration* refers to patterns in the co-movement of multiple data series over time (Engle and Granger 1987). The methodology is not explicitly seeking to explain causal linkages among the various factors driving income growth but is instead exploiting stable long-run relationships that tend to hold between income and other economic growth factors over time.

Key Economic Growth Factors. Estimating the expected contribution of education to income growth requires the identification and inclusion of other key economic factors that also reliably predict economic growth across regions. Ideally, these growth factors should have three characteristics:

1) a strong theoretical foundation and relationship to the economic growth process;
2) a reliable statistical relationship with regional economic growth over time; and
3) can be easily translated into meaningful policy options and economic development strategies.

Along with educational attainment, we model the contribution of three other well-known factors affecting regional economic growth:

- labor force participation,
- capital investment, and
- traded activity, or openness.

These three factors receive considerable attention in the research literature on economic growth and have long been recognized by policymakers as viable targets for regional economic development. These growth variables are also broadly consistent with evidence at the country level in both Bergheim (2008) and Casadio et al. (2012) that trade openness, human capital, and investment in physical capital drive growth across a range of countries. Dall'erba and Llamosas-Rosas (2015) provide an overview of research examining the returns to schooling at the state and regional level within the context of multiple growth factors.

Labor Force Participation. Labor force participation has long been viewed as a potential source of added economic growth (Aaronson et al. 2014). Higher utilization and more efficient employment of existing labor resources directly increases the potential output of a region. This view was substantiated by the long-run influx of women into the U.S. labor force during much of the Post-World War II period.

While educational attainment is concerned with the *quality* of the labor force, labor force participation focuses on enhancing the *size* of the labor force within a region. It is also influenced by changes in educational attainment through the activities of the state's public colleges and universities. Participation rates are particularly relevant within this framework given that workers with higher educational attainment are more likely to participate in the labor force and are less likely to experience unemployment during economic downturns.

In addition to increased education, other widely used approaches to increasing labor force participation rates include subsidized job training following mass layoffs, high-school completion programs, targeted employment tax credits, and expanded child care availability.

Capital. The second factor, capital investment, has long been viewed as a critical ingredient to economic growth, especially in the capital-intensive sectors of the economy (Garofalo and Yamarik 2002 and Yamarik 2011). Capital spending is particularly important in major energy-producing states such as Oklahoma where the mining sector is often the most capital-intensive sector of the economy, as well as in manufacturing-intensive regions.

Several theoretical frameworks are available to describe the process by which capital formation takes place and influences economic growth. There is only limited agreement on the exact process, including the degree of endogeneity of capital spending (Bergheim 2008). Economic development strategies designed to stimulate capital spending include investment tax credits, subsidized lending programs, accelerated depreciation schedules for equipment, sales and use tax exemptions on equipment purchases, and ad valorem tax exemptions and rebates.

Capital investment receives added interest as an economic development vehicle because of its link to education. Labor productivity is closely linked to the use of capital, whereby the more intense use of capital increases the realized productivity of the workforce. Efforts by the state to increase educational attainment will be most effective when accompanied by increased capital investments requiring the use of highly trained workers.

Traded Activity, or Openness. And, finally, production for trade outside a region, or a region's degree of openness, traces its origins to the notion of enhancing the 'basic' industries located within a region. Basic industries produce goods and services that are exported for sale outside the local market. This includes trade with other states as well as internationally. States with large manufacturing, mining, and Federal government sectors (including military) tend to have the most traded activity with outside regions. Oklahoma has relatively high concentrations of all three sectors.

Traded activity captures spending from outside the region which in turn helps support the development of the region's 'non-basic' sectors. Non-basic industries are believed to merely recirculate existing purchasing power, which is believed to exert less influence on overall regional activity than an equivalent injection of spending from outside the region. Theory also suggests that the cross-border exchange of goods, services, technologies, factors of production, and ideas have a beneficial impact on incomes as scarce resources are utilized more efficiently (Hausmann, Pritchett, and Rodrik 2005). Economic development strategies that attempt to boost traded activity include trade zones, manufacturers' exemptions, as well as various tax exemptions, deductions, and rebates targeted at exporters.

Interrelationships. The four growth factors in the model rarely work in isolation but are instead highly interrelated, especially with education. As described earlier, capital investment acts as a complement to the labor force in jointly determining overall rates of worker productivity. As a result, efforts to produce better-educated workers for industries which have no capital base in place to thrive within the region are likely to produce lower returns to increased education. Similarly, many basic industries that produce traded activity outside the region tend to be the heaviest users of capital, particularly the mining and manufacturing sectors. Finally, education is closely related to rate of labor force participation, with higher education generally associated with increased participation rates.

Economic Development Strategies. All four growth factors are also believed to play a key role in the fundamental process of economic growth over time across all regions and are not simply transient contributors to the growth process. The use of these factors condenses the broad range of potential economic development strategies into four basic foundational policy actions that can be taken with respect to a regional economy – higher levels of education, greater labor force participation, increased capital formation, and increased traded activity. This basic model results in a set of four fundamental economic development strategies that are identified as relevant in the economics research literature and time-tested in practice.

Other Potential Growth Factors. There are certainly other potential economic factors that underlie the regional economic growth process. One such factor is population. We exclude population from the model based on extended findings in the research literature that suggest population is largely determined *by*, or endogenous to, the overall economic growth process rather than a key determinant *of* economic growth in most regions (Becker, Glaeser and Murphy 1999; Easterly

2001). There is also little statistical relationship between population growth and economic growth over time and across regions (Bergheim 2008).

We similarly exclude measures of innovation such as patents and R&D spending. Additionally, elements postulated to enhance a region's economic dynamism such as entrepreneurship training, depth and breadth of capital markets, levels of business taxes, mobility of labor and capital, and the regulatory environment (Bauer et al. 2006) are also omitted. These are all possible candidates for explaining economic growth in a regional growth forecasting model. There is significant disagreement, however, concerning the role played by these factors in fostering long-run economic growth at the regional level (Bartik 2009).

Data. The panel cointegration model is constructed with five data series defined as follows:

PIPC = personal income per capita (dollars)
AVGSCH = average years of schooling (years)
CAPPW = net private fixed capital per worker (dollars)
EMPOPR = employment-population ratio (percent), or employment ratio
EXPORTPW = earnings from traded activity per worker (dollars)

Personal income per capita, years of schooling, and employment-population ratio are measured annually over the 1970-2015 period; capital per worker and traded activity per worker are measured annually over the 1990-2015 period.[26] All variables are denoted by the log operator, L(), when used in natural logarithms. A log series used in differenced form in order to compute percentage changes over time is denoted by the log-difference operator, DL().

The measure of educational attainment used in the model is the average years of schooling for the population ages 25 and over as defined earlier in the report. While this measure reflects overall state educational attainment across all levels of the education chain, we focus primarily on the contribution of education beyond high school to the growth process. It is important to reiterate that changes in the overall attainment level of the state's workforce is increasingly being determined by gains made at the top of the education scale. Diminishing progress remains to be made on the share of students who do not complete high school. Oklahoma, like most states, already has a relatively high and stable high school completion rate.

The employment-population ratio (or employment ratio) is defined as total state employment (using the BEA definition including both wage and salary employees and self-employed proprietors) divided by state population. The U.S. employment ratio equaled 59.3 percent in 2015, versus 58.5 percent in Oklahoma, 32nd among the states. In other words, only 58.5 percent of the state population was actively engaged in work in 2015, a 0.8 percent deficit relative to the nation.

Data on the stock of fixed capital is generally not available at the sub-national level and must be estimated from U.S. data. State-level estimates are formed in the 1990 to 2015 period by partitioning national data on net private fixed assets at the industry level based on a region's

share of national earnings at the industry level (Yamarik 2013).[27] The estimated measure of capital is net of depreciation and includes the broad asset categories of equipment, structures, and intellectual property. Public sector assets are excluded from the analysis.

Industry-level estimates of net private fixed assets are formed for each state at approximately the 3-digit North American Industrial Classification System (NAICS) as defined by BEA. The industry level estimates are then aggregated to derive total net private fixed assets at the state level. Net investment is measured as the year-to-year change in net private fixed assets.

Capital is defined in the model as net private fixed assets per worker (using the BEA definition of employment including both wage and salary employees and self-employed proprietors). Capital per worker at the national level totaled $126,768 in 2015, versus $136,017 in Oklahoma, 16th among the states.

Exports is the most common measure of traded activity at the national level. However, there is no equivalent measure of regional external trade at the sub-national level. Measures of international exports from the states and metro areas are available, but they do not capture the full notion of traded activity at the sub-national level. Ignored are goods and services that are sold outside a state or region but within the U.S.

We construct a proxy of traded activity for each state by estimating the amount of earnings derived within industry sectors that produce goods and services considered mostly or fully for sale outside the local market. Using BEA industry definitions at approximately the 3-digit NAICS level, the following *goods-producing* sectors are considered basic sectors: farming; forestry, fishing, and related activities; mining; and manufacturing.

The following *service-providing* sectors are viewed as basic sectors producing services largely for external trade: air transportation; rail transportation; water transportation; truck transportation; transit and ground passenger transportation; pipeline transportation; scenic and sightseeing transportation; telecommunications; ISPs, search portals, and data processing; securities, commodity contracts, and investments; arts, entertainment, and recreation; accommodation; and Federal government - civilian and military.

Traded activity is defined as total household earnings derived from these basic sectors that primarily produce activity for consumption outside the state divided by total state employment (using the BEA definition of employment including both wage and salary employees and self-employed proprietors).[28] Traded activity per worker totaled $14,110 nationally in 2015, versus $22,168 in Oklahoma, 3rd highest among the states.

Across the four growth factors, Oklahoma is categorized as ranking relatively low on overall educational attainment and labor force participation but relatively high on the use of capital and the level of traded activity outside the state. The state's relative weakness on the labor force issues of attainment and participation suggests the state's economic development focus on education is directed at the correct policy targets.

Figure 33. Sample Correlation Matrix – Levels (50 States)

	L(PIPC)	L(AVGSCH)	L(CAPPW)	L(TRADEPW)	L(EMPOPR)
L(PIPC)	1.00	0.79	0.88	0.72	0.43
L(AVGSCH)	0.79	1.00	0.62	0.46	0.63
L(CAPPW)	0.88	0.62	1.00	0.68	0.26
L(TRADEPW)	0.72	0.46	0.68	1.00	0.36
L(EMPOPR)	0.43	0.63	0.26	0.36	1.00

Notes: Sample is 1970-2015 for personal income per capita (PIPC), years of schooling (AVGSCH), and employment-population ratio (EMPOPR). Capital per worker (CAPPW) and traded activity per worker (TRADEPW) are measured over the 1990-2015 period. All correlations are significantly different from zero based on a t-test.

Correlation Analysis. Figure 33 summarizes the long-run correlation of each factor with personal income per capita across the fifty states. Examining the simple historical correlations of income with the four growth factors provides a basic illustration of the various long-run interrelationships over time.

All four growth factors are highly positively correlated with the level of personal income per capita (see first column or first row of Figure 33) and are all significantly different from zero based on a t-test. The correlations of each growth factor with income range from a high of 0.88 for capital per worker to a low of 0.43 for the employment ratio. Years of schooling has the second highest correlation with income at 0.79. Traded activity is only slightly lower at 0.72.

Among the four growth factors, years of schooling is highly correlated with both capital (0.62) and the employment ratio (0.63) as expected but has a lower correlation with traded activity (0.46). Capital and traded activity are highly correlated (0.68) as expected given the capital intensity of many trade-based sectors. However, both capital and traded activity have a relatively weak correlation with the employment-population ratio (0.26 and 0.36, respectively), with little theoretical evidence suggesting direct linkages.

Figure 34 extends the correlation analysis to annual changes in personal income per capita and the four growth factors in log-difference form in the 1970 to 2015 period.[29] Annual changes in all four growth factors are positively correlated with changes in income and significantly different from zero based on a t-test.

Two factors – traded activity per worker and employment ratio – have a relatively high year-to-year correlation with income per capita exceeding 0.50. However, the correlation between income and education is much lower in differences (0.19) than in levels (0.79). This is consistent with intuition that the level of education in a region may contain more information about future income growth than small, incremental year-to-year changes in education. It also suggests that volatile year-to-year cyclical changes in income are less likely to be correlated with a smooth measure such as the change in educational attainment.

Figure 34. Sample Correlation Matrix – Differences (50 States)

	DL(PIPC)	DL(AVGSCH)	DL(CAPPW)	DL(TRADEPW)	DL(EMPOPR)
DL(PIPC)	1.00	0.19	0.32	0.52	0.64
DL(AVGSCH)	0.19	1.00	0.04	0.07	0.08
DL(CAPPW)	0.32	0.04	1.00	0.35	0.02
DL(TRADEPW)	0.52	0.07	0.35	1.00	0.09
DL(EMPOPR)	0.64	0.08	0.02	0.09	1.00

Notes: Sample is 1971-2015 for log first differences of personal income per capita, years of schooling, and employment-population ratio. Log first differences of capital per worker and traded activity per worker are measured over the 1991-2015 period. All correlations are significantly different from zero based on a t-test.

The correlation between capital and traded activity remains relatively high (0.35) in differences, but the correlation between schooling and the employment ratio becomes quite weak (0.08) over time when measured in differences. This suggests that year-to-year changes in the employment ratio are tied to other factors beyond simply ongoing steady growth in educational attainment.

ESTIMATING THE MODEL

Panel cointegration techniques are used to derive empirical estimates of the effect of each growth factor on personal income per capita across the states over time. The estimated model allows us to evaluate the expected long-run effect on state income growth given alternative scenarios for the level of higher education in the state.

Estimation Process. A summary of the steps in estimating the model is as follows:

1. Each data series is tested to determine whether it has suitable statistical properties for inclusion in the model, primarily stationarity. All five variables (income and the four growth factors) satisfy the requirements for inclusion in the model.

2. A long-run *cointegration* test is applied to the data to determine whether there is a reliable long-run relationship between income and each of the growth factors.

3. *Error correction terms* are estimated from the cointegration test in step 2 that describe whether a region's performance on income growth over time is consistent with the long-run level of income that would be predicted by each of the growth factors. Large error correction terms lend evidence on whether a region's performance is above or below the rate of income growth that would be expected given changes in the growth factors.

4. The estimated cointegration relationships are then used to estimate the expected long-run change in income resulting from a change in years of education and the other growth factors.

Estimation of Long-run Cointegrating Relationships. The Pedroni (2004) fully modified ordinary least squares panel (FMOLS) method is used to estimate the long-run coefficients for the cointegrating relationships between income and the four growth factors. Error correction terms are then calculated from the cointegration models.

Figure 35 contains the estimated coefficients for each growth factor in the 50-state panel cointegration model. The coefficients can be interpreted as long-run elasticities with respect to personal income per capita. In other words, the numerical value of each coefficient can be interpreted as the expected long-run percentage change in personal income per capita for a one percent change in the growth factor.

For education, or human capital, a one percent increase in the number of years of schooling produces an estimated 11.35 percent average increase in personal income per capita across the states in the sample period. The size of the education response in the model is consistent with, but generally smaller than, the average state-level effect reported in Garofalo and Yamarik (2002) and Yamarik (2011).

The long-run coefficients for the other growth factors in **Figure 35** are interpreted in a similar manner. A one percent increase in the amount of capital per worker is associated with an additional 0.90 percent in added income per capita across the states. For traded activity per worker, each one percent increase in the amount of earnings from traded activity produces an expected long-run increase of 1.52 percent in personal income per capita on average across the states. Finally, a one percent increase in the employment-population ratio produces an expected long-run increase of 6.57 percent in personal income per capita.

Error Correction Terms. The 50-state panel cointegration model also provides estimates of state-level error correction terms for each growth factor for each state over time (**Figure 36**). The year-by-year error correction terms for Oklahoma show the deviation of actual state income each year from the predicted value of state income based on the estimated long-run cointegration model for each growth factor. In other words, error correction terms identify the difference between actual and predicted performance for a region over time based on the estimated long-run cointegrating relationships.

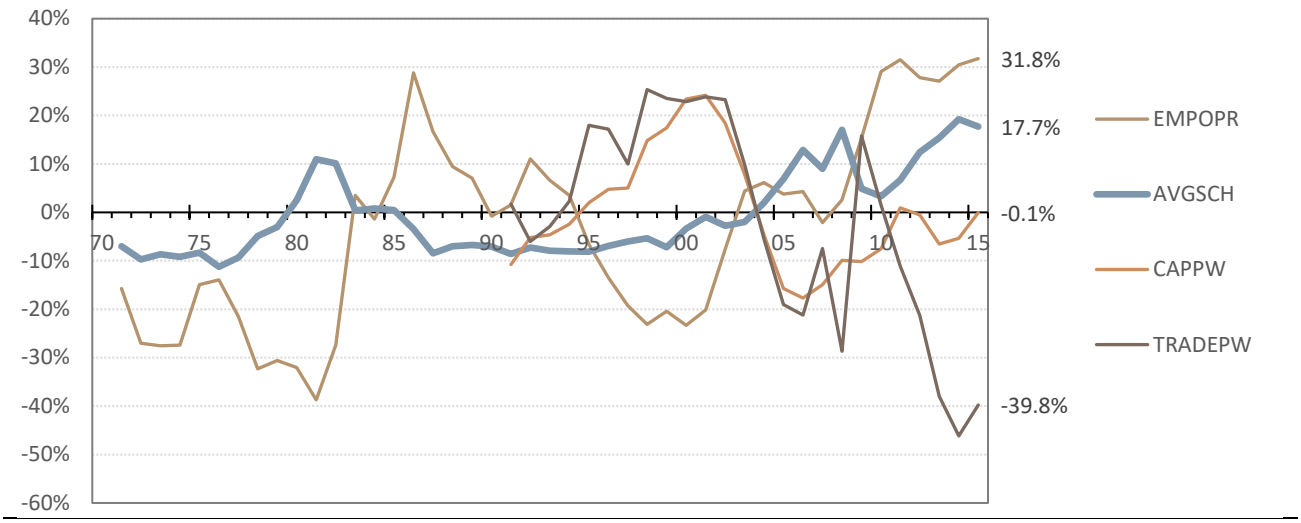
Gaps between actual and predicted performance suggest that the path of the state economy will be corrected over time and returned to its long-run cointegration path. These gaps, or error

Figure 35. Long-Run Cointegration Coefficients (50 States)

(Income) Dependent Variable	(Growth Factor) Explanatory Variable	Panel FMOLS Results		
		RHS Coefficient	t-Statistic	P-Value
PIPC	AVGSCH	11.346	153.75	0.0000
PIPC	CAPPW	0.903	77.43	0.0000
PIPC	TRADEPW	1.522	45.89	0.0000
PIPC	EMPOPR	6.574	61.69	0.0000

Notes: Table shows coefficients from bi-variate panel cointegration tests using fully modified least squares (FMOLS). Null hypothesis is no cointegration. Sample is 1970-2015 for personal income per capita (PIPC), years of schooling (AVGSCH), and employment-population ratio (EMPOPR). Capital per worker (CAPPW) and traded activity per worker (TRADEPW) are measured over the 1990-2015 period.

Figure 36. Estimated Long-Run Error Correction Terms - Oklahoma



Notes: Variable names are years of schooling (AVGSCH), employment-population ratio (EMPOPR), capital per worker (CAPPW), and traded activity per worker (TRADEPW).

correction terms, also highlight periods where an individual growth factor may be having more or less influence than expected on income growth.

The error correction terms in **Figure 36** suggest that income per capita in Oklahoma in 2015 was approximately 17.7 percent higher than predicted based solely on years of schooling (AVGSCH). This is an even larger gap than suggested by the simple historical correlation analysis between the level of income and education in **Figure 32**. Outperformance is also suggested (31.8 percent higher than expected) by the large positive error correction term for the employment ratio (EMPOPR) in 2015. These large positive error correction terms are consistent with the earlier discussion that the state ranked relatively high on income per capita in 2015 but ranked much lower on both years of schooling and the employment ratio.

The path of the error correction term for years of schooling illustrates significant deviations from the long-run estimated relationship between education and income in Oklahoma over time. The error remained highly positive between 2004 and 2015, suggesting that income per capita in the state exceeded what would have been predicted based solely on increases in educational attainment across these years. The gap dropped sharply in 2009 and 2010 during the recent national recession as the oil and gas industry contracted sharply and weighed on overall income growth but remained positive. From 2004 to 2015, the gap averaged 10.6 percent and reached a peak of 17.7 percent in 2015. This suggests that state income growth has systematically outperformed the rate of growth expected based solely on education gains the past decade.

The recent period of income outperformance relative to education gains coincides closely with the resumption of strength in the state's oil and gas sector beginning in 2003. State income gains outstripped gains at the national level as the state made up considerable ground on a per capita basis. A similar period of outperformance relative to education gains was present in the 1980 to

1982 period at the height of the Oil Boom. The strong gains in income in the period far outpaced the state's expected performance based solely on education gains.

Conversely, the error correction terms suggest that income per capita in Oklahoma in 2015 was almost 40 percent lower than expected based on the very high level of traded activity per worker in the state. Traded activity in the state has been driven to unusually high levels in recent years, primarily by rising oil and gas-related activity. This has propelled overall state income growth, but the substantial growth in traded activity is not fully reflected in growth in income per capita.

Finally, Oklahoma's relatively high level of income per capita in 2015 was almost exactly in line with the state's relatively high use of capital per worker. Hence, a very small error correction term for capital per worker.

POTENTIAL LONG-RUN INCOME GAINS FROM EDUCATION

The estimated long-run cointegration coefficients provide helpful empirical information for state policymakers on the potential income gains from increased education in Oklahoma. The model can be used to approximate the potential effect on state income of raising the state's current average years of schooling from 13.15 to the national average of 13.33, an increase of 0.18 years.

For Oklahoma, an increase of 0.18 years is equivalent to a 1.37 percent increase from the 2016 level of 13.15 years. This represents roughly half the actual gain of 0.33 years in Oklahoma the past decade, when it increased from 12.82 years to 13.15 years. The scenario assumes that the state labor force accrues roughly 5 years of added educational attainment relative to the nation, with all other factors remaining constant.

Based on the results from the panel cointegration model, the required 1.37 percent increase in educational attainment required to match the nation is multiplied by the 11.346 percent estimated increase in state income per capita per unit change in education. Again, the income response represents an average measured across the fifty states based on the long-run panel cointegration model (**Figure 35**).

Given state income per capita of $45,682 in 2016, the predicted outcome of the model of national-like educational attainment in Oklahoma is an increase of $7,081 per person to $52,763, a 15.5 percent gain. The state would move from a 7.8 percent shortfall relative to the nation to a 6.4 percent premium in per capita income. Oklahoma would rank 13th in per capita income, just ahead of Minnesota but trailing Washington and the energy-producing states of Wyoming and North Dakota.

Implications for State Education Policy. The model scenario of attaining a national-like education level in the state has several additional policy implications:

1. The model scenario suggests that matching the nation on educational attainment could have a substantial effect on total state income. In aggregate, achieving a national-like education mix represents a $27.782 billion increase in total personal income in the state

in 2016, or a 15.5 percent increase from $179.2 billion to $207.0 billion. Oklahoma would rise from 28th to 24th among the states in total personal income, trailing Connecticut but just ahead of Louisiana and South Carolina.

2. Educational attainment and labor force participation are the only measures among the four key growth variables examined on which the state is trailing the nation. These factors are directly tied to the state's progress on higher education and offer the largest opportunities for potential future income gains among the four economic development strategies discussed. The state is already highly ranked on both capital use per worker and traded activity per worker.
3. Achieving educational attainment equal to the nation would simultaneously contribute to greater overall employment participation. An estimate using the long-run linear relationship between education and the employment ratio across the states suggests that the required 0.18-year rise in state educational attainment would be associated with a 2.5 percent increase in the employment ratio on average across the states. In Oklahoma, this would push the state's employment ratio up from 58.1 percent to 60.6 percent. This would also push the state above the 59.9 percent national rate and raise the state's employment rate from 36th to 24th among the states. This shift in the employment-population ratio would also equate to a rise in state employment of approximately 57,000 additional wage and salary or self-employed workers, holding population constant.
4. The large error correction term for years of schooling in the growth model suggests that the strong performance of the state economy the past decade has been concealing the moderate net progress being made on overall education attainment. Other factors beyond education (e.g. the reemergence of the state oil and gas industry) have been playing a highly signficant role in the relative strength of the state. Again, if based solely on the best-fit relationship with education across the fifty states, Oklahoma's income per capita would be estimated at only $42,321, or 7.4 percent lower than actual income and 14.6 percent below national income in 2016. The estimated error correction term for 2015 suggests that the level of personal income per capita in the state was 17.7 percent above the long-run level expected based solely on educational attainment.
5. The model suggests that the performance of the state economy in recent years has been in line with expectations relative to capital spending but is not performing as well as expected based on the state's very high levels of traded activity outside the region. This suggests that a sharp pullback in traded activity (e.g. a reduction in state oil and gas production) could put significant downward pressure on state income. This risk further underscores the relative importance of recognizing the state's economic outperformance relative to education gains made in recent years.

V. Economic Contribution of Higher Education Operations

The final economic channel reviewed is the influence of the operations and expenditures of the state's public colleges and universities on state and local economic activity. The System is a large service-based enterprise whose operations exert tremendous economic and financial influence on both the state economy and the local regions in which it operates. In FY2016, approximately $5.05 billion was spent directly on general budgetary expenditures and capital projects across all institutions and constituent agencies of the System.

Like all industry sectors, the delivery of public higher education has a strong economic interdependence with the broader economy. These 'demand-side' effects traced to the ongoing operations of the system create measurable spillover activity in the form of employment, employee compensation, and total economic output.

ECONOMIC IMPACT METHODOLOGY

Estimates of gross economic impact are formed first at the state level and then for each institution and constituent agency. The institution-level analyses differ from the state impact in that a localized regional model is used and adjustments are made to spending items that are considered nonlocal when evaluating smaller regions of the state.

Modeling Regional Linkages. Estimates of the gross economic spillover effects of the System are formed using traditional input-output estimates derived from the IMPLAN model. This approach uses the direct activity (primarily expenditures) of the System along with a model of the flow of expenditures between businesses, households, and the government sector.

While the input-output approach provides a useful way to measure the extent of the economic interlinkages within a regional economy, the approach is not without shortcomings. The primary criticisms of the approach are misapplication of the models and the failure of the largely static approach to account for changes in other areas of the economy such as prices, wages, and traded activity.[30] More specific to higher education, studies have reported that the direct and indirect economic impacts of universities on their local communities and regions are often overestimated through input-output analysis (Siegfried et al. 2007). Despite these criticisms, careful application of the models can provide useful estimates of the gross economic activity attributable to an individual industry, firm, or institution within a region.

System Structure. The range of economic activities taking place across the System are highly varied and often bear little resemblance to the traditional teaching, research, and service components of higher education. Public higher education systems have developed as quasi-governmental institutions that function much like private, for-profit businesses and operate across several business lines. This is the case for many of the auxiliary enterprises operated by the System. These business lines include housing, food service, transportation, and other common consumer services.

As a result, no single industry sector within the IMPLAN model precisely reflects the range of activities across the System. Some activities, such as intercollegiate athletics, have no close parallel in the private sector, or in the IMPLAN model.

To accommodate these various activities, expenditure data for the System are divided into natural business segments to better match the IMPLAN industry structure. We then model the individual effects of each component and aggregate them to determine the overall System effect. The three-step process of matching the components of the System to IMPLAN sectors, modeling the individual effects, and then aggregating the individual contributions of the components is often termed analysis-by-parts. It is technically equivalent to modeling the activity as a single entity, but the process can produce more appropriate impact estimates when the activities being modeled do not fit precisely within a single IMPLAN industry sector.[31]

We do not attempt to formulate a comprehensive net cost-benefit analysis of the System. There are many relevant components to a net analysis that extend well beyond the direct economic role of the System. These include social costs and benefits, alternative uses of state and local funding, alternative options for providing higher education in the state, and the deadweight economic loss that can occur in the private sector because of taxpayer funding of services. The prior study of the System by Battelle (2010) provides an extensive review of many of these impacts.

We also do not attempt to construct a counterfactual scenario that represents an alternative comparative view of the state economy that removes the System and its various interrelationships from the structure of the model. Devising a sound counterfactual analysis that represents a reasonable alternative use to higher education expenditures presents a considerable modeling challenge. It is not at all clear what the proper counterfactual should be in assessing the economic role of a state-supported higher education system. Instead, we provide a detailed analysis of the costs incurred by the System and make adjustments to the gross results to account for the effect of relevant factors that can meaningfully alter the estimates derived from the input-output analysis.

EXPENDITURE IMPACTS

Systemwide operating expenditures totaled $4.54 billion in FY2016 and are detailed by type of institution in **Figure 11**. To best match the diverse underlying mix of System expenditures to the IMPLAN model structure, they are first divided into two major components - compensation paid to employees and spending on goods and services. Spending on goods and services is subsequently divided into separate business lines that are modeled individually within IMPLAN.

Figure 37 summarizes the state-level spending amounts partitioned into the various components used in the impact analysis. Each expenditure item is discussed below.

Employee Compensation. The first component, compensation (wage and salary earnings plus fringe benefits) paid to employees, is the largest single expenditure of the System and totaled

Figure 37. Oklahoma Higher Education System Expenditure Impacts (FY2016)

Expenditure	Amount
Employee Compensation	
Wages & Fringe Benefits	$2.53 billion
Operations Expenditures (net of Employee Compensation)	
General Education and Administrative Expenditures	$1.49 billion
Sponsored Research and Programs	$195.6 million
Intercollegiate Athletics	$122.6 million
Teaching Hospitals	$109.6 million
Capital Expenditures	
Construction	$503.6 million
Equipment and Manufactured Goods	$88.9 million
Nonresident Student Spending	
Total Spending	$452.8 million
Nonresident Students	33,566
Room/Board/Living Expenses	$13,490 per student per year
Total Direct Expenditures	$5.497 billion

$2.53 billion in FY2016 (**Figure 12**). Fringe benefits comprise 25.6 percent ($649.6 million) of compensation and range from 23 to 31 percent at the institution level.

Compensation captures the earnings of employees across all areas of the System, including both institutions and constituent agencies, and represents approximately 57 percent of total systemwide expenditures. The large share of expenditures devoted to compensation reflects the highly labor-intensive nature of education delivery and is typical of most service-providing sectors. Viewed more broadly, the earnings of System employees comprise 2.7 percent of the $94.65 billion in total employee compensation earned statewide in 2016.

The subsequent spending of compensation by System employees within the state is a significant source of spillover economic activity. Employee compensation is modeled in IMPLAN as an increase in the employee compensation component of labor income rather than as a component of value added at the industry level. Entering compensation in the model in this fashion shifts the focus of the analysis from the receipt of income to the activity generated by the spending of income. As a result, only induced effects from compensation are generated in the results. The share of spending occurring within the state or local region is determined by spending patterns and import ratios within the IMPLAN model.

Industry Purchases. The second component of System expenditures is the purchase of goods and services to facilitate the operations of the System. These expenditures include a broad range of goods and services and comprise the remaining 43 percent ($1.92 billion) of total System expenditures. The net effects of these purchases on the rest of the state and regional economies

are determined in part by the share of these goods and services purchased within the region rather than imported.

Expenditures on goods and services are divided into four subgroups, and each is paired with a comparable IMPLAN sector that best reflects the underlying nature of the activity taking place. Three sectors – sponsored research and programs, intercollegiate athletics, and medical teaching hospitals – are modeled using non-education industry sectors within IMPLAN. All remaining expenditures are considered traditional general education and administrative expenses of the System and are modeled using an education-based industry sector in IMPLAN. The treatment of each spending group within the model is discussed in the following sections.

General Education and Administrative Expenditures. Traditional education and administrative expenditures of the System (net of compensation) totaled $1.49 billion in FY2016. These items include professional services, travel, utilities, supplies, equipment, library materials, and other operating expenses. Also included are scholarships, fellowships, grants, and other student aid which are assumed to be used by students to offset the direct cost of education. No detailed industry sector for public higher education is available in IMPLAN. Hence, these expenditures, as well as the share spent locally, is modeled using the IMPLAN spending profile for private higher education institutions in the state. Swenson (2014) evaluates the use of the private education sector in IMPLAN to model public university expenditures and finds that it can produce results consistent with those arising from the use of an industry-level breakdown of spending.

Sponsored Research and Programs. Spending on goods and services related to sponsored research and programs (net of compensation) totaled $195.6 million in FY2016. These expenditures are believed to match most closely with the spending profile used in the scientific research and development sector in IMPLAN. Lack of access to budget details limits the ability to allocate these expenditures to individual industry sectors.

Intercollegiate Athletics. The System engaged in an estimated $122.6 million in spending on goods and services (net of compensation) associated with intercollegiate athletics in FY2016. Approximately 90 percent of the expenditures are made by the state's two research universities. This spending is believed to be fundamentally different from core higher education expenditures. No detailed budget is available for these expenditures which eliminates the option of using a custom spending pattern within IMPLAN. After reviewing the detailed spending patterns across the various sports-related sectors available in IMPLAN, we believe the spectator sports companies sector provides the most comparable spending profile. Regardless of the sports-related sector chosen, the overall results are largely insensitive to the sector chosen. Tests suggest that the spectator sports companies sector generally has slightly higher output multipliers than the other sports-related sectors but slightly lower labor income multipliers. Employment multipliers are roughly comparable across the various sports-related sectors.

Teaching Hospitals. Health care operations expenditures tied to the OU- and OSU-operated medical teaching hospitals totaled $109.6 million (net of compensation) in FY2016. These expenditures

are modeled using the spending pattern in the private hospital sector in IMPLAN. A detailed breakdown of spending is not available. Despite the public-sector nature of the OU and OSU teaching hospitals, the spending profile of the private hospital sector in IMPLAN is believed to be the best available representation of expenditures associated with running the facilities.

Capital Expenditures. Capital spending is another recurring source of economic activity generated by the operations of the System. Capital expenditures across the System totaled $592.5 million in FY2016. These expenditures typically are used to fund either construction projects or purchases of manufactured goods. The largest share of capital spending is for construction, and the largest individual capital purchases are typically construction-related. Historically, the state's research institutions have received the largest share of capital spending projects.

Review of the details of past capital budgets at several institutions suggests that approximately 85 percent of capital spending historically is for construction while 15 percent goes toward a range of manufactured items. For construction spending, an estimated 30 percent is for residential buildings, 50 percent for nonresidential buildings, and 20 percent for maintenance, repair, and expansion. Among manufactured items, approximately 75 percent is for durable goods and 25 percent for nondurable goods. The estimated shares reported across the various categories of capital spending can vary significantly from year to year but represent a long-term average.

In the IMPLAN analysis, construction spending is aggregated into three sectors - residential, nonresidential, and maintenance and repair. Construction capital expenses are assigned to the three aggregates sectors as follows: 30 percent to residential, 50 percent to nonresidential, and 20 percent to maintenance and repair. Capital purchases of manufactured goods cross into numerous IMPLAN sectors. In the IMPLAN analysis, capital spending is treated as an industry purchase whereby 75 percent of capital expenditures is assigned to an aggregated sector holding all durable goods sectors and the remaining 25 percent is assigned to an aggregated sector holding all nondurable goods sectors.

Non-Resident Spending. It is common to include some portion of student spending as a related economic impact when modeling the economic contribution of a public college or university. The direct impact of tuition, fees, and books and supplies are already captured through the expenditures used to fund the operation of the System as described above. Purchases of books and supplies are assumed largely captured by auxiliary enterprises operated by the System, primarily bookstores. While a small share of these items is undoubtedly purchased from other sources within the state, they are treated as fully captured within System expenditures. The overall impact results are not believed to be sensitive to this treatment of book and supply purchases.

However, considerable debate surrounds the exact portion of personal student spending that should be treated as net new spending. Spending on room, board, and other personal items by *state* residents is generally considered merely a shift in the location where living expenses are

paid within the state. The portion that is most universally accepted is the personal spending of *non-resident* students on room, board, and personal items.

When doing a state-level analysis, the estimated share of new spending includes the cost of room, board, and personal items of students originating from other states and other countries. However, when examining the local impact of an individual institution, net new student spending also includes the cost of room, board, and personal items for students who are state residents but originate from outside the local region.

State-Level Student Spending Estimates. A reported 35,333 nonresident students attended one of the state's public colleges and universities in FY2016. This includes students from other states and nations. We reduce the total to allow for five percent of nonresidents who are near the border and within driving distance of a state institution. Nonresident students are assumed to spend an average of $13,490 annually on room, board, and other living expenses. This cost is derived from reports provided by the System that reflect the overall average cost of attendance. The per student cost is also representative of the cost reported in several other reports examining student spending in comparable low-cost states.[32] At the state level, we do not differentiate among on-campus and off-campus room and board costs and treat them as equal across institution types and student categories. Little net difference in cost is believed to exist in most areas of the state given the range of available housing options in most college and university communities. The overall economic impact results are not sensitive to this assumption.

Based on the adjusted number of nonresident students and their expected average annual expenditures, net new expenditures by nonresident students in the state total an estimated $452.8 million in FY2016. This represents net new spending of $12,815 per nonresident student after adjustments. Rather than constructing an arbitrary spending profile in IMPLAN for nonresident spending, this spending is modeled as an increase in household income in the state. Total expenditures are spread across the five lowest income brackets in IMPLAN to reflect a relatively low overall average income but some inherent variability in student income.[33]

STATE EXPENDITURE IMPACTS

Gross economic spillover impacts resulting from System expenditures detailed in **Figure 37** are estimated for the state in FY2016. Included are estimates of the amount of employment, employee compensation, and economic output supported by the state's public colleges and universities, both directly and through spillover effects.[34]

The impact results detailed in **Figure 38** suggest that the operations of the state's public colleges and universities have a sizeable influence on the broader state economy. In total, the System supported an estimated 78,500 jobs, $3.78 billion in employee compensation, and $8.21 billion in economic output in FY2016.

The $8.21 billion in total economic output is the broadest measure of the total economic contribution of the System and can be partitioned into direct, indirect, and induced effects.[35] The

direct effect includes $5.05 billion in direct economic output generated by the System. The direct output of the System in turn supports an incremental $3.16 billion in indirect and induced output in other industries statewide. In other words, each dollar of direct output within the System supports an additional $0.63 in estimated output statewide. The *indirect* effect is the economic output generated in the state resulting from expenditures on goods and services to support the operations of the System and to fund capital expenditures. The *induced* effect reflects the economic output generated in other sectors of the state economy resulting from new household spending in the state out of employee compensation received as part of the direct and indirect effects.

The total impact of $3.78 billion in employee compensation supported by the System's activities and expenditures can also be partitioned into direct, indirect, and induced effects. The *direct* effect includes $2.53 billion in compensation paid to System employees and an estimated $233.2 million in compensation paid to workers engaged in capital projects. The direct compensation earned within the System supports an incremental $1.02 billion in indirect and induced compensation earned by workers in other industries statewide. Each dollar of direct compensation earned by System employees supports an additional $0.45 of compensation earned statewide. The *indirect* effect is the compensation paid in the state resulting from expenditures on goods and services to support the operations of the System and through capital expenditures. The *induced* effect reflects the compensation paid in other sectors of the state economy resulting from new household spending in the region out of employee compensation received as part of the direct and indirect effects. The $3.78 billion in estimated employee compensation supported by the System represents 4.0 percent of total statewide compensation paid in 2016.

Measured by direct employment, 54,127 employees worked either within the System or were engaged in work related to capital projects. This employment supports an additional 24,407 jobs statewide through estimated indirect and induced effects. The *indirect* effect is the employment generated across the state as a result of expenditures by the System on goods and services and capital projects. The *induced* effect reflects the employment generated in other sectors of the economy resulting from new household spending in the region out of household earnings received as part of the direct and indirect effects. In total, the operations of the System directly and indirectly support more than 78,500 jobs statewide.

Figure 38. Operational Expenditure Spillover Effects – State of Oklahoma

Impact Type	Employment	Employee Compensation	Output
Direct Effect	54,127	$2,767,076,840	$5,046,555,285
Indirect Effect	4,214	174,219,733	501,217,240
Induced Effect	20,193	843,499,490	2,660,592,918
Total Effect	78,534	$3,784,796,063	$8,208,365,443
Multiplier	1.45	1.37	1.63

LOCAL INSTITUTION EFFECTS

Impact estimates are next formed for the localized impact each individual institution and constituent agency has on its respective local operating region.[36] The operating region is defined as the individual county or group of counties believed to best represent the primary market area.[37]

Institution-level spending data for each item used in the impact analysis is detailed in **Figure 39**. These spending items include employee compensation, spending on goods and services, capital spending, and nonlocal net student spending. All items except net student spending are calculated in the same manner used in the state-level analysis. The method used to form estimates of net student spending at the local level for each institution and agency is detailed in the following section.

Local Net Student Spending. When forming student net spending estimates for individual institutions and constituent agencies, students who are residents of the state but originate from outside the local area are also adding net new *nonlocal* spending to the region. Unfortunately, there is no direct method for calculating this nonlocal spending share. An underlying data concern is the reliability of using student reported permanent addresses to gauge the true residency of a student. In addition, nearly all students bring some new local spending to the region tied to their attendance. Whether meals, incidental spending, or convenience shopping, some small share of every student's local spending is tied to their enrollment. Hence, our estimates which use just room, board, and personal expenses are likely to provide a conservative estimate of the true share of nonlocal spending.

Net new student spending at the local level is estimated in two steps. First, all students originating from outside the state or nation are considered to produce net new spending in the local regional economy. An estimated 36.8 percent of students attending research universities are nonresidents originating from outside the state or country. The share is 40.9 percent at the University of Oklahoma and 32.6 percent at Oklahoma State University. The share falls to only 22.6 percent for regional universities. Regional universities with relatively high shares of students from outside the state or nation include Panhandle State (51.3 percent), Langston (43.4 percent), and the University of Central Oklahoma (35.6 percent). The nonresident share falls to 7.8 percent across two-year colleges. Two institutions along the state border – Northeastern Oklahoma A&M (21.3 percent) and Western Oklahoma State College (16.2 percent) - are the only two-year institutions with more than 15 percent of students from outside the state or nation.

Second, a fraction of the remaining students who are state residents but are from outside the local region are assumed to represent net new spending in the local area. This true fraction is unknown but is largely influenced by the type of institution, share of part-time students, and commuting proximity to an urban region. Research and regional universities have a much higher share of full-time students and attract more students from outside the immediate region of the institution. At research universities, the ratio of FTE students to total students is 0.72. This

suggests that the average student is taking a nearly 75 percent course load, with most attending full-time. The share is slightly lower at 0.64 for regional universities, with most students still enrolled full-time. The share falls sharply to only 0.43 at two-year colleges which are more heavily weighted toward part-time students who commute from local communities. This suggests that the average community college student is taking slightly less than a 50 percent course load. These students do not typically move outside their primary county of residence to attend college on a part-time basis. As a result, net new spending in the region by most students at two-year colleges is limited to incidental spending while in the local area.

Detailed data on originating country, state, or county of residence are available for students at the state's two research universities. For the University of Oklahoma, 40.9 percent of students are from outside the state or are international students. These students are all deemed to bring net new spending to the metro area. An additional 24.2 percent of all University of Oklahoma students originate from outside the Oklahoma City metropolitan area are treated as nonlocal. In total, 65.1 percent of students are treated as nonresidents or nonlocal for student spending purposes and are considered to bring net new spending to the Oklahoma City metro area.

For Oklahoma State University-Stillwater, 32.6 percent of students are from outside the state of Oklahoma, including international students. Of the remaining 67.4 percent, only 7.4 percent of students originate locally from Payne County. The remaining 60 percent are from other counties across the state. This small local share reflects the relatively small population base located in Payne County. However, because student commuting to Stillwater from both Oklahoma City and Tulsa are common, we assume that only 75 percent of state resident students from outside Payne County are living locally. Hence, 77.6 percent of all students in Stillwater are estimated to bring net new spending to Payne County.

Detailed data are not available on residence by county for most regional universities and two-year colleges. For these institutions, the share of total students attending from outside the state or country is used to approximate the attractiveness and subsequent pull of students from within the state but outside the immediate region. This share of state resident students is added to the share of students from outside the state or country to determine the total share of students who represent net new spending in the local region. The same approach is used for all constituent agencies.

The estimated share of nonlocal spending is highly variable across institution types. Across two-year colleges, the spending of 17.5 percent of students represents net new spending in the region – 9.5 percent from outside the state or nation and 8.0 percent from state residents outside the local area. For the state's regional universities, the average share of net new local spending reaches 39.5 percent of students – 23.8 percent from outside the state or nation and 15.7 percent from state residents outside the local area. At the state's research universities, an average of 71.3 percent of students represent net new spending in the local region – 36.7 percent from outside the state or nation and 34.6 percent from state residents outside the local area.

The nonresident and nonlocal spending share is also highly variable within each institution category. For regional universities, relatively high shares are estimated for Panhandle State University (76.2 percent), Langston University (68.0 percent), and the University of Central Oklahoma (51.7 percent). Relatively low shares are estimated for the University of Science and Arts of Oklahoma (11.6 percent) and Northeastern State University (16.8 percent). Among two-year colleges, relatively high shares are estimated for Northeastern Oklahoma A&M (31.3 percent), Tulsa Community College (29.8 percent), and Carl Albert State College (29.2 percent). Relatively low shares are estimated for Rose State College (3.2 percent), Seminole State College (6.9 percent), and Connors State College (10.5 percent).

Measured across each local institution, a total of $1.01 billion in student spending is treated as net new nonlocal spending from outside the region where the institutions operate. This broader definition results in slightly more than double the $452.8 million in estimated net new spending identified in the state-level student spending analysis.

Local Economic Impacts. Estimated gross economic spillover impacts resulting for each institution and constituent agency in the System in FY2016 are detailed in **Figure 40**. Included are estimates of the amount of employment, employee compensation, and economic output supported by these entities, both directly and through spillover effects.

Measured by total estimated economic output, the state's two research universities and health-related constituent agencies exerted the greatest overall impact on their local regional economies in FY2016. The University of Oklahoma Health Sciences Center supported the greatest amount of local economic activity among all institutions and constituent agencies. The facility supports approximately $1.85 billion in total economic activity, 10,700 jobs, and $1.1 billion in employee compensation in the Oklahoma City region. The University of Oklahoma campus in Norman follows closely behind, supporting a total of $1.83 billion in economic output, 20,400 jobs, and $761 million in employee compensation in the Oklahoma City region. Oklahoma State University's main campus in Stillwater ranks third, supporting $1.75 billion in economic output, 19,900 jobs, and $709 million in employee compensation in the local area. Among other constituent agencies, the OSU Center for Health Sciences supports more than $366 million in total economic output, 800 jobs, and $74 million in employee compensation.

The University of Central Oklahoma has the largest impact among regional universities, supporting approximately $685 million in economic output, 4,900 jobs, and $170 million in employee compensation in the Oklahoma City region. Among other regional universities, the largest total economic output impacts are at Northeastern State University ($198 million), Langston University ($185 million), East Central University ($150 million), Southwestern Oklahoma State University ($140 million), and Cameron University ($122 million). No other regional university supported more than $100 million in total economic output annually. The smallest regional university contribution to local economic output is at the University of Science and Arts of Oklahoma with $33 million in FY2016.

Tulsa Community College ($251 million and 3,300 jobs) and Oklahoma City Community College ($145 million in output and 2,600 jobs) supported far larger amounts of total economic output and employment than the remaining two-year institutions in FY2016. Northern Oklahoma College ($92 million) and Rose State College ($79 million) supported more than $75 million in total economic output in their operating regions. Redlands Community College generated the smallest total economic output among two-year schools with $28 million in output annually.

Among other constituent agencies, OSU-Oklahoma City supported total economic output of $133 million in FY2016, while OSU Institute of Technology in Okmulgee was responsible for $88 million in total output. Among the research university's satellite campuses in Tulsa, OSU-Tulsa supported a total of $42 million in economic output while OU-Tulsa supported $28 million.

RATIO OF ECONOMIC OUTPUT TO APPROPRIATIONS

A useful policy measure of the state's financial contribution to higher education is the ratio of the gross economic output of the System relative to the amount of state appropriations used to fund its operations. Figure 41 provides estimates of the ratio of output to appropriations for the aggregate System and each of the individual institutions and constituent agencies.

In FY2016, the state's higher education System produced an estimated $8.21 billion in gross economic output with funding from state appropriations of $874.6 million. This equates to a ratio of 9.4 dollars in economic output for each dollar of appropriations provided by the state.

The ratio varies widely across the major groups of institutions and constituent agencies. Constituent agencies produced the largest ratio of economic output to appropriations at 18.8. The state's two research universities produced an average of 12.4 dollars in output per dollar of appropriations. Regional universities produced 9.1 dollars on average, while two-year colleges generated an average of 7.1 dollars.

Among the individual institutions and agencies producing the most economic output relative to appropriations, the state's two medical schools – Oklahoma State University Center for Health Science (29.7) and University of Oklahoma Health Sciences Center (22.8) – produced the two highest individual ratios. Both of the state's research universities – University of Oklahoma-Norman (14.7) and Oklahoma State University-Stillwater (10.6) – produced more than 10 dollars in economic output per dollar of appropriations. Two regional universities – University of Central Oklahoma (14.8) and Langston University (11.3) – and two two-year institutions – Oklahoma State University-OKC (13.1) and Northern Oklahoma College (10.3) – similarly produced more than 10 dollars in output per dollar of appropriations. All other regional universities and two-year colleges produced less than 10 dollars in economic output per dollar of appropriations. The Tulsa branch campuses of the state's research universities – Oklahoma State University-Tulsa (4.2) and University of Oklahoma-Tulsa (4.0) – produced the lowest ratios of economic output to appropriations.

Figure 39. Direct Expenditure Impacts by Institution and Agency

	Operations Spending ($millions)								Local Student Spending	
	Total	Employee Comp.	Total Goods & Services	General Edu. & Admin	Sponsored Research & Programs	Inter-collegiate Athletics	Teaching Hospitals	Capital Spending	State-Level Nonresident Spending	Local-Level Nonresident Spending
RESEARCH UNIVERSITIES										
OU-Norman	$929.5	$545.0	$384.5	$258.0	$62.0	$64.4	$0.0	$120.0	$133.7	$234.9
OSU-Stillwater	843.2	487.6	355.7	280.9	28.3	46.4	0.0	159.1	102.9	241.4
REGIONAL UNIVERSITIES										
Univ. of Central Oklahoma	245.7	120.7	125.0	119.5	3.8	1.7	0.0	165.3	59.9	76.9
East Central Univ.	63.3	31.5	31.8	28.3	2.1	1.3	0.0	24.9	8.3	20.8
Northeastern State Univ.	119.3	60.6	58.8	57.8	0.0	0.9	0.0	1.5	8.9	22.0
NW OK State Univ.	36.3	18.2	18.2	17.2	0.5	0.5	0.0	0.7	6.8	15.9
SE OK State Univ.	56.5	31.5	25.0	24.6	0.0	0.3	0.0	2.8	11.7	27.5
SW OK State Univ.	79.7	43.3	36.4	35.5	0.9	0.0	0.0	5.8	9.1	21.8
Cameron Univ.	66.4	34.5	31.9	30.6	0.6	0.7	0.0	3.3	11.9	28.9
Langston Univ.	75.9	27.8	48.2	40.9	6.6	0.8	0.0	21.6	13.2	27.4
OK Panhandle State Univ.	25.5	9.8	15.7	15.1	0.0	0.6	0.0	1.0	7.7	15.2
Univ. of Sci. & Arts	17.3	9.8	7.6	7.4	0.1	0.1	0.0	1.9	1.8	4.2
Rogers State Univ.	51.0	24.4	26.7	24.9	0.9	0.9	0.0	1.5	3.0	7.9
TWO-YEAR COLLEGES										
Carl Albert State College	$26.1	$12.9	$13.3	$12.0	$1.1	$0.2	$0.0	$1.4	$4.4	$11.4
Connors State College	27.0	9.4	17.5	16.8	0.7	0.0	0.0	0.4	1.5	4.3
Eastern OK State College	27.1	10.1	17.0	15.5	1.2	0.3	0.0	0.7	1.3	3.7
Murray State College	30.7	12.0	18.7	18.0	0.6	0.0	0.0	0.4	2.7	7.4
NEO A&M College	30.2	12.3	17.9	14.7	0.7	2.4	0.0	1.2	5.5	14.2
Northern OK College	51.0	19.4	31.6	31.1	0.2	0.2	0.0	0.0	6.2	18.3
OKC Community College	89.0	46.3	42.8	40.7	2.1	0.0	0.0	1.2	18.9	58.2
Redlands Community College	17.4	9.1	8.4	7.2	1.1	0.0	0.0	0.4	1.4	5.0
Rose State College	41.0	29.0	12.0	10.8	0.9	0.3	0.0	4.3	1.3	4.1
Seminole State College	21.0	9.3	11.7	11.3	0.0	0.4	0.0	0.6	1.3	3.8
Tulsa Community College	147.6	83.8	63.7	63.7	0.0	0.0	0.0	2.7	7.1	23.3
Western OK State College	14.5	7.3	7.2	6.7	0.4	0.0	0.0	0.4	2.9	8.3
CONSTITUENT AGENCIES										
OU Health Sci. Center	$997.7	$706.3	$291.3	$120.4	$67.2	$0.0	$103.7	$6.5	$9.4	$17.7
OU-Tulsa	15.0	11.4	3.6	3.6	0.0	0.0	0.0	0.0	2.4	8.5
OSU-Tulsa	22.3	17.0	5.4	5.4	0.0	0.0	0.0	1.5	2.1	8.4
OSU Inst. of Technology	48.2	23.4	24.8	23.4	1.4	0.0	0.0	1.0	2.6	39.0
OSU-OKC	60.4	21.5	38.9	30.5	8.4	0.0	0.0	13.5	0.9	21.6
OSU Center for Health Sci.	178.2	49.0	129.2	119.8	3.8	0.0	5.6	47.0	2.0	4.4

Figure 40. Estimated Economic Impacts by Institution and Agency

	Employment (Full- and Part-Time Jobs)				Employee Compensation ($millions)				Economic Output ($millions)			
RESEARCH UNIVERSITIES	**Direct**	**Indirect**	**Induced**	**Total**	**Direct**	**Indirect**	**Induced**	**Total**	**Direct**	**Indirect**	**Induced**	**Total**
OU-Norman	14,494	1,594	4,348	20,437	$572.3	$40.1	$148.8	$761.1	$1,164.9	$139.8	$524.2	$1,828.9
OSU-Stillwater	13,651	1,092	5,187	19,931	521.7	41.7	146.1	709.5	1,102.5	99.2	551.3	1,753.0
REGIONAL UNIVERSITIES	**Direct**	**Indirect**	**Induced**	**Total**	**Direct**	**Indirect**	**Induced**	**Total**	**Direct**	**Indirect**	**Induced**	**Total**
Univ. of Central Oklahoma	3,112	373	1,400	4,886	$136.4	$6.8	$27.3	$170.5	$472.6	$33.1	$179.6	$685.3
East Central Univ.	1,001	110	450	1,562	33.4	2.7	7.7	43.7	92.6	6.5	50.9	150.0
Northeastern State Univ.	1,961	98	628	2,687	67.8	6.1	25.8	99.7	135.3	10.8	51.4	197.5
NW OK State Univ.	712	36	185	932	20.3	1.0	4.7	26.0	40.3	2.0	15.7	58.1
SE OK State Univ.	959	96	470	1,525	35.9	2.9	7.2	46.0	66.4	8.0	24.6	98.9
SW OK State Univ.	1,332	93	373	1,799	45.9	3.7	11.5	61.0	97.5	5.8	37.0	140.4
Cameron Univ.	1,120	146	291	1,557	38.0	3.0	13.3	54.3	78.8	4.7	38.6	122.1
Langston Univ.	720	72	216	1,009	30.8	2.5	11.1	44.4	112.2	14.6	58.3	185.0
OK Panhandle State Univ.	364	44	167	574	11.0	0.7	3.2	14.9	27.8	3.6	15.0	46.4
Univ. of Sci. & Arts	352	39	144	535	11.0	0.7	2.3	14.0	21.7	1.3	10.2	33.2
Rogers State Univ.	693	42	208	943	27.3	1.9	10.7	39.9	57.3	2.9	33.2	93.4
TWO-YEAR COLLEGES	**Direct**	**Indirect**	**Induced**	**Total**	**Direct**	**Indirect**	**Induced**	**Total**	**Direct**	**Indirect**	**Induced**	**Total**
Carl Albert State College	439	53	180	671	$13.6	$1.2	$4.9	$19.8	$30.6	$3.1	$16.5	$50.2
Connors State College	317	38	83	438	10.9	0.7	3.5	15.0	28.5	2.0	14.0	44.5
Eastern OK State College	341	20	99	460	11.0	0.6	4.5	16.1	29.2	3.5	14.3	47.0
Murray State College	368	29	180	578	13.4	0.7	3.1	17.1	34.5	2.8	12.8	50.1
NEO A&M College	438	35	131	604	13.9	1.1	5.6	20.5	34.5	2.8	20.7	58.0
Northern OK College	694	42	201	937	20.4	1.6	4.5	26.5	56.1	4.5	32.0	92.5
OKC Community College	1,636	164	785	2,585	50.4	2.5	10.6	63.5	95.6	7.6	42.1	145.3
Redlands Community College	327	20	98	445	9.5	0.6	2.4	12.5	18.9	1.3	7.8	28.0
Rose State College	921	101	295	1,318	33.0	1.7	11.6	46.2	47.5	4.8	26.6	78.9
Seminole State College	278	25	78	381	10.5	0.7	4.0	15.2	22.3	2.7	8.7	33.6
Tulsa Community College	2,135	214	961	3,310	96.4	8.7	21.2	126.3	165.2	18.2	67.7	251.1
Western OK State College	271	33	76	380	8.1	0.6	1.9	10.6	16.5	0.8	9.0	26.3
CONSTITUENT AGENCIES	**Direct**	**Indirect**	**Induced**	**Total**	**Direct**	**Indirect**	**Induced**	**Total**	**Direct**	**Indirect**	**Induced**	**Total**
OU Health Sci. Center	7,915	475	2,375	10,764	$798.2	$63.9	$271.4	$1,133.4	$1,094.5	$54.7	$700.5	$1,849.8
OU-Tulsa	171	12	46	229	12.8	1.0	3.4	17.2	16.2	1.8	10.4	28.4
OSU-Tulsa	266	16	91	373	18.8	1.5	4.3	24.7	27.2	2.2	12.2	41.6
OSU Inst. of Technology	594	42	172	808	24.8	1.5	6.9	33.2	56.1	3.9	28.0	88.1
OSU-OKC	577	35	150	762	24.5	1.5	7.3	33.3	82.7	7.4	43.0	133.2
OSU Center for Health Sci.	606	42	200	848	53.4	4.3	16.0	73.7	236.4	11.8	118.2	366.5

FIGURE 41. RATIO OF GROSS ECONOMIC OUTPUT TO APPROPRIATIONS

	Gross Economic Output ($millions)	Final Revised FY2016 Appropriations ($millions)	Ratio of Economic Output to Appropriations
RESEARCH UNIVERSITIES	$3,581.9	$289.0	12.4
OU-Norman	1,828.9	124.2	14.7
OSU-Stillwater	1,753.0	164.8	10.6
REGIONAL UNIVERSITIES	$1,810.3	$199.6	9.1
Univ. of Central Oklahoma	685.3	46.4	14.8
East Central Univ.	150.0	15.4	9.8
Northeastern State Univ.	197.5	32.3	6.1
NW OK State Univ.	58.1	8.9	6.5
SE OK State Univ.	98.9	16.4	6.0
SW OK State Univ.	140.4	19.9	7.1
Cameron Univ.	122.1	19.0	6.4
Langston Univ.	185.0	16.3	11.3
OK Panhandle State Univ.	46.4	6.3	7.3
Univ. of Sci. & Arts	33.2	6.5	5.1
Rogers State Univ.	93.4	12.3	7.6
TWO-YEAR COLLEGES	$905.5	$127.6	7.1
Carl Albert State College	50.2	5.6	8.9
Connors State College	44.5	6.0	7.5
Eastern OK State College	47.0	5.7	8.3
Murray State College	50.1	5.1	9.9
NEO A&M College	58.0	7.8	7.4
Northern OK College	92.5	9.0	10.3
OKC Community College	145.3	22.2	6.6
Redlands Community College	28.0	5.6	5.0
Rose State College	78.9	18.2	4.3
Seminole State College	33.6	5.2	6.4
Tulsa Community College	251.1	32.1	7.8
Western OK State College	26.3	5.1	5.2
CONSTITUENT AGENCIES	$2,507.6	$133.4	18.8
OU Health Sci. Center	1,849.8	81.2	22.8
OU-Tulsa	28.4	7.1	4.0
OSU-Tulsa	41.6	9.8	4.2
OSU Inst. of Technology	88.1	12.7	7.0
OSU-OKC	133.2	10.1	13.1
OSU Center for Health Sci.	366.5	12.3	29.7
ALL INSTITUTIONS AND CONSTITUENT AGENCIES	$8,208.4	$874.6	9.4

Note: The gross economic output and appropriations estimates for the individual institutions and constituent agencies do not sum to the total for all institutions and agencies. Economic output estimates at the institution and agency level include a broader measure of net new student expenditures than the aggregate estimate. Aggregate appropriations include funding items that are not attributed to any individual institution or agency.

Appendix

Figure A1. Oklahoma Public Higher Education Enrollment by Institution

INSTITUTION	FY2006	FY2007	FY2008	FY2009	FY2010	FY2011	FY2012	FY2013	FY2014	FY2015	FY2016	10 Year Change	10 Year % Change
RESEARCH UNIVERSITIES													
OU-Norman	31,562	30,249	29,965	30,176	30,553	30,184	31,351	31,387	31,401	31,528	31,945	383	1.2%
OU Health Sci. Center	3,804	4,040	4,188	4,427	4,523	4,253	4,005	3,927	3,841	3,762	3,667	-137	-3.6%
OSU-Stillwater	27,291	26,751	26,448	26,438	26,340	26,824	27,802	28,765	29,225	28,997	28,858	1,567	5.7%
OSU Center for Health Sci.	296	435	420	433	431	433	432	468	579	753	908	612	206.8%
Total	**62,953**	**61,475**	**61,021**	**61,474**	**61,847**	**61,694**	**63,590**	**64,547**	**65,046**	**65,040**	**65,378**	**2,425**	**3.9%**
REGIONAL UNIVERSITIES													
Univ. of Central Oklahoma	19,167	18,853	18,745	18,912	19,450	20,387	20,464	20,625	20,442	20,083	20,068	901	4.7%
East Central Univ.	6,040	5,738	5,727	5,705	5,889	6,140	6,102	5,947	5,690	5,458	5,450	-590	-9.8%
Northeastern State Univ.	11,434	11,218	10,907	10,584	11,261	11,466	11,114	10,429	10,177	9,882	9,734	-1,700	-14.9%
NW OK State Univ.	2,756	2,594	2,521	2,611	2,756	2,780	2,740	2,760	2,709	2,612	2,598	-158	-5.7%
SE OK State Univ.	4,979	4,819	4,858	4,854	5,289	5,238	5,235	5,024	4,785	4,701	4,589	-390	-7.8%
SW OK State Univ.	6,286	6,300	6,135	5,984	6,218	6,297	6,255	5,952	5,821	5,907	6,074	-212	-3.4%
Cameron Univ.	7,853	7,652	7,248	7,247	8,074	8,242	8,262	7,824	7,275	6,689	6,288	-1,565	-19.9%
Langston Univ.	3,946	3,447	3,383	3,654	3,487	3,510	3,626	3,140	3,085	3,053	2,985	-961	-24.4%
Univ. of Sci. & Arts	1,714	1,786	1,592	1,410	1,307	1,259	1,191	1,138	1,064	1,037	994	-720	-42.0%
OK Panhandle State Univ.	1,356	1,378	1,438	1,489	1,575	1,651	1,718	1,598	1,613	1,520	1,479	123	9.1%
Rogers State Univ.	5,232	5,252	5,109	5,110	5,502	5,754	6,011	6,007	5,548	4,977	5,006	-226	-4.3%
Total	**70,763**	**69,037**	**67,663**	**67,560**	**70,808**	**72,724**	**72,718**	**70,444**	**68,209**	**65,919**	**65,265**	**-5,498**	**-7.8%**
TWO-YEAR COLLEGES													
Connors State College	3,032	3,013	3,108	3,204	3,248	3,596	3,359	3,151	3,113	3,023	3,012	-20	-0.7%
Eastern OK State College	2,302	2,473	2,418	2,688	2,898	2,824	2,632	2,639	2,378	2,209	2,150	-152	-6.6%
Murray State College	3,035	3,143	3,193	3,308	3,583	3,800	3,602	3,452	3,126	3,151	3,015	-20	-0.7%
NEO A&M College	2,897	2,696	2,692	2,629	3,133	3,268	3,461	3,343	3,087	2,911	2,764	-133	-4.6%
Northern OK College	6,626	7,055	7,127	7,097	7,404	7,484	7,404	6,937	6,865	6,843	6,657	31	0.5%
Tulsa Community College	26,586	26,517	27,409	28,760	30,487	30,502	29,396	29,130	27,530	26,355	25,153	-1,433	-5.4%
OSU-OKC	8,850	7,772	8,857	9,293	10,935	11,266	11,397	10,805	10,213	9,840	9,142	292	3.3%
OSU Inst. of Technology	3,932	4,428	4,709	5,090	5,597	5,068	5,648	5,549	5,024	4,636	3,683	-249	-6.3%
Western OK State College	2,962	3,034	2,974	3,315	5,267	7,055	8,089	8,472	2,261	2,202	2,076	-886	-29.9%
Redlands Community College	3,260	3,237	3,403	3,300	3,473	3,443	3,628	3,466	3,918	3,621	3,598	338	10.4%
Carl Albert State College	3,451	3,389	3,257	3,262	3,438	3,454	3,522	3,311	3,187	2,856	2,902	-549	-15.9%
Seminole State College	3,005	2,913	2,853	2,909	3,262	3,095	3,289	3,004	2,860	2,631	2,463	-542	-18.0%
Rose State College	12,366	12,303	12,216	12,262	13,196	13,839	11,900	11,322	10,303	9,826	9,649	-2,717	-22.0%
OKC Community College	19,710	20,021	19,375	19,817	21,632	22,391	22,578	21,524	20,456	20,454	19,668	-42	-0.2%
Total	**102,014**	**101,994**	**103,591**	**106,934**	**117,553**	**121,085**	**119,905**	**116,105**	**104,321**	**100,558**	**95,932**	**-6,082**	**-6.0%**
SYSTEM TOTAL	**235,730**	**232,506**	**232,275**	**235,968**	**250,208**	**255,503**	**256,213**	**251,096**	**237,576**	**231,517**	**226,575**	**-9,155**	**-3.9%**

Source: OSRHE

Figure A2. Total Expenditures by Activity/Function – Research Universities (FY2016)

Educational & General Part 1	OU-Norman	OSU-Stillwater	Research
Instruction	233,125,489	141,653,103	374,778,592
Research	21,749,520	36,440,992	58,190,512
Public Service	13,083,807	10,314,717	23,398,524
Academic Support	95,017,272	76,721,669	171,738,941
Student Services	17,064,306	23,817,775	40,882,081
Institutional Support	27,038,149	21,601,054	48,639,203
Operation of Physical Plant	61,668,763	46,604,099	108,272,862
Scholarships	59,416,036	73,873,827	133,289,863
Total Ed & General Part 1	**$528,163,342**	**$431,027,236**	**$959,190,578**
Educational & General Part 2	**OU-Norman**	**OSU-Stillwater**	**Research**
Auxiliary Enterprises			
Student Services	88,402,478	75,225,183	163,627,661
Faculty/Staff Services	0	0	0
Intercollegiate Athletics	107,394,192	77,325,090	184,719,282
Other Operations	6,287,681	15,418,405	21,706,086
Other Self-Supporting Activities	0	0	0
Mandatory Transfers	0	0	0
Total Auxiliary Enterprises	202,084,351	167,968,678	370,053,029
Agency Special			
Hospital and Teaching Clinics	0	0	0
Other Agency Special	0	0	0
Student Aid			
Scholarships, Fellowships, Grants	5,327,289	38,138,724	43,466,013
Other Student Aid	20,408,877	25,489,185	45,898,062
Sponsored Research & Programs	155,008,733	45,761,477	200,770,210
Total Ed & General Part 2	**$382,829,250**	**$277,358,064**	**$660,187,314**
Total Expenditures	**$910,992,592**	**$708,385,300**	**$1,619,377,892**

Source: OSRHE

Figure A2 (Cont). Total Expenditures by Activity/Function – Regional Universities (FY2016)

Educational & General Part 1	UCO	East Central	NSU	NWOSU	SEOSU	SWOSU	CAMERON	LANGSTON	PANHANDLE	USAO	Rogers	Regional
Instruction	87,204,548	20,030,237	38,446,898	10,207,106	18,956,140	29,571,627	22,416,544	10,945,815	4,815,626	5,041,508	13,107,512	260,743,561
Research	1,037,774	201,503	780,675	79,091	49,378	184,065	170,541	8,914,761	0	257,734	0	11,675,522
Public Service	992,560	374,645	216,075	0	323,341	504,489	356,562	132,375	0	9,109	363,109	3,272,265
Academic Support	15,236,844	2,172,370	6,135,121	1,600,067	2,467,902	3,298,645	2,330,722	2,477,503	1,268,690	761,376	2,504,498	40,253,738
Student Services	14,241,153	1,663,587	7,424,451	3,725,591	4,205,737	5,099,580	4,627,427	3,551,162	2,326,531	1,282,403	3,414,098	51,561,720
Institutional Support	18,451,384	3,345,762	5,799,888	1,634,087	2,817,213	4,323,138	4,330,817	4,527,056	1,857,563	1,720,721	3,807,243	52,614,872
Operation of Physical Plant	26,244,462	5,112,463	9,486,140	2,964,160	4,817,928	5,120,171	6,198,717	4,189,592	2,284,320	1,894,105	4,671,185	72,983,243
Scholarships	11,120,699	7,594,777	6,824,223	4,203,258	9,391,191	8,183,060	5,413,250	3,929,370	3,874,286	832,342	4,740,103	66,106,559
Total Ed & General Part 1	**$174,529,424**	**$40,495,344**	**$75,113,471**	**$24,413,360**	**$43,028,830**	**$56,284,775**	**$45,844,580**	**$38,667,634**	**$16,427,016**	**$11,799,298**	**$32,607,748**	**$559,211,480**
Educational & General Part 2	**UCO**	**East Central**	**NSU**	**NWOSU**	**SEOSU**	**SWOSU**	**CAMERON**	**LANGSTON**	**PANHANDLE**	**USAO**	**Rogers**	**Regional**
Auxiliary Enterprises												
Student Services	26,329,580	5,580,093	7,570,929	2,815,831	6,208,213	10,215,441	4,595,503	3,884,606	2,578,527	2,856,383	2,160,972	74,796,078
Faculty/Staff Services	558,230	0	0	0	159,615	0	0	0	70,293	150,336	0	938,474
Intercollegiate Athletics	2,820,534	2,235,953	1,545,310	768,828	527,701	0	1,140,074	1,257,514	936,583	144,519	1,491,161	12,868,177
Other Operations	0	2,692,751	8,599,677	3,495,661	39,308	0	762,068	7,205,449	1,946,494	228,616	2,152,606	27,122,630
Other Self-Supporting Activities	0	0	0	0	0	0	0	0	0	0	0	0
Mandatory Transfers	0	0	0	0	0	0	0	0	0	0	0	0
Total Auxiliary Enterprises	29,708,344	10,508,797	17,715,916	7,080,320	6,934,837	10,215,441	6,497,645	12,347,569	5,531,897	3,379,854	5,804,739	115,725,359
Agency Special												
Hospital and Teaching Clinics	0	0	0	0	0	0	0	0	0	0	0	0
Other Agency Special	0	0	0	0	0	0	0	0	61,127	115,623	0	176,750
Student Aid												
Scholarships, Fellowships, Grants	11,001,670	6,999,159	2,067,089	406,171	16,360	6,492,842	2,373,838	1,124,504	808,612	1,698,935	739,404	33,728,584
Other Student Aid	21,016,163	0	24,430,252	3,178,326	6,506,933	4,546,530	10,155,849	7,411,867	2,644,031	0	9,629,964	89,519,915
Sponsored Research & Programs	9,416,551	5,259,213	0	1,271,747	0	2,160,616	1,569,920	16,391,339	0	352,618	2,265,072	38,687,076
Total Ed & General Part 2	**$71,142,728**	**$22,767,169**	**$44,213,257**	**$11,936,564**	**$13,458,130**	**$23,415,429**	**$20,597,252**	**$37,275,279**	**$9,045,667**	**$5,547,030**	**$18,439,179**	**$277,837,684**
Total Expenditures	**$245,672,152**	**$63,262,513**	**$119,326,728**	**$36,349,924**	**$56,486,960**	**$79,700,204**	**$66,441,832**	**$75,942,913**	**$25,472,683**	**$17,346,328**	**$51,046,927**	**$837,049,164**

Source: OSRHE

Figure A2 (Cont). Total Expenditures by Activity/Function – Two-Year Colleges (FY2016)

Educational & General Part 1	Carl Albert	CONNORS	EOSC	MURRAY	NEOA&M	NOC	OCCC	REDLANDS	ROSE	SEMINOLE	Tulsa CC	WOSC	Two-Year
Instruction	5,341,071	3,928,975	4,099,520	6,729,911	5,760,882	7,702,704	31,227,380	3,550,853	19,145,724	4,549,329	41,775,903	2,849,876	136,662,128
Research	0	0	0	0	0	0	0	0	0	0	0	0	0
Public Service	0	0	0	217,091	0	192,441	457,885	382,352	342,255	0	137,258	0	1,729,282
Academic Support	726,863	1,462,151	2,073,559	1,797,523	815,207	1,660,406	1,775,187	1,745,883	1,966,012	450,908	18,724,050	1,238,811	34,436,560
Student Services	1,365,777	1,382,870	1,244,180	1,710,001	991,507	3,068,373	5,644,842	953,280	1,936,871	1,462,030	8,491,463	1,284,655	29,535,849
Institutional Support	1,328,338	1,894,274	1,611,591	1,913,189	2,287,288	2,695,629	6,952,341	1,171,796	4,085,194	1,671,088	15,018,968	1,321,312	41,951,008
Operation of Physical Plant	1,577,332	2,384,942	1,570,657	2,086,829	2,244,467	6,959,582	7,010,922	1,003,081	3,577,047	1,556,343	16,448,393	1,267,192	47,686,787
Scholarships	0	0	1,169,733	2,199,943	2,823,804	1,427,258	3,065,530	1,944,111	959,512	1,320,881	7,809,694	1,277,222	23,997,688
Total Ed & General Part 1	**$10,339,381**	**$11,053,212**	**$11,769,240**	**$16,654,487**	**$14,923,155**	**$23,706,393**	**$56,134,087**	**$10,751,356**	**$32,012,615**	**$11,010,579**	**$108,405,729**	**$9,239,068**	**$315,999,302**
Educational & General Part 2	**Carl Albert**	**CONNORS**	**EOSC**	**MURRAY**	**NEOA&M**	**NOC**	**OCCC**	**REDLANDS**	**ROSE**	**SEMINOLE**	**Tulsa CC**	**WOSC**	**Two-Year**
Auxiliary Enterprises													
Student Services	2,407,778	4,071,360	1,878,395	4,687,991	2,011,839	10,143,290	6,829,753	1,374,551	1,884,578	2,263,360	12,008,463	1,268,016	50,829,374
Faculty/Staff Services	0	0	506	0	1,869,536	4,206	1,282,289	1,845	0	0	0	157,130	3,315,512
Intercollegiate Athletics	346,637	0	500,836	0	4,031,300	394,058	0	36,685	559,983	680,902	0	150,851	6,701,252
Other Operations	3,163,849	0	2,464,096	323,729	69,163	8,489,543	137,451	305,006	117,337	385,223	1,108,583	0	16,563,980
Other Self-Supporting Activities	0	0	0	0	0	0	0	0	0	0	0	0	0
Mandatory Transfers	571,070	0	0	0	0	0	40,222	0	0	0	0	0	611,292
Total Auxiliary Enterprises	6,489,334	4,071,360	4,843,833	5,011,720	7,981,838	19,031,097	8,289,715	1,718,087	2,561,898	3,329,485	13,117,046	1,575,997	78,021,410
Agency Special													
Hospital and Teaching Clinics	0	0	0	0	0	0	0	0	0	0	0	0	0
Other Agency Special	0	0	0	0	0	0	0	82,008	0	0	0	54,619	136,627
Student Aid													
Scholarships, Fellowships, Grants	1,031,688	10,020,676	1,515,026	3,328,505	5,430,976	820,233	2,707,958	166,320	40,482	3,043,247	3,783,158	434,763	32,323,032
Other Student Aid	5,582,165	0	5,982,491	4,086,745	0	6,977,008	16,627,095	1,890,376	4,201,195	3,633,429	22,248,862	2,231,612	73,460,978
Sponsored Research & Programs	2,707,332	1,816,966	3,036,014	1,617,475	1,825,514	428,232	5,286,830	2,805,009	2,139,034	0	0	997,333	22,659,739
Total Ed & General Part 2	**$15,810,519**	**$15,909,002**	**$15,377,364**	**$14,044,445**	**$15,238,328**	**$27,256,570**	**$32,911,598**	**$6,661,800**	**$8,942,609**	**$10,006,161**	**$39,149,066**	**$5,294,324**	**$206,601,786**
Total Expenditures	**$26,149,900**	**$26,962,214**	**$27,146,604**	**$30,698,932**	**$30,161,483**	**$50,962,963**	**$89,045,685**	**$17,413,156**	**$40,955,224**	**$21,016,740**	**$147,554,795**	**$14,533,392**	**$522,601,088**

Source: OSRHE

Figure A2 (Cont). Total Expenditures by Activity/Function – Constituent Agencies (FY2016)

Educational & General Part 1	OU-HSC	OU-LAW	OU-TULSA	OSU-TULSA	OSU-CVHS	OSU-OAES	OSU-OCES	OSU-IT	OSU-OKC	OSU-CHS	Const. Agencies
Instruction	87,088,506	8,849,831	5,718,863	11,045,312	6,473,708	0	0	13,015,156	13,289,416	54,693,732	200,174,524
Research	3,398,573	0	104,599	770,604	5,077,610	37,128,099	0	0	0	2,037,158	48,516,643
Public Service	495,109	0	29,855	115,877	10,637,742	0	40,262,246	0	0	2,680,245	54,221,074
Academic Support	27,960,639	3,583,478	2,635,426	1,852,158	1,621,799	0	0	3,315,334	1,830,075	4,882,258	47,681,167
Student Services	4,485,583	1,839,165	334,304	1,891,668	255,250	0	0	2,791,542	2,390,607	852,172	14,840,291
Institutional Support	25,103,834	511,139	1,849,733	2,756,473	738,833	0	0	5,728,461	3,422,292	6,297,142	46,407,907
Operation of Physical Plant	25,368,929	1,627,743	3,697,395	2,736,614	4,246,539	0	0	3,881,567	2,855,286	6,470,490	50,884,563
Scholarships	3,924,608	2,084,586	631,580	130,464	13,275	0	0	1,511,695	943,602	635,794	9,875,604
Total Ed & General Part 1	**$177,825,781**	**$18,495,942**	**$15,001,755**	**$21,299,170**	**$29,064,756**	**$37,128,099**	**$40,262,246**	**$30,243,755**	**$24,731,278**	**$78,548,991**	**$472,601,773**
Educational & General Part 2	**OU-HSC**	**OU-LAW**	**OU-TULSA**	**OSU-TULSA**	**OSU-CVHS**	**OSU-OAES**	**OSU-OCES**	**OSU-IT**	**OSU-OKC**	**OSU-CHS**	**Const. Agencies**
Auxiliary Enterprises											
Student Services	2,530,844	0	0	748,547	0	0	0	5,055,027	1,015,536	187,895	9,537,849
Faculty/Staff Services	5,188,883	0	0	0	0	0	0	0	0	0	5,188,883
Intercollegiate Athletics	0	0	0	0	0	0	0	0	0	0	0
Other Operations	18,719,652	0	0	287,312	197,747	2,081,456	950,288	2,152,447	3,350,613	7,930,529	35,670,044
Other Self-Supporting Activities	0	0	0	0	0	0	0	0	0	0	0
Mandatory Transfers	0	0	0	0	0	0	0	0	0	0	0
Total Auxiliary Enterprises	26,439,379	0	0	1,035,859	197,747	2,081,456	950,288	7,207,474	4,366,149	8,118,424	50,396,776
Agency Special											
Hospital and Teaching Clinics	560,349,156	0	0	0	0	0	0	0	0	81,796,378	642,145,534
Other Agency Special	64,762,978	0	0	0	0	0	0	0	0	0	64,762,978
Student Aid											
Scholarships, Fellowships, Grants	317,494	0	0	0	0	67,646	0	7,290,691	10,314,483	274,047	18,264,361
Other Student Aid	0	0	0	0	0	0	0	0	0	0	0
Sponsored Research & Programs	167,978,880	0	0	6,547	8,301,995	12,962,009	3,841,734	3,463,547	20,948,876	9,425,136	226,928,724
Total Ed & General Part 2	**$819,847,887**	**$0**	**$0**	**$1,042,406**	**$8,499,742**	**$15,111,111**	**$4,792,022**	**$17,961,712**	**$35,629,508**	**$99,613,985**	**$1,002,498,373**
Total Expenditures	**$997,673,668**	**$18,495,942**	**$15,001,755**	**$22,341,576**	**$37,564,498**	**$52,239,210**	**$45,054,268**	**$48,205,467**	**$60,360,786**	**$178,162,976**	**$1,475,100,146**

Source: OSRHE

Figure A3. Capital Expenditures - Oklahoma State System of Higher Education

RESEARCH UNIVERSITIES	FY2014	FY2015	FY2016	FY2017e	FY2018e
OU-Norman	64,396,051	88,082,209	120,000,000	157,000,000	220,000,000
OSU-Stillwater	178,730,000	148,250,000	155,500,000	185,900,000	204,400,000
Total	**$243,126,051**	**$236,332,209**	**$275,500,000**	**$342,900,000**	**$424,400,000**
REGIONAL UNIVERSITIES					
Univ. of Central Oklahoma	6,110,000	6,697,699	165,298,950	27,425,893	16,763,683
East Central Univ.	11,300,000	12,800,000	24,900,000	29,000,000	29,000,000
Northeastern State Univ.	4,654,800	3,088,234	1,477,000	4,900,000	6,000,000
NW OK State Univ.	843,000	1,016,000	665,560	773,077	872,282
SE OK State Univ.	2,800,000	2,600,000	2,800,000	1,518,000	1,518,000
SW OK State Univ.	8,833,000	2,600,000	5,800,000	3,400,000	5,500,000
Cameron Univ.	3,200,000	3,200,000	3,250,000	3,550,000	5,000,000
Langston Univ.	3,924,231	15,540,000	21,579,288	20,100,000	20,650,000
OK Panhandle State Univ.	976,000	991,000	991,000	991,000	1,892,875
Univ. of Sci. & Arts	1,520,000	2,150,000	1,870,000	1,815,000	2,612,000
Rogers State Univ.	900,000	900,000	1,500,000	750,000	750,000
Total	**$45,061,031**	**$51,582,933**	**$230,131,798**	**$94,222,970**	**$90,558,840**
TWO-YEAR COLLEGES					
Carl Albert State College	436,941	1,436,941	1,436,941	3,205,845	1,341,810
Connors State College	16,000,000	436,941	436,941	354,375	332,822
Eastern OK State College	607,000	665,584	675,000	750,000	689,703
Murray State College	450,000	0	421,648	354,375	332,822
NEO A&M College	1,632,237	2,272,961	1,230,998	1,268,079	5,000,000
Northern OK College	54,725,000	53,035,000	0	37,270,000	31,685,000
OKC Community College	6,513,701	1,448,333	1,162,343	2,529,231	2,941,776
Redlands Community College	904,491	436,941	421,648	354,375	332,822
Rose State College	2,456,500	3,898,000	4,325,426	4,268,668	4,500,000
Seminole State College	600,000	600,000	600,000	600,000	600,000
Tulsa Community College	2,149,000	2,090,000	2,650,000	1,550,000	1,350,000
Western OK State College	0	0	421,648	354,375	332,822
Total	**$86,474,870**	**$66,320,701**	**$13,782,593**	**$52,859,323**	**$49,439,577**
ALL INSTITUTIONS	**$374,661,952**	**$354,235,843**	**$519,414,391**	**$489,982,293**	**$564,398,418**
CONSTITUENT AGENCIES					
OU Health Sci. Center	71,500,000	6,500,000	6,500,000	6,500,000	6,500,000
OU Law	0	0	0	0	0
OU-Tulsa	0	0	0	0	0
OSU-Tulsa	2,000,000	2,000,000	1,500,000	1,500,000	3,000,000
OSU Center for Vet. Sci.	3,000,000	5,530,000	800,000	1,000	0
OSU OK Ag. Exp. Station	100,000	0	1,000,000	3,000,000	4,600,000
OSU OK Coop. Ext. Svc.	50,000	3,000	1,750,000	1,250,000	2,000,000
OSU Inst. of Technology	2,500,000	3,500,000	1,000,000	6,955,500	2,600,000
OSU-OKC	1,201,906	900,000	13,500,000	5,800,000	1,513,000
OSU Center for Health Sci.	0	2,000,000	47,000,000	27,000,000	8,000,000
Total	**$80,351,906**	**$20,433,000**	**$73,050,000**	**$52,006,500**	**$28,213,000**
SYSTEM TOTAL	**$455,013,858**	**$374,668,843**	**$592,464,391**	**$541,988,793**	**$592,611,418**

Source: OSRHE

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Endnotes

[1] The Oklahoma State System of Higher Education was established on March 11, 1941, when the people of the state adopted an amendment to the constitution, Article XIII-A, creating the State System. The amendment provides, "All institutions of higher education supported wholly or in part by direct legislative appropriations shall be integral parts of a unified system to be known as The Oklahoma State System of Higher Education. Higher education, as the term is used in Section I of Article XIII-A, Constitution of Oklahoma, and House Bill No. 810, Chapter 396, Section 102, Session Laws 1965, is defined "...to include all education of any kind beyond or in addition to the twelfth grade or its equivalent as that grade is now generally understood and accepted in the public schools of the State of Oklahoma; provided, however, that this shall not exclude as a constituent institution any institution of higher learning which now offers as a part of its curriculum courses of high school study." Sections of the Oklahoma Constitution governing the Higher Education System are available online at: http://oklegal.onenet.net/okcon/XIII-A.html

[2] The four governing boards within the System and their respective institutions are as follows: University of Oklahoma Board of Regents – OU, CU, and RSU; Board of Regents for the Oklahoma A&M Colleges – OSU, LU, CSC, OPSU, NEOAM; Regional University System of Oklahoma – UCO, NSU, SOWSU, NWOSU, SEOSU, ECU; Institutional Boards of Regents – USAO, MSC, RSC, TCC, CASC, NOC, RCC, WOSC, EOSC, OCCC, SSC.

[3] Total enrollment is based on unduplicated headcount. OSRHE defines unduplicated headcount as follows: "To be included in the unduplicated headcount, a student must have been enrolled, paid fees, and received a class report. Each student is counted only once during the time period under consideration. The student is assigned to a class level (freshman/sophomore-lower division, junior/senior-upper division, graduate, and professional) based upon the time period under consideration. Fall semester unduplicated headcount includes only those students enrolled during that semester. Each student is counted only once for the full-year unduplicated headcount. Students are assigned to the class level in which they were enrolled in their last active semester. In this way, dropouts, stopouts, transfers, and changes in class level are considered. Headcount is unduplicated only within the institution. Consequently, a student who takes courses at two separate institutions would be counted at both institutions."

[4] OSRHE reports that 20 percent of all individual course enrollments in FY2017 were online.

[5] FY2016 estimates of private school enrollment are not yet available. See: U.S. Department of Education National Center for Education Statistics 2016 Digest of Education Statistics survey. https://nces.ed.gov/programs/digest/index.asp

[6] Approximately 77.8% attend a public two-year community college, 19.5% attend a public regional university, 2.1% attend a public research university, and 0.6% attend a private university.

[7] Data on origin of student enrollment are available online from OSRHE at: https://www.okhighered.org/studies-reports/enrollment.shtml. FY2015 is the most recent year available.

[8] Appropriations reported in this section of the report include only those directly allocated to the institutions. They exclude appropriations for scholarships, special programs, and other items.

[9] Employment and compensation data for the full System at the institution level is not available from OSRHE. Employment counts and salary totals used in the report are derived by institution from payroll files provided by the State of Oklahoma Office of Management and Enterprise Services. All datasets are available for download at https://data.ok.gov/. Datasets are available by quarter and provide salary amounts and hours worked each month. Total compensation is derived from salary amounts by using fringe benefit shares at the institution level derived from salary data published by OSRHE in FY2016 budget files for Part 1 of the E&G budget for each institution. The overall fringe benefit share of total compensation is 25.7 percent.

[10] A small number of employees not affiliated with an institution or constituent agency were employed by the State Regents for Higher Education (191 FTE) in FY2016.

[11] These estimates differ slightly from American Community Survey estimates for 2016 used in later sections of the report.

[12] https://nces.ed.gov/programs/coe/indicator_coi.asp

[13] The report is available online at: http://www.uis.unesco.org/Library/Documents/mean-years-schooling-indicator-methodology-2013-en.pdf.

[14] The Barro and Lee dataset is available online at: http://www.barrolee.com/.

[15] The interpolated estimates are derived using the Bayesian-like approach of Denton (1971). State estimates are informed in the Denton procedure using known national estimates on an annual basis as a prior.

[16] The reported share includes students enrolled both in Oklahoma and at out-of-state institutions.

[17] Earnings are derived from the March 2017 survey which asks respondents about income earned in 2016. See: https://www.census.gov/data/tables/time-series/demo/income-poverty/cps-pinc/pinc-03.html

[18] The Census survey asks respondents about their income in the prior 12 months.

[19] DESCRIBE ESTIMATES MADE. The Bureau of Economic Analysis publishes regional price parity indexes for the years 2008 through 2015. The average in these eight years is 89.6375, suggesting that the average overall price level in Oklahoma is 10.3625 percent (100.0-89.6375) lower than the U.S. level in the period. Because there is little variation in the index from 2008 to 2015 (minimum value is 88.9 and maximum value is 90.0), the index value of 88.9 reported for 2008 is used in the 2005 to 2007 period. Similarly, the 2015 index value of 89.9 is used in 2016.

[20] This is influenced in part by the in-migration of employees at the state's public colleges and universities.

[21] See student migration and residence data from the Digest of Education Statistics maintained by the National Center for Education Statistics at: https://nces.ed.gov/programs/digest/current_tables.asp?

[22] Data on origin of student enrollment are available online from OSRHE at: https://www.okhighered.org/studies-reports/enrollment.shtml. FY2015 is the most recent year available.

[23] Bils and Klenow (2000) similarly argue that higher incomes may, in fact, be driving gains in education in the highest income regions, and not the reverse. The suggestion is that parents of students completing education beyond high school generally earn higher incomes which in turn increases the ability of these families to absorb the cost of increased formal education. A similar concern persists at the international level that many countries are now rapidly increasing their overall level of educational attainment because they are increasingly growing richer and able to afford more costly education systems.

[24] While personal income includes some measures of unearned income (e.g. transfer payments) which are not directly related to current educational attainment, unearned income over the work life is known to be correlated with education level.

[25] See: Rickman, Dan S. & Wang, Hongbo & Winters, John V., 2017. "Is shale development drilling holes in the human capital pipeline?" Energy Economics, vol. 62(C), pages 283-290.

[26] The model estimation period ends in 2015 rather than 2016 due to the reporting lag for data on fixed assets at the U.S. level by Bureau of Economic Analysis.

[27] For a detailed discussion of the approach, see Yamarik (2013). The regional earnings data at the industry level used to partition the national data contain many missing and suppressed values. We estimate the missing values using a large-scale RAS approach. Priors for the estimation process are determined using either disclosed values across the full period or national industry ratios.

[28] Traded sectors are those with the following BEA industry numbers at approximately the 3-digit NAICS level: farming (71 and 81); forestry, fishing, and related activities (100); mining (200); manufacturing (500); air transportation (801); rail transportation (802); water transportation (803); truck transportation (804); transit and ground passenger transportation (805); pipeline transportation (806); scenic and sightseeing transportation (807); telecommunications (905); ISPs, search portals, and data processing (906); securities, commodity contracts, and investments (1003); arts, entertainment, and recreation (1700); accommodation (1801); and Federal government - civilian and military (2001 and 2002).

[29] A log-difference is used to approximate a percentage change.

[30] Input-output analysis is most appropriate when the policy change or stimulus does not alter production patterns, product prices, input prices, wage rates, or cost of capital. It is generally most useful when there are no capital or labor constraints.

[31] For a basic introduction to analysis-by-parts with IMPLAN, see: https://implanhelp.zendesk.com/hc/en-us/articles/115002799353-The-Basics-of-Analysis-by-Parts

[32] Estimates for the University of North Carolina System are $11,597 per year. See: http://www.northcarolina.edu/sites/default/files/documents/unc_aggregate_mainreport_1213_final_formatted2_dated_feb2015.pdf. Estimates for the University of Houston System are $12,192 per year for on-campus living and $14,922 per year for off-campus living. See: http://www.uh.edu/economicstudy/Eco-Impact-Study_10-4-13_Revised.pdf. Estimates for the University of Georgia System are $14,272 per year. See: https://www.terry.uga.edu/media/documents/USG_Impact_2015.pdf

[33] Total nonresident student spending of $452,803,654 is spread across five income brackets as follows: $158,481,279 (35%) for households with less than $10,000 in income; $113,200,913 (25%) for household with $10-15,000 in income; $90,560,731 (20%) for household with $15-25,000 in income; $45,280,365 (10%) for households with $25-35,000 in income; and $45,280,365 (10%) for households with $35-50,000 in income. This reflects that fact that most

nonresident students will have relatively low income on average. However, many will earn significant income from other sources or have other household members participating in the labor force.

[34] Caution must be exercised when using input-output analysis to estimate the total economic activity 'supported' by an existing industry or firm. Input-output multipliers are designed to predict the gross changes in a regional economy resulting from a small, incremental change in its current structure. For an accessible discussion of how multiplier-based estimates of spillover effects are frequently misused and often overstate resulting spillover effects, see Hughes (2003) and Olfert and Stabler (1994).

[35] Output for service-providing industries in IMPLAN is generally defined as total revenue or sales. For the state higher education system, total income received is approximately equal to total expenditures.

[36] Estimates for the OU Law Center and Oklahoma Geological Survey are included in the overall total for OU-Norman. The total for OSU-Stillwater includes the impact of the Center for Veterinary Sciences, Oklahoma Agricultural Experiment Service, and Oklahoma Agricultural Extension Service.

[37] Economic impact estimates are formed for seven institutions and constituent agencies using the counties comprising the Oklahoma City metropolitan area – University of Oklahoma (OU), University of Central Oklahoma, Langston University, Oklahoma City Community College, Rose State College, OU Health Sciences Center, and OSU-OKC. Four institutions and constituent agencies are modeled using the Tulsa metropolitan area counties – Tulsa Community College, OU-Tulsa, OSU-Tulsa, and OSU Center for Health Sciences. Carl Albert State College is modeled using Le Flore and Sequoyah counties. Northern Oklahoma College is modeled using Kay, Payne, and Garfield counties. All other institutions and agencies are modeled using the single county where the principal campus is located.

Individual College and University Economic Impact Profiles

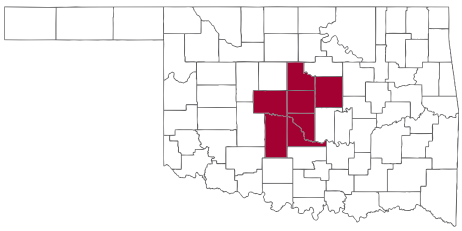
The following pages provide estimates of the FY2016 economic impacts of the State of Oklahoma's public institutions of higher education (including research and regional universities, two-year colleges, and constituent agencies) listed in the same order as Figure 39 on page 88.

These profiles include the direct expenditure impacts, the operational expenditure spillover effects, and the ratio of economic output to appropriations for each institution.

These economic impact profiles were prepared separately by the State Chamber Research Foundation using data from this report.

University of Oklahoma

Economic Impacts



The University of Oklahoma generated expenditures of $1.2 billion in FY2016 and supported approximately $1.8 billion in total economic output. With a ratio of economic output to appropriations of 14.7, the University of Oklahoma produced $14.70 in economic output per dollar of state appropriations.

There are direct, indirect, and induced economic benefits generated in the state and local regional economies through the operational expenditures of the faculty, staff and students of the University of Oklahoma. The following table details the FY2016 expenditures used to calculate the institution's local regional economic impacts.

Expenditure Impacts (FY2016)

Expenditure	Amount ($ millions)
Employee Compensation	$545.0
General Education & Administrative Expenditures	$258.0
Sponsored Research & Programs	$62.0
Intercollegiate Athletics	$64.4
Teaching Hospitals	$0.0
Capital Expenditures	$120.0
Nonresident Student Spending	$133.7
Total Direct Expenditures	**$1,183.2**

The table below quantifies the broad economic impacts generated within the local region through the operations and functions of the University of Oklahoma.

Operational Expenditure Spillover Effects

Impact Type	Employment	Employee Compensation ($ millions)	Output ($ millions)
Direct Effect	14,494	$572.3	$1,164.9
Indirect Effect	1,594	$40.1	$139.8
Induced Effect	4,348	$148.8	$524.2
Total Effect	**20,437**	**$761.1**	**$1,828.9**
Multiplier	1.41	1.33	1.57

A useful policy measure of the state's financial contribution to higher education is the ratio of the gross economic output of the System relative to the amount of state appropriations used to fund its operations. The table below provides an estimate of the ratio of output to appropriations for the University of Oklahoma.

Ratio of Economic Output to Appropriations

Gross Economic Output ($ millions)	Final Revised FY16 Appropriations ($ millions)	Ratio of Economic Output to Appropriations
$1,828.9	$124.2	14.7

Impact Types

Direct Effect: The specific impact of the employment and operational expenditures related to the higher education institution.

Indirect Effect: The impact of expenditures by higher education-related suppliers.

Induced Effect: The additional impact of the spending of employees and suppliers' employees in the overall economy that can be attributed to the higher education-related expenditures.

The three types—direct, indirect, and induced—together, are considered the ***total effect***. The ***multiplier*** is the ratio of total impacts to direct effects.

Definition of Impact Variables

Employment: The number of workers (full or part-time) whose employment is due, totally or in part, to the economic effects of the higher education-related expenditures.

Employee Compensation: The wages and fringe benefits received by individuals in the economy.

Output: The dollar value of expenditures.

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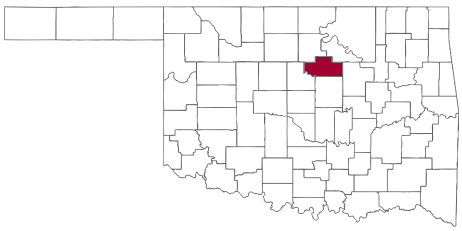
Oklahoma State University

Economic Impacts



Oklahoma State University generated expenditures of $1.1 billion in FY2016 and supported approximately $1.8 billion in total economic output. With a ratio of economic output to appropriations of 10.6, Oklahoma State University produced $10.60 in economic output per dollar of state appropriations.

There are direct, indirect, and induced economic benefits generated in the state and local regional economies through the operational expenditures of the faculty, staff and students of Oklahoma State University. The following table details the FY2016 expenditures used to calculate the institution's local regional economic impacts.

Expenditure Impacts (FY2016)

Expenditure	Amount ($ millions)
Employee Compensation	$487.6
General Education & Administrative Expenditures	$280.9
Sponsored Research & Programs	$28.3
Intercollegiate Athletics	$46.4
Teaching Hospitals	$0.0
Capital Expenditures	$159.1
Nonresident Student Spending	$102.9
Total Direct Expenditures	**$1,105.2**

The table below quantifies the broad economic impacts generated within the local region through the operations and functions of Oklahoma State University.

Operational Expenditure Spillover Effects

Impact Type	Employment	Employee Compensation ($ millions)	Output ($ millions)
Direct Effect	13,651	$521.7	$1,102.5
Indirect Effect	1,092	$41.7	$99.2
Induced Effect	5,187	$146.1	$551.3
Total Effect	**19,931**	**$709.5**	**$1,753.0**
Multiplier	1.46	1.36	1.59

A useful policy measure of the state's financial contribution to higher education is the ratio of the gross economic output of the System relative to the amount of state appropriations used to fund its operations. The table below provides an estimate of the ratio of output to appropriations for Oklahoma State University.

Ratio of Economic Output to Appropriations

Gross Economic Output ($ millions)	Final Revised FY16 Appropriations ($ millions)	Ratio of Economic Output to Appropriations
$1,753.0	$164.8	10.6

Impact Types

Direct Effect: The specific impact of the employment and operational expenditures related to the higher education institution.

Indirect Effect: The impact of expenditures by higher education-related suppliers.

Induced Effect: The additional impact of the spending of employees and suppliers' employees in the overall economy that can be attributed to the higher education-related expenditures.

The three types—direct, indirect, and induced—together, are considered the ***total effect***. The ***multiplier*** is the ratio of total impacts to direct effects.

Definition of Impact Variables

Employment: The number of workers (full or part-time) whose employment is due, totally or in part, to the economic effects of the higher education-related expenditures.

Employee Compensation: The wages and fringe benefits received by individuals in the economy.

Output: The dollar value of expenditures.

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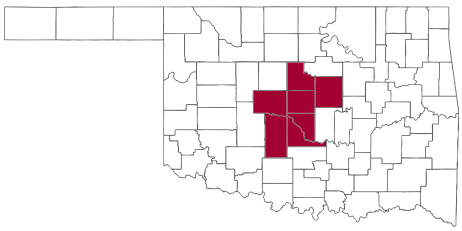
University of Central Oklahoma
Economic Impacts



The University of Central Oklahoma generated expenditures of $470.9 million in FY2016 and supported approximately $685.3 million in total economic output. With a ratio of economic output to appropriations of 14.8, the University of Central Oklahoma produced $14.80 in economic output per dollar of state appropriations.

There are direct, indirect, and induced economic benefits generated in the state and local regional economies through the operational expenditures of the faculty, staff and students of the University of Central Oklahoma. The following table details the FY2016 expenditures used to calculate the institution's local regional economic impacts.

Expenditure Impacts (FY2016)

Expenditure	Amount ($ millions)
Employee Compensation	$120.7
General Education & Administrative Expenditures	$119.5
Sponsored Research & Programs	$3.8
Intercollegiate Athletics	$1.7
Teaching Hospitals	$0.0
Capital Expenditures	$165.3
Nonresident Student Spending	$59.9
Total Direct Expenditures	**$470.9**

The table below quantifies the broad economic impacts generated within the local region through the operations and functions of the University of Central Oklahoma.

Operational Expenditure Spillover Effects

Impact Type	Employment	Employee Compensation ($ millions)	Output ($ millions)
Direct Effect	3,112	$136.4	$472.6
Indirect Effect	373	$6.8	$33.1
Induced Effect	1,400	$27.3	$179.6
Total Effect	**4,886**	**$170.5**	**$685.3**
Multiplier	1.57	1.25	1.45

A useful policy measure of the state's financial contribution to higher education is the ratio of the gross economic output of the System relative to the amount of state appropriations used to fund its operations. The table below provides an estimate of the ratio of output to appropriations for the University of Central Oklahoma.

Ratio of Economic Output to Appropriations

Gross Economic Output ($ millions)	Final Revised FY16 Appropriations ($ millions)	Ratio of Economic Output to Appropriations
$685.3	$46.4	14.8

Impact Types

Direct Effect: The specific impact of the employment and operational expenditures related to the higher education institution.

Indirect Effect: The impact of expenditures by higher education-related suppliers.

Induced Effect: The additional impact of the spending of employees and suppliers' employees in the overall economy that can be attributed to the higher education-related expenditures.

The three types—direct, indirect, and induced—together, are considered the ***total effect***. The ***multiplier*** is the ratio of total impacts to direct effects.

Definition of Impact Variables

Employment: The number of workers (full or part-time) whose employment is due, totally or in part, to the economic effects of the higher education-related expenditures.

Employee Compensation: The wages and fringe benefits received by individuals in the economy.

Output: The dollar value of expenditures.

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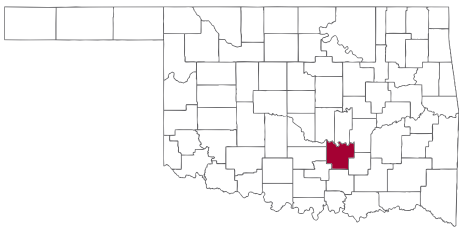
East Central University

Economic Impacts



East Central University generated expenditures of $96.5 million in FY2016 and supported approximately $150 million in total economic output. With a ratio of economic output to appropriations of 9.8, East Central University produced $9.80 in economic output per dollar of state appropriations.

There are direct, indirect, and induced economic benefits generated in the state and local regional economies through the operational expenditures of the faculty, staff and students of East Central University. The following table details the FY2016 expenditures used to calculate the institution's local regional economic impacts.

Expenditure Impacts (FY2016)

Expenditure	Amount ($ millions)
Employee Compensation	$31.5
General Education & Administrative Expenditures	$28.3
Sponsored Research & Programs	$2.1
Intercollegiate Athletics	$1.3
Teaching Hospitals	$0.0
Capital Expenditures	$24.9
Nonresident Student Spending	$8.3
Total Direct Expenditures	**$96.5**

The table below quantifies the broad economic impacts generated within the local region through the operations and functions of East Central University.

Operational Expenditure Spillover Effects

Impact Type	Employment	Employee Compensation ($ millions)	Output ($ millions)
Direct Effect	1,001	$33.4	$92.6
Indirect Effect	110	$2.7	$6.5
Induced Effect	450	$7.7	$50.9
Total Effect	**1,562**	**$43.7**	**$150.0**
Multiplier	1.56	1.31	1.62

A useful policy measure of the state's financial contribution to higher education is the ratio of the gross economic output of the System relative to the amount of state appropriations used to fund its operations. The table below provides an estimate of the ratio of output to appropriations for East Central University.

Ratio of Economic Output to Appropriations

Gross Economic Output ($ millions)	Final Revised FY16 Appropriations ($ millions)	Ratio of Economic Output to Appropriations
$150.0	$15.4	9.8

Impact Types

Direct Effect: The specific impact of the employment and operational expenditures related to the higher education institution.

Indirect Effect: The impact of expenditures by higher education-related suppliers.

Induced Effect: The additional impact of the spending of employees and suppliers' employees in the overall economy that can be attributed to the higher education-related expenditures.

The three types—direct, indirect, and induced—together, are considered the ***total effect***. The ***multiplier*** is the ratio of total impacts to direct effects.

Definition of Impact Variables

Employment: The number of workers (full or part-time) whose employment is due, totally or in part, to the economic effects of the higher education-related expenditures.

Employee Compensation: The wages and fringe benefits received by individuals in the economy.

Output: The dollar value of expenditures.

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Northeastern State University

Economic Impacts

Northeastern State University generated expenditures of $129.7 million in FY2016 and supported approximately $197.5 million in total economic output. With a ratio of economic output to appropriations of 6.1, Northeastern State University produced $6.10 in economic output per dollar of state appropriations.

There are direct, indirect, and induced economic benefits generated in the state and local regional economies through the operational expenditures of the faculty, staff and students of Northeastern State University. The following table details the FY2016 expenditures used to calculate the institution's local regional economic impacts.

Expenditure Impacts (FY2016)

Expenditure	Amount ($ millions)
Employee Compensation	$60.6
General Education & Administrative Expenditures	$57.8
Sponsored Research & Programs	$0.0
Intercollegiate Athletics	$0.9
Teaching Hospitals	$0.0
Capital Expenditures	$1.5
Nonresident Student Spending	$8.9
Total Direct Expenditures	**$129.7**

The table below quantifies the broad economic impacts generated within the local region through the operations and functions of Northeastern State University.

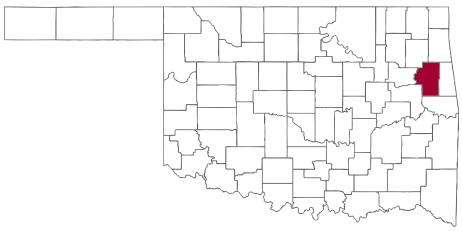
Operational Expenditure Spillover Effects

Impact Type	Employment	Employee Compensation ($ millions)	Output ($ millions)
Direct Effect	1,961	$67.8	$135.3
Indirect Effect	98	$6.1	$10.8
Induced Effect	628	$25.8	$51.4
Total Effect	**2,687**	**$99.7**	**$197.5**
Multiplier	1.37	1.47	1.46

A useful policy measure of the state's financial contribution to higher education is the ratio of the gross economic output of the System relative to the amount of state appropriations used to fund its operations. The table below provides an estimate of the ratio of output to appropriations for Northeastern State University.

Ratio of Economic Output to Appropriations

Gross Economic Output ($ millions)	Final Revised FY16 Appropriations ($ millions)	Ratio of Economic Output to Appropriations
$197.5	$32.3	6.1



Impact Types

Direct Effect: The specific impact of the employment and operational expenditures related to the higher education institution.

Indirect Effect: The impact of expenditures by higher education-related suppliers.

Induced Effect: The additional impact of the spending of employees and suppliers' employees in the overall economy that can be attributed to the higher education-related expenditures.

The three types—direct, indirect, and induced—together, are considered the ***total effect***. The ***multiplier*** is the ratio of total impacts to direct effects.

Definition of Impact Variables

Employment: The number of workers (full or part-time) whose employment is due, totally or in part, to the economic effects of the higher education-related expenditures.

Employee Compensation: The wages and fringe benefits received by individuals in the economy.

Output: The dollar value of expenditures.

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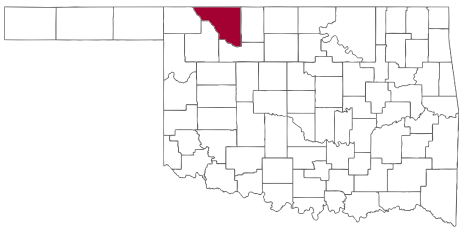
Northwestern Oklahoma State University

Economic Impacts



Northwestern Oklahoma State University generated expenditures of $43.8 million in FY2016 and supported approximately $58.1 million in total economic output. With a ratio of economic output to appropriations of 6.5, Northwestern Oklahoma State University produced $6.50 in economic output per dollar of state appropriations.

There are direct, indirect, and induced economic benefits generated in the state and local regional economies through the operational expenditures of the faculty, staff and students of Northwestern Oklahoma State University. The following table details the FY2016 expenditures used to calculate the institution's local regional economic impacts.

Expenditure Impacts (FY2016)

Expenditure	Amount ($ millions)
Employee Compensation	$18.2
General Education & Administrative Expenditures	$17.2
Sponsored Research & Programs	$0.5
Intercollegiate Athletics	$0.5
Teaching Hospitals	$0.0
Capital Expenditures	$0.7
Nonresident Student Spending	$6.8
Total Direct Expenditures	**$43.8**

The table below quantifies the broad economic impacts generated within the local region through the operations and functions of Northwestern Oklahoma State University.

Operational Expenditure Spillover Effects

Impact Type	Employment	Employee Compensation ($ millions)	Output ($ millions)
Direct Effect	712	$20.3	$40.3
Indirect Effect	36	$1.0	$2.0
Induced Effect	185	$4.7	$15.7
Total Effect	**932**	**$26.0**	**$58.1**
Multiplier	1.31	1.28	1.44

A useful policy measure of the state's financial contribution to higher education is the ratio of the gross economic output of the System relative to the amount of state appropriations used to fund its operations. The table below provides an estimate of the ratio of output to appropriations for Northwestern Oklahoma State University.

Ratio of Economic Output to Appropriations

Gross Economic Output ($ millions)	Final Revised FY16 Appropriations ($ millions)	Ratio of Economic Output to Appropriations
$58.1	$8.9	6.5

Impact Types

Direct Effect: The specific impact of the employment and operational expenditures related to the higher education institution.

Indirect Effect: The impact of expenditures by higher education-related suppliers.

Induced Effect: The additional impact of the spending of employees and suppliers' employees in the overall economy that can be attributed to the higher education-related expenditures.

The three types—direct, indirect, and induced—together, are considered the ***total effect***. The ***multiplier*** is the ratio of total impacts to direct effects.

Definition of Impact Variables

Employment: The number of workers (full or part-time) whose employment is due, totally or in part, to the economic effects of the higher education-related expenditures.

Employee Compensation: The wages and fringe benefits received by individuals in the economy.

Output: The dollar value of expenditures.

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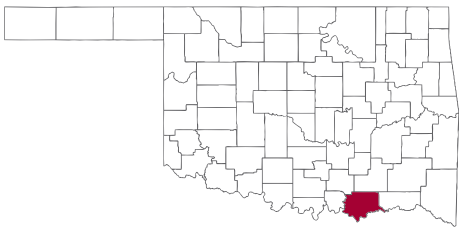
Southeastern Oklahoma State University

Economic Impacts



Southeastern Oklahoma State University generated expenditures of $71.0 million in FY2016 and supported approximately $98.9 million in total economic output. With a ratio of economic output to appropriations of 6.0, Southeastern Oklahoma State University produced $6.00 in economic output per dollar of state appropriations.

There are direct, indirect, and induced economic benefits generated in the state and local regional economies through the operational expenditures of the faculty, staff and students of Southeastern Oklahoma State University. The following table details the FY2016 expenditures used to calculate the institution's local regional economic impacts.

Expenditure Impacts (FY2016)

Expenditure	Amount ($ millions)
Employee Compensation	$31.5
General Education & Administrative Expenditures	$24.6
Sponsored Research & Programs	$0.0
Intercollegiate Athletics	$0.3
Teaching Hospitals	$0.0
Capital Expenditures	$2.8
Nonresident Student Spending	$11.7
Total Direct Expenditures	**$71.0**

The table below quantifies the broad economic impacts generated within the local region through the operations and functions of Southeastern Oklahoma State University.

Operational Expenditure Spillover Effects

Impact Type	Employment	Employee Compensation ($ millions)	Output ($ millions)
Direct Effect	959	$35.9	$66.4
Indirect Effect	96	$2.9	$8.0
Induced Effect	470	$7.2	$24.6
Total Effect	**1,525**	**$46.0**	**$98.9**
Multiplier	1.59	1.28	1.49

A useful policy measure of the state's financial contribution to higher education is the ratio of the gross economic output of the System relative to the amount of state appropriations used to fund its operations. The table below provides an estimate of the ratio of output to appropriations for Southeastern Oklahoma State University.

Ratio of Economic Output to Appropriations

Gross Economic Output ($ millions)	Final Revised FY16 Appropriations ($ millions)	Ratio of Economic Output to Appropriations
$98.9	$16.4	6.0

Impact Types

Direct Effect: The specific impact of the employment and operational expenditures related to the higher education institution.

Indirect Effect: The impact of expenditures by higher education-related suppliers.

Induced Effect: The additional impact of the spending of employees and suppliers' employees in the overall economy that can be attributed to the higher education-related expenditures.

The three types—direct, indirect, and induced—together, are considered the ***total effect***. The ***multiplier*** is the ratio of total impacts to direct effects.

Definition of Impact Variables

Employment: The number of workers (full or part-time) whose employment is due, totally or in part, to the economic effects of the higher education-related expenditures.

Employee Compensation: The wages and fringe benefits received by individuals in the economy.

Output: The dollar value of expenditures.

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Southwestern Oklahoma State University

Economic Impacts

Southwestern Oklahoma State University generated expenditures of $94.6 million in FY2016 and supported approximately $140.4 million in total economic output. With a ratio of economic output to appropriations of 7.1, Southwestern Oklahoma State University produced $7.10 in economic output per dollar of state appropriations.

There are direct, indirect, and induced economic benefits generated in the state and local regional economies through the operational expenditures of the faculty, staff and students of Southwestern Oklahoma State University. The following table details the FY2016 expenditures used to calculate the institution's local regional economic impacts.

Expenditure Impacts (FY2016)

Expenditure	Amount ($ millions)
Employee Compensation	$43.3
General Education & Administrative Expenditures	$35.5
Sponsored Research & Programs	$0.9
Intercollegiate Athletics	$0.0
Teaching Hospitals	$0.0
Capital Expenditures	$5.8
Nonresident Student Spending	$9.1
Total Direct Expenditures	**$94.6**

The table below quantifies the broad economic impacts generated within the local region through the operations and functions of Southwestern Oklahoma State University.

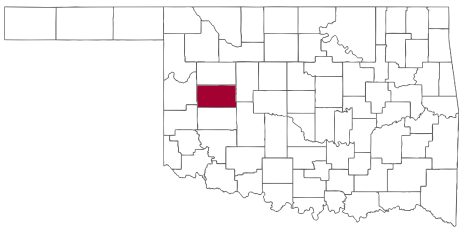
Operational Expenditure Spillover Effects

Impact Type	Employment	Employee Compensation ($ millions)	Output ($ millions)
Direct Effect	1,332	$45.9	$97.5
Indirect Effect	93	$3.7	$5.8
Induced Effect	373	$11.5	$37.0
Total Effect	**1,799**	**$61.0**	**$140.4**
Multiplier	1.35	1.33	1.44

A useful policy measure of the state's financial contribution to higher education is the ratio of the gross economic output of the System relative to the amount of state appropriations used to fund its operations. The table below provides an estimate of the ratio of output to appropriations for Southwestern Oklahoma State University.

Ratio of Economic Output to Appropriations

Gross Economic Output ($ millions)	Final Revised FY16 Appropriations ($ millions)	Ratio of Economic Output to Appropriations
$140.4	$19.9	7.1



Impact Types

Direct Effect: The specific impact of the employment and operational expenditures related to the higher education institution.

Indirect Effect: The impact of expenditures by higher education-related suppliers.

Induced Effect: The additional impact of the spending of employees and suppliers' employees in the overall economy that can be attributed to the higher education-related expenditures.

The three types—direct, indirect, and induced—together, are considered the ***total effect***. The ***multiplier*** is the ratio of total impacts to direct effects.

Definition of Impact Variables

Employment: The number of workers (full or part-time) whose employment is due, totally or in part, to the economic effects of the higher education-related expenditures.

Employee Compensation: The wages and fringe benefits received by individuals in the economy.

Output: The dollar value of expenditures.

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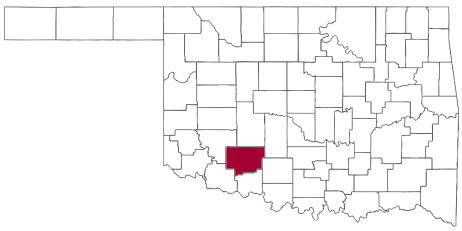
Cameron University

Economic Impacts



Cameron University generated expenditures of $81.6 million in FY2016 and supported approximately $122.1 million in total economic output. With a ratio of economic output to appropriations of 6.4, Cameron University produced $6.40 in economic output per dollar of state appropriations.

There are direct, indirect, and induced economic benefits generated in the state and local regional economies through the operational expenditures of the faculty, staff and students of Cameron University. The following table details the FY2016 expenditures used to calculate the institution's local regional economic impacts.

Expenditure Impacts (FY2016)

Expenditure	Amount ($ millions)
Employee Compensation	$34.5
General Education & Administrative Expenditures	$30.6
Sponsored Research & Programs	$0.6
Intercollegiate Athletics	$0.7
Teaching Hospitals	$0.0
Capital Expenditures	$3.3
Nonresident Student Spending	$11.9
Total Direct Expenditures	**$81.6**

The table below quantifies the broad economic impacts generated within the local region through the operations and functions of Cameron University.

Operational Expenditure Spillover Effects

Impact Type	Employment	Employee Compensation ($ millions)	Output ($ millions)
Direct Effect	1,120	$38.0	$78.8
Indirect Effect	146	$3.0	$4.7
Induced Effect	291	$13.3	$38.6
Total Effect	**1,557**	**$54.3**	**$122.1**
Multiplier	1.39	1.43	1.55

A useful policy measure of the state's financial contribution to higher education is the ratio of the gross economic output of the System relative to the amount of state appropriations used to fund its operations. The table below provides an estimate of the ratio of output to appropriations for Cameron University.

Ratio of Economic Output to Appropriations

Gross Economic Output ($ millions)	Final Revised FY16 Appropriations ($ millions)	Ratio of Economic Output to Appropriations
$122.1	$19.0	6.4

Impact Types

Direct Effect: The specific impact of the employment and operational expenditures related to the higher education institution.

Indirect Effect: The impact of expenditures by higher education-related suppliers.

Induced Effect: The additional impact of the spending of employees and suppliers' employees in the overall economy that can be attributed to the higher education-related expenditures.

The three types—direct, indirect, and induced—together, are considered the ***total effect***. The ***multiplier*** is the ratio of total impacts to direct effects.

Definition of Impact Variables

Employment: The number of workers (full or part-time) whose employment is due, totally or in part, to the economic effects of the higher education-related expenditures.

Employee Compensation: The wages and fringe benefits received by individuals in the economy.

Output: The dollar value of expenditures.

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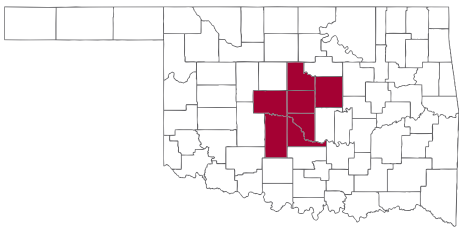
Langston University

Economic Impacts



Langston University generated expenditures of $110.7 million in FY2016 and supported approximately $185.0 million in total economic output. With a ratio of economic output to appropriations of 11.3, Langston University produced $11.30 in economic output per dollar of state appropriations.

There are direct, indirect, and induced economic benefits generated in the state and local regional economies through the operational expenditures of the faculty, staff and students of Langston University. The following table details the FY2016 expenditures used to calculate the institution's local regional economic impacts.

Expenditure Impacts (FY2016)

Expenditure	Amount ($ millions)
Employee Compensation	$27.8
General Education & Administrative Expenditures	$40.9
Sponsored Research & Programs	$6.6
Intercollegiate Athletics	$0.8
Teaching Hospitals	$0.0
Capital Expenditures	$21.6
Nonresident Student Spending	$13.2
Total Direct Expenditures	**$110.7**

The table below quantifies the broad economic impacts generated within the local region through the operations and functions of Langston University.

Operational Expenditure Spillover Effects

Impact Type	Employment	Employee Compensation ($ millions)	Output ($ millions)
Direct Effect	720	$30.8	$112.2
Indirect Effect	72	$2.5	$14.6
Induced Effect	216	$11.1	$58.3
Total Effect	**1,009**	**$44.4**	**$185.0**
Multiplier	1.40	1.44	1.65

A useful policy measure of the state's financial contribution to higher education is the ratio of the gross economic output of the System relative to the amount of state appropriations used to fund its operations. The table below provides an estimate of the ratio of output to appropriations for Langston University.

Ratio of Economic Output to Appropriations

Gross Economic Output ($ millions)	Final Revised FY16 Appropriations ($ millions)	Ratio of Economic Output to Appropriations
$185.0	$16.3	11.3

Impact Types

Direct Effect: The specific impact of the employment and operational expenditures related to the higher education institution.

Indirect Effect: The impact of expenditures by higher education-related suppliers.

Induced Effect: The additional impact of the spending of employees and suppliers' employees in the overall economy that can be attributed to the higher education-related expenditures.

The three types—direct, indirect, and induced—together, are considered the ***total effect***. The ***multiplier*** is the ratio of total impacts to direct effects.

Definition of Impact Variables

Employment: The number of workers (full or part-time) whose employment is due, totally or in part, to the economic effects of the higher education-related expenditures.

Employee Compensation: The wages and fringe benefits received by individuals in the economy.

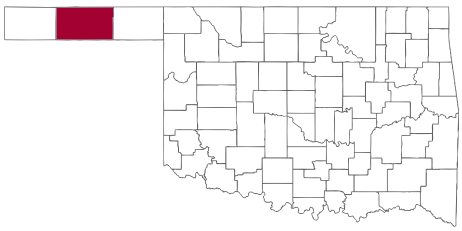
Output: The dollar value of expenditures.

STATE CHAMBER RESEARCH FOUNDATION

Prepared by the State Chamber Research Foundation with data from RegionTrack's *The Economic Role of Oklahoma's Public Colleges and Universities* 2018 report

Oklahoma Panhandle State University

Economic Impacts



Oklahoma Panhandle State University generated expenditures of $34.2 million in FY2016 and supported approximately $46.4 million in total economic output. With a ratio of economic output to appropriations of 7.3, Oklahoma Panhandle State University produced $7.30 in economic output per dollar of state appropriations.

There are direct, indirect, and induced economic benefits generated in the state and local regional economies through the operational expenditures of the faculty, staff and students of Oklahoma Panhandle State University. The following table details the FY2016 expenditures used to calculate the institution's local regional economic impacts.

Expenditure Impacts (FY2016)

Expenditure	Amount ($ millions)
Employee Compensation	$9.8
General Education & Administrative Expenditures	$15.1
Sponsored Research & Programs	$0.0
Intercollegiate Athletics	$0.6
Teaching Hospitals	$0.0
Capital Expenditures	$1.0
Nonresident Student Spending	$7.7
Total Direct Expenditures	**$34.2**

The table below quantifies the broad economic impacts generated within the local region through the operations and functions of Oklahoma Panhandle State University.

Operational Expenditure Spillover Effects

Impact Type	Employment	Employee Compensation ($ millions)	Output ($ millions)
Direct Effect	364	$11.0	$27.8
Indirect Effect	44	$0.7	$3.6
Induced Effect	167	$3.2	$15.0
Total Effect	**574**	**$14.9**	**$46.4**
Multiplier	1.58	1.35	1.67

A useful policy measure of the state's financial contribution to higher education is the ratio of the gross economic output of the System relative to the amount of state appropriations used to fund its operations. The table below provides an estimate of the ratio of output to appropriations for Oklahoma Panhandle State University.

Ratio of Economic Output to Appropriations

Gross Economic Output ($ millions)	Final Revised FY16 Appropriations ($ millions)	Ratio of Economic Output to Appropriations
$46.4	$6.3	7.3

Impact Types

Direct Effect: The specific impact of the employment and operational expenditures related to the higher education institution.

Indirect Effect: The impact of expenditures by higher education-related suppliers.

Induced Effect: The additional impact of the spending of employees and suppliers' employees in the overall economy that can be attributed to the higher education-related expenditures.

The three types—direct, indirect, and induced—together, are considered the ***total effect***. The ***multiplier*** is the ratio of total impacts to direct effects.

Definition of Impact Variables

Employment: The number of workers (full or part-time) whose employment is due, totally or in part, to the economic effects of the higher education-related expenditures.

Employee Compensation: The wages and fringe benefits received by individuals in the economy.

Output: The dollar value of expenditures.

STATE CHAMBER RESEARCH FOUNDATION

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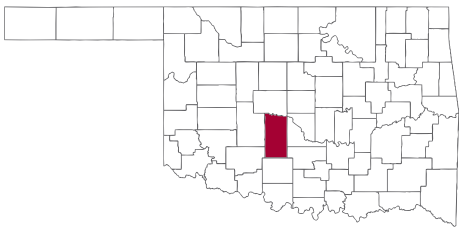
University of Science and Arts of Oklahoma

Economic Impacts



The University of Science and Arts of Oklahoma generated expenditures of $21.0 million in FY2016 and supported approximately $33.2 million in total economic output. With a ratio of economic output to appropriations of 5.1, the University of Science and Arts of Oklahoma produced $5.10 in economic output per dollar of state appropriations.

There are direct, indirect, and induced economic benefits generated in the state and local regional economies through the operational expenditures of the faculty, staff and students of the University of Science and Arts of Oklahoma. The following table details the FY2016 expenditures used to calculate the institution's local regional economic impacts.

Expenditure Impacts (FY2016)

Expenditure	Amount ($ millions)
Employee Compensation	$9.8
General Education & Administrative Expenditures	$7.4
Sponsored Research & Programs	$0.1
Intercollegiate Athletics	$0.1
Teaching Hospitals	$0.0
Capital Expenditures	$1.9
Nonresident Student Spending	$1.8
Total Direct Expenditures	**$21.0**

The table below quantifies the broad economic impacts generated within the local region through the operations and functions of the University of Science and Arts of Oklahoma.

Operational Expenditure Spillover Effects

Impact Type	Employment	Employee Compensation ($ millions)	Output ($ millions)
Direct Effect	352	$11.0	$21.7
Indirect Effect	39	$0.7	$1.3
Induced Effect	144	$2.3	$10.2
Total Effect	**535**	**$14.0**	**$33.2**
Multiplier	1.52	1.27	1.53

A useful policy measure of the state's financial contribution to higher education is the ratio of the gross economic output of the System relative to the amount of state appropriations used to fund its operations. The table below provides an estimate of the ratio of output to appropriations for the University of Science and Arts of Oklahoma.

Ratio of Economic Output to Appropriations

Gross Economic Output ($ millions)	Final Revised FY16 Appropriations ($ millions)	Ratio of Economic Output to Appropriations
$33.2	$6.5	5.1

Impact Types

Direct Effect: The specific impact of the employment and operational expenditures related to the higher education institution.

Indirect Effect: The impact of expenditures by higher education-related suppliers.

Induced Effect: The additional impact of the spending of employees and suppliers' employees in the overall economy that can be attributed to the higher education-related expenditures.

The three types—direct, indirect, and induced—together, are considered the ***total effect***. The ***multiplier*** is the ratio of total impacts to direct effects.

Definition of Impact Variables

Employment: The number of workers (full or part-time) whose employment is due, totally or in part, to the economic effects of the higher education-related expenditures.

Employee Compensation: The wages and fringe benefits received by individuals in the economy.

Output: The dollar value of expenditures.

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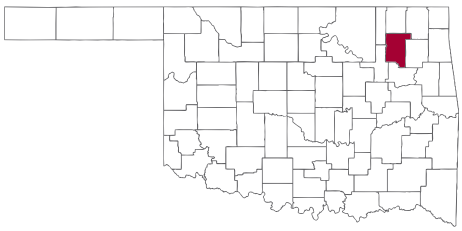
Rogers State University

Economic Impacts



Rogers State University generated expenditures of $55.5 million in FY2016 and supported approximately $93.4 million in total economic output. With a ratio of economic output to appropriations of 7.6, Rogers State University produced $7.60 in economic output per dollar of state appropriations.

There are direct, indirect, and induced economic benefits generated in the state and local regional economies through the operational expenditures of the faculty, staff and students of Rogers State University. The following table details the FY2016 expenditures used to calculate the institution's local regional economic impacts.

Expenditure Impacts (FY2016)

Expenditure	Amount ($ millions)
Employee Compensation	$24.4
General Education & Administrative Expenditures	$24.9
Sponsored Research & Programs	$0.9
Intercollegiate Athletics	$0.9
Teaching Hospitals	$0.0
Capital Expenditures	$1.5
Nonresident Student Spending	$3.0
Total Direct Expenditures	**$55.5**

The table below quantifies the broad economic impacts generated within the local region through the operations and functions of Rogers State University.

Operational Expenditure Spillover Effects

Impact Type	Employment	Employee Compensation ($ millions)	Output ($ millions)
Direct Effect	693	$27.3	$57.3
Indirect Effect	42	$1.9	$2.9
Induced Effect	208	$10.7	$33.2
Total Effect	**943**	**$39.9**	**$93.4**
Multiplier	1.36	1.46	1.63

A useful policy measure of the state's financial contribution to higher education is the ratio of the gross economic output of the System relative to the amount of state appropriations used to fund its operations. The table below provides an estimate of the ratio of output to appropriations for Rogers State University.

Ratio of Economic Output to Appropriations

Gross Economic Output ($ millions)	Final Revised FY16 Appropriations ($ millions)	Ratio of Economic Output to Appropriations
$93.4	$12.3	7.6

Impact Types

Direct Effect: The specific impact of the employment and operational expenditures related to the higher education institution.

Indirect Effect: The impact of expenditures by higher education-related suppliers.

Induced Effect: The additional impact of the spending of employees and suppliers' employees in the overall economy that can be attributed to the higher education-related expenditures.

The three types—direct, indirect, and induced—together, are considered the ***total effect***. The ***multiplier*** is the ratio of total impacts to direct effects.

Definition of Impact Variables

Employment: The number of workers (full or part-time) whose employment is due, totally or in part, to the economic effects of the higher education-related expenditures.

Employee Compensation: The wages and fringe benefits received by individuals in the economy.

Output: The dollar value of expenditures.

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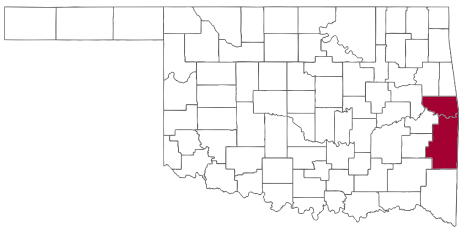
Carl Albert State College

Economic Impacts



Carl Albert State College generated expenditures of $31.9 million in FY2016 and supported approximately $50.2 million in total economic output. With a ratio of economic output to appropriations of 8.9, Carl Albert State College produced $8.90 in economic output per dollar of state appropriations.

There are direct, indirect, and induced economic benefits generated in the state and local regional economies through the operational expenditures of the faculty, staff and students of Carl Albert State College. The following table details the FY2016 expenditures used to calculate the institution's local regional economic impacts.

Expenditure Impacts (FY2016)

Expenditure	Amount ($ millions)
Employee Compensation	$12.9
General Education & Administrative Expenditures	$12.0
Sponsored Research & Programs	$1.1
Intercollegiate Athletics	$0.2
Teaching Hospitals	$0.0
Capital Expenditures	$1.4
Nonresident Student Spending	$4.4
Total Direct Expenditures	**$31.9**

The table below quantifies the broad economic impacts generated within the local region through the operations and functions of Carl Albert State College.

Operational Expenditure Spillover Effects

Impact Type	Employment	Employee Compensation ($ millions)	Output ($ millions)
Direct Effect	439	$13.6	$30.6
Indirect Effect	53	$1.2	$3.1
Induced Effect	180	$4.9	$16.5
Total Effect	**671**	**$19.8**	**$50.2**
Multiplier	1.53	1.46	1.64

A useful policy measure of the state's financial contribution to higher education is the ratio of the gross economic output of the System relative to the amount of state appropriations used to fund its operations. The table below provides an estimate of the ratio of output to appropriations for Carl Albert State College.

Ratio of Economic Output to Appropriations

Gross Economic Output ($ millions)	Final Revised FY16 Appropriations ($ millions)	Ratio of Economic Output to Appropriations
$50.2	$5.6	8.9

Impact Types

Direct Effect: The specific impact of the employment and operational expenditures related to the higher education institution.

Indirect Effect: The impact of expenditures by higher education-related suppliers.

Induced Effect: The additional impact of the spending of employees and suppliers' employees in the overall economy that can be attributed to the higher education-related expenditures.

The three types—direct, indirect, and induced—together, are considered the ***total effect***. The ***multiplier*** is the ratio of total impacts to direct effects.

Definition of Impact Variables

Employment: The number of workers (full or part-time) whose employment is due, totally or in part, to the economic effects of the higher education-related expenditures.

Employee Compensation: The wages and fringe benefits received by individuals in the economy.

Output: The dollar value of expenditures.

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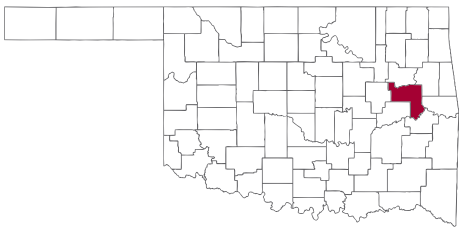
Connors State College

Economic Impacts



Connors State College generated expenditures of $28.9 million in FY2016 and supported approximately $44.5 million in total economic output. With a ratio of economic output to appropriations of 7.5, Connors State College produced $7.50 in economic output per dollar of state appropriations.

There are direct, indirect, and induced economic benefits generated in the state and local regional economies through the operational expenditures of the faculty, staff and students of Connors State College. The following table details the FY2016 expenditures used to calculate the institution's local regional economic impacts.

Expenditure Impacts (FY2016)

Expenditure	Amount ($ millions)
Employee Compensation	$9.4
General Education & Administrative Expenditures	$16.8
Sponsored Research & Programs	$0.7
Intercollegiate Athletics	$0.0
Teaching Hospitals	$0.0
Capital Expenditures	$0.4
Nonresident Student Spending	$1.5
Total Direct Expenditures	**$28.9**

The table below quantifies the broad economic impacts generated within the local region through the operations and functions of Connors State College.

Operational Expenditure Spillover Effects

Impact Type	Employment	Employee Compensation ($ millions)	Output ($ millions)
Direct Effect	317	$10.9	$28.5
Indirect Effect	38	$0.7	$2.0
Induced Effect	83	$3.5	$14.0
Total Effect	**438**	**$15.0**	**$44.5**
Multiplier	1.38	1.38	1.56

A useful policy measure of the state's financial contribution to higher education is the ratio of the gross economic output of the System relative to the amount of state appropriations used to fund its operations. The table below provides an estimate of the ratio of output to appropriations for Connors State College.

Ratio of Economic Output to Appropriations

Gross Economic Output ($ millions)	Final Revised FY16 Appropriations ($ millions)	Ratio of Economic Output to Appropriations
$44.5	$6.0	7.5

Impact Types

Direct Effect: The specific impact of the employment and operational expenditures related to the higher education institution.

Indirect Effect: The impact of expenditures by higher education-related suppliers.

Induced Effect: The additional impact of the spending of employees and suppliers' employees in the overall economy that can be attributed to the higher education-related expenditures.

The three types—direct, indirect, and induced—together, are considered the ***total effect***. The ***multiplier*** is the ratio of total impacts to direct effects.

Definition of Impact Variables

Employment: The number of workers (full or part-time) whose employment is due, totally or in part, to the economic effects of the higher education-related expenditures.

Employee Compensation: The wages and fringe benefits received by individuals in the economy.

Output: The dollar value of expenditures.

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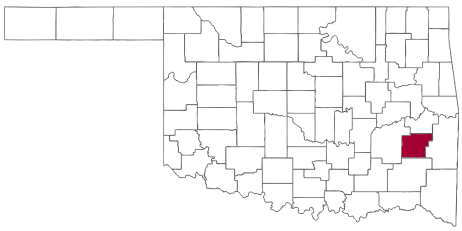
Eastern Oklahoma State College

Economic Impacts



Eastern Oklahoma State College generated expenditures of $29.1 million in FY2016 and supported approximately $47.0 million in total economic output. With a ratio of economic output to appropriations of 8.3, Eastern Oklahoma State College produced $8.30 in economic output per dollar of state appropriations.

There are direct, indirect, and induced economic benefits generated in the state and local regional economies through the operational expenditures of the faculty, staff and students of Eastern Oklahoma State College. The following table details the FY2016 expenditures used to calculate the institution's local regional economic impacts.

Expenditure Impacts (FY2016)

Expenditure	Amount ($ millions)
Employee Compensation	$10.1
General Education & Administrative Expenditures	$15.5
Sponsored Research & Programs	$1.2
Intercollegiate Athletics	$0.3
Teaching Hospitals	$0.0
Capital Expenditures	$0.7
Nonresident Student Spending	$1.3
Total Direct Expenditures	**$29.1**

The table below quantifies the broad economic impacts generated within the local region through the operations and functions of Eastern Oklahoma State College.

Operational Expenditure Spillover Effects

Impact Type	Employment	Employee Compensation ($ millions)	Output ($ millions)
Direct Effect	341	$11.0	$29.2
Indirect Effect	20	$0.6	$3.5
Induced Effect	99	$4.5	$14.3
Total Effect	**460**	**$16.1**	**$47.0**
Multiplier	1.35	1.46	1.61

A useful policy measure of the state's financial contribution to higher education is the ratio of the gross economic output of the System relative to the amount of state appropriations used to fund its operations. The table below provides an estimate of the ratio of output to appropriations for Eastern Oklahoma State College.

Ratio of Economic Output to Appropriations

Gross Economic Output ($ millions)	Final Revised FY16 Appropriations ($ millions)	Ratio of Economic Output to Appropriations
$47.0	$5.7	8.3

Impact Types

Direct Effect: The specific impact of the employment and operational expenditures related to the higher education institution.

Indirect Effect: The impact of expenditures by higher education-related suppliers.

Induced Effect: The additional impact of the spending of employees and suppliers' employees in the overall economy that can be attributed to the higher education-related expenditures.

The three types—direct, indirect, and induced—together, are considered the ***total effect***. The ***multiplier*** is the ratio of total impacts to direct effects.

Definition of Impact Variables

Employment: The number of workers (full or part-time) whose employment is due, totally or in part, to the economic effects of the higher education-related expenditures.

Employee Compensation: The wages and fringe benefits received by individuals in the economy.

Output: The dollar value of expenditures.

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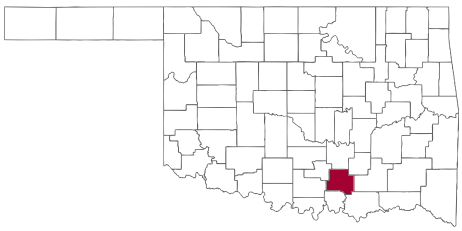
Murray State College

Economic Impacts



Murray State College generated expenditures of $33.8 million in FY2016 and supported approximately $50.1 million in total economic output. With a ratio of economic output to appropriations of 9.9, Murray State College produced $9.90 in economic output per dollar of state appropriations.

There are direct, indirect, and induced economic benefits generated in the state and local regional economies through the operational expenditures of the faculty, staff and students of Murray State College. The following table details the FY2016 expenditures used to calculate the institution's local regional economic impacts.

Expenditure Impacts (FY2016)

Expenditure	Amount ($ millions)
Employee Compensation	$12.0
General Education & Administrative Expenditures	$18.0
Sponsored Research & Programs	$0.6
Intercollegiate Athletics	$0.0
Teaching Hospitals	$0.0
Capital Expenditures	$0.4
Nonresident Student Spending	$2.7
Total Direct Expenditures	**$33.8**

The table below quantifies the broad economic impacts generated within the local region through the operations and functions of Murray State College.

Operational Expenditure Spillover Effects

Impact Type	Employment	Employee Compensation ($ millions)	Output ($ millions)
Direct Effect	368	$13.4	$34.5
Indirect Effect	29	$0.7	$2.8
Induced Effect	180	$3.1	$12.8
Total Effect	**578**	**$17.1**	**$50.1**
Multiplier	1.57	1.28	1.45

A useful policy measure of the state's financial contribution to higher education is the ratio of the gross economic output of the System relative to the amount of state appropriations used to fund its operations. The table below provides an estimate of the ratio of output to appropriations for Murray State College.

Ratio of Economic Output to Appropriations

Gross Economic Output ($ millions)	Final Revised FY16 Appropriations ($ millions)	Ratio of Economic Output to Appropriations
$50.1	$5.1	9.9

Impact Types

Direct Effect: The specific impact of the employment and operational expenditures related to the higher education institution.

Indirect Effect: The impact of expenditures by higher education-related suppliers.

Induced Effect: The additional impact of the spending of employees and suppliers' employees in the overall economy that can be attributed to the higher education-related expenditures.

The three types—direct, indirect, and induced—together, are considered the ***total effect***. The ***multiplier*** is the ratio of total impacts to direct effects.

Definition of Impact Variables

Employment: The number of workers (full or part-time) whose employment is due, totally or in part, to the economic effects of the higher education-related expenditures.

Employee Compensation: The wages and fringe benefits received by individuals in the economy.

Output: The dollar value of expenditures.

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Northeastern Oklahoma A&M College

Economic Impacts

Northeastern Oklahoma A&M College generated expenditures of $36.9 million in FY2016 and supported approximately $58 million in total economic output. With a ratio of economic output to appropriations of 7.4, Northeastern Oklahoma A&M College produced $7.40 in economic output per dollar of state appropriations.

There are direct, indirect, and induced economic benefits generated in the state and local regional economies through the operational expenditures of the faculty, staff and students of Northeastern Oklahoma A&M College. The following table details the FY2016 expenditures used to calculate the institution's local regional economic impacts.

Expenditure Impacts (FY2016)

Expenditure	Amount ($ millions)
Employee Compensation	$12.3
General Education & Administrative Expenditures	$14.7
Sponsored Research & Programs	$0.7
Intercollegiate Athletics	$2.4
Teaching Hospitals	$0.0
Capital Expenditures	$1.2
Nonresident Student Spending	$5.5
Total Direct Expenditures	**$36.9**

The table below quantifies the broad economic impacts generated within the local region through the operations and functions of Northeastern Oklahoma A&M College.

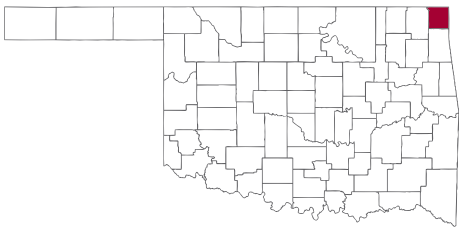
Operational Expenditure Spillover Effects

Impact Type	Employment	Employee Compensation ($ millions)	Output ($ millions)
Direct Effect	438	$13.9	$34.5
Indirect Effect	35	$1.1	$2.8
Induced Effect	131	$5.6	$20.7
Total Effect	**604**	**$20.5**	**$58.0**
Multiplier	1.38	1.47	1.68

A useful policy measure of the state's financial contribution to higher education is the ratio of the gross economic output of the System relative to the amount of state appropriations used to fund its operations. The table below provides an estimate of the ratio of output to appropriations for Northeastern Oklahoma A&M College.

Ratio of Economic Output to Appropriations

Gross Economic Output ($ millions)	Final Revised FY16 Appropriations ($ millions)	Ratio of Economic Output to Appropriations
$58.0	$7.8	7.4



Impact Types

Direct Effect: The specific impact of the employment and operational expenditures related to the higher education institution.

Indirect Effect: The impact of expenditures by higher education-related suppliers.

Induced Effect: The additional impact of the spending of employees and suppliers' employees in the overall economy that can be attributed to the higher education-related expenditures.

The three types—direct, indirect, and induced—together, are considered the ***total effect***. The ***multiplier*** is the ratio of total impacts to direct effects.

Definition of Impact Variables

Employment: The number of workers (full or part-time) whose employment is due, totally or in part, to the economic effects of the higher education-related expenditures.

Employee Compensation: The wages and fringe benefits received by individuals in the economy.

Output: The dollar value of expenditures.

STATE CHAMBER RESEARCH FOUNDATION

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Northern Oklahoma College

Economic Impacts

Northern Oklahoma College generated expenditures of $57.2 million in FY2016 and supported approximately $92.5 million in total economic output. With a ratio of economic output to appropriations of 10.3, Northern Oklahoma College produced $10.30 in economic output per dollar of state appropriations.

There are direct, indirect, and induced economic benefits generated in the state and local regional economies through the operational expenditures of the faculty, staff and students of Northern Oklahoma College. The following table details the FY2016 expenditures used to calculate the institution's local regional economic impacts.

Expenditure Impacts (FY2016)

Expenditure	Amount ($ millions)
Employee Compensation	$19.4
General Education & Administrative Expenditures	$31.1
Sponsored Research & Programs	$0.2
Intercollegiate Athletics	$0.2
Teaching Hospitals	$0.0
Capital Expenditures	$0.0
Nonresident Student Spending	$6.2
Total Direct Expenditures	**$57.2**

The table below quantifies the broad economic impacts generated within the local region through the operations and functions of Northern Oklahoma College.

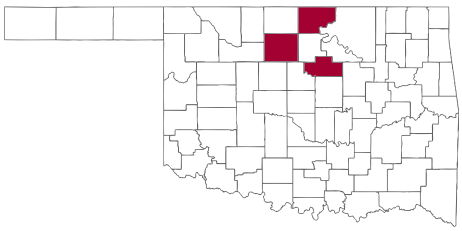
Operational Expenditure Spillover Effects

Impact Type	Employment	Employee Compensation ($ millions)	Output ($ millions)
Direct Effect	694	$20.4	$56.1
Indirect Effect	42	$1.6	$4.5
Induced Effect	201	$4.5	$32.0
Total Effect	**937**	**$26.5**	**$92.5**
Multiplier	1.35	1.30	1.65

A useful policy measure of the state's financial contribution to higher education is the ratio of the gross economic output of the System relative to the amount of state appropriations used to fund its operations. The table below provides an estimate of the ratio of output to appropriations for Northern Oklahoma College.

Ratio of Economic Output to Appropriations

Gross Economic Output ($ millions)	Final Revised FY16 Appropriations ($ millions)	Ratio of Economic Output to Appropriations
$92.5	$9.0	10.3



Impact Types

Direct Effect: The specific impact of the employment and operational expenditures related to the higher education institution.

Indirect Effect: The impact of expenditures by higher education-related suppliers.

Induced Effect: The additional impact of the spending of employees and suppliers' employees in the overall economy that can be attributed to the higher education-related expenditures.

The three types—direct, indirect, and induced—together, are considered the ***total effect***. The ***multiplier*** is the ratio of total impacts to direct effects.

Definition of Impact Variables

Employment: The number of workers (full or part-time) whose employment is due, totally or in part, to the economic effects of the higher education-related expenditures.

Employee Compensation: The wages and fringe benefits received by individuals in the economy.

Output: The dollar value of expenditures.

STATE CHAMBER RESEARCH FOUNDATION

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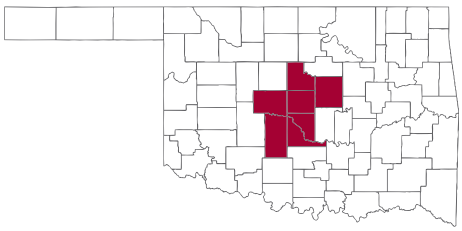
Oklahoma City Community College

Economic Impacts



Oklahoma City Community College generated expenditures of $109.1 million in FY2016 and supported approximately $145.3 million in total economic output. With a ratio of economic output to appropriations of 6.6, Oklahoma City Community College produced $6.60 in economic output per dollar of state appropriations.

There are direct, indirect, and induced economic benefits generated in the state and local regional economies through the operational expenditures of the faculty, staff and students of Oklahoma City Community College. The following table details the FY2016 expenditures used to calculate the institution's local regional economic impacts.

Expenditure Impacts (FY2016)

Expenditure	Amount ($ millions)
Employee Compensation	$46.3
General Education & Administrative Expenditures	$40.7
Sponsored Research & Programs	$2.1
Intercollegiate Athletics	$0.0
Teaching Hospitals	$0.0
Capital Expenditures	$1.2
Nonresident Student Spending	$18.9
Total Direct Expenditures	**$109.1**

The table below quantifies the broad economic impacts generated within the local region through the operations and functions of Oklahoma City Community College.

Operational Expenditure Spillover Effects

Impact Type	Employment	Employee Compensation ($ millions)	Output ($ millions)
Direct Effect	1,636	$50.4	$95.6
Indirect Effect	164	$2.5	$7.6
Induced Effect	785	$10.6	$42.1
Total Effect	**2,585**	**$63.5**	**$145.3**
Multiplier	1.58	1.26	1.52

A useful policy measure of the state's financial contribution to higher education is the ratio of the gross economic output of the System relative to the amount of state appropriations used to fund its operations. The table below provides an estimate of the ratio of output to appropriations for Oklahoma City Community College.

Ratio of Economic Output to Appropriations

Gross Economic Output ($ millions)	Final Revised FY16 Appropriations ($ millions)	Ratio of Economic Output to Appropriations
$145.3	$22.2	6.6

Impact Types

Direct Effect: The specific impact of the employment and operational expenditures related to the higher education institution.

Indirect Effect: The impact of expenditures by higher education-related suppliers.

Induced Effect: The additional impact of the spending of employees and suppliers' employees in the overall economy that can be attributed to the higher education-related expenditures.

The three types—direct, indirect, and induced—together, are considered the ***total effect***. The ***multiplier*** is the ratio of total impacts to direct effects.

Definition of Impact Variables

Employment: The number of workers (full or part-time) whose employment is due, totally or in part, to the economic effects of the higher education-related expenditures.

Employee Compensation: The wages and fringe benefits received by individuals in the economy.

Output: The dollar value of expenditures.

STATE CHAMBER RESEARCH FOUNDATION

Prepared by the State Chamber Research Foundation with data from RegionTrack's *The Economic Role of Oklahoma's Public Colleges and Universities* 2018 report

Redlands Community College

Economic Impacts

Redlands Community College generated expenditures of $19.2 million in FY2016 and supported approximately $28 million in total economic output. With a ratio of economic output to appropriations of 5.0, Redlands Community College produced $5 dollars in economic output per dollar of state appropriations.

There are direct, indirect, and induced economic benefits generated in the state and local regional economies through the operational expenditures of the faculty, staff and students of Redlands Community College. The following table details the FY2016 expenditures used to calculate the institution's local regional economic impacts.

Expenditure Impacts (FY2016)

Expenditure	Amount ($ millions)
Employee Compensation	$9.1
General Education & Administrative Expenditures	$7.2
Sponsored Research & Programs	$1.1
Intercollegiate Athletics	$0.0
Teaching Hospitals	$0.0
Capital Expenditures	$0.4
Nonresident Student Spending	$1.4
Total Direct Expenditures	**$19.2**

The table below quantifies the broad economic impacts generated within the local region through the operations and functions of Redlands Community College.

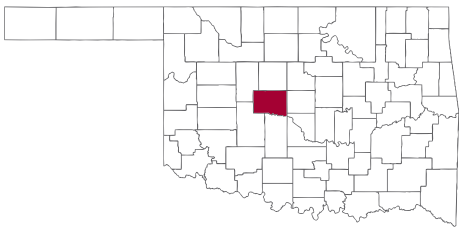
Operational Expenditure Spillover Effects

Impact Type	Employment	Employee Compensation ($ millions)	Output ($ millions)
Direct Effect	327	$9.5	$18.9
Indirect Effect	20	$0.6	$1.3
Induced Effect	98	$2.4	$7.8
Total Effect	**445**	**$12.5**	**$28.0**
Multiplier	1.36	1.32	1.48

A useful policy measure of the state's financial contribution to higher education is the ratio of the gross economic output of the System relative to the amount of state appropriations used to fund its operations. The table below provides an estimate of the ratio of output to appropriations for Redlands Community College.

Ratio of Economic Output to Appropriations

Gross Economic Output ($ millions)	Final Revised FY16 Appropriations ($ millions)	Ratio of Economic Output to Appropriations
$28.0	$5.6	5.0



Impact Types

Direct Effect: The specific impact of the employment and operational expenditures related to the higher education institution.

Indirect Effect: The impact of expenditures by higher education-related suppliers.

Induced Effect: The additional impact of the spending of employees and suppliers' employees in the overall economy that can be attributed to the higher education-related expenditures.

The three types—direct, indirect, and induced—together, are considered the ***total effect***. The ***multiplier*** is the ratio of total impacts to direct effects.

Definition of Impact Variables

Employment: The number of workers (full or part-time) whose employment is due, totally or in part, to the economic effects of the higher education-related expenditures.

Employee Compensation: The wages and fringe benefits received by individuals in the economy.

Output: The dollar value of expenditures.

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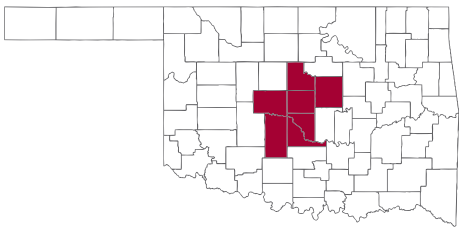
Rose State College

Economic Impacts



Rose State College generated expenditures of $46.6 million in FY2016 and supported approximately $78.9 million in total economic output. With a ratio of economic output to appropriations of 4.3, Rose State College produced $4.30 in economic output per dollar of state appropriations.

There are direct, indirect, and induced economic benefits generated in the state and local regional economies through the operational expenditures of the faculty, staff and students of Rose State College. The following table details the FY2016 expenditures used to calculate the institution's local regional economic impacts.

Expenditure Impacts (FY2016)

Expenditure	Amount ($ millions)
Employee Compensation	$29.0
General Education & Administrative Expenditures	$10.8
Sponsored Research & Programs	$0.9
Intercollegiate Athletics	$0.3
Teaching Hospitals	$0.0
Capital Expenditures	$4.3
Nonresident Student Spending	$1.3
Total Direct Expenditures	**$46.6**

The table below quantifies the broad economic impacts generated within the local region through the operations and functions of Rose State College.

Operational Expenditure Spillover Effects

Impact Type	Employment	Employee Compensation ($ millions)	Output ($ millions)
Direct Effect	921	$33.0	$47.5
Indirect Effect	101	$1.7	$4.8
Induced Effect	295	$11.6	$26.6
Total Effect	**1,318**	**$46.2**	**$78.9**
Multiplier	1.43	1.40	1.66

A useful policy measure of the state's financial contribution to higher education is the ratio of the gross economic output of the System relative to the amount of state appropriations used to fund its operations. The table below provides an estimate of the ratio of output to appropriations for Rose State College.

Ratio of Economic Output to Appropriations

Gross Economic Output ($ millions)	Final Revised FY16 Appropriations ($ millions)	Ratio of Economic Output to Appropriations
$78.9	$18.2	4.3

Impact Types

Direct Effect: The specific impact of the employment and operational expenditures related to the higher education institution.

Indirect Effect: The impact of expenditures by higher education-related suppliers.

Induced Effect: The additional impact of the spending of employees and suppliers' employees in the overall economy that can be attributed to the higher education-related expenditures.

The three types—direct, indirect, and induced—together, are considered the ***total effect***. The ***multiplier*** is the ratio of total impacts to direct effects.

Definition of Impact Variables

Employment: The number of workers (full or part-time) whose employment is due, totally or in part, to the economic effects of the higher education-related expenditures.

Employee Compensation: The wages and fringe benefits received by individuals in the economy.

Output: The dollar value of expenditures.

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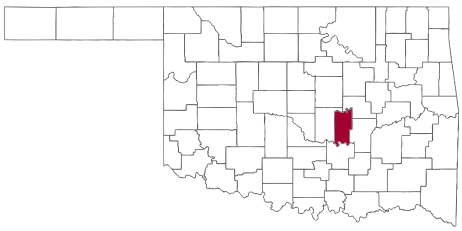
Seminole State College

Economic Impacts



Seminole State College generated expenditures of $22.9 million in FY2016 and supported approximately $33.6 million in total economic output. With a ratio of economic output to appropriations of 6.4, Seminole State College produced $6.40 in economic output per dollar of state appropriations.

There are direct, indirect, and induced economic benefits generated in the state and local regional economies through the operational expenditures of the faculty, staff and students of Seminole State College. The following table details the FY2016 expenditures used to calculate the institution's local regional economic impacts.

Expenditure Impacts (FY2016)

Expenditure	Amount ($ millions)
Employee Compensation	$9.3
General Education & Administrative Expenditures	$11.3
Sponsored Research & Programs	$0.0
Intercollegiate Athletics	$0.4
Teaching Hospitals	$0.0
Capital Expenditures	$0.6
Nonresident Student Spending	$1.3
Total Direct Expenditures	**$22.9**

The table below quantifies the broad economic impacts generated within the local region through the operations and functions of Seminole State College.

Operational Expenditure Spillover Effects

Impact Type	Employment	Employee Compensation ($ millions)	Output ($ millions)
Direct Effect	278	$10.5	$22.3
Indirect Effect	25	$0.7	$2.7
Induced Effect	78	$4.0	$8.7
Total Effect	**381**	**$15.2**	**$33.6**
Multiplier	1.37	1.45	1.51

A useful policy measure of the state's financial contribution to higher education is the ratio of the gross economic output of the System relative to the amount of state appropriations used to fund its operations. The table below provides an estimate of the ratio of output to appropriations for Seminole State College.

Ratio of Economic Output to Appropriations

Gross Economic Output ($ millions)	Final Revised FY16 Appropriations ($ millions)	Ratio of Economic Output to Appropriations
$33.6	$5.2	6.4

Impact Types

Direct Effect: The specific impact of the employment and operational expenditures related to the higher education institution.

Indirect Effect: The impact of expenditures by higher education-related suppliers.

Induced Effect: The additional impact of the spending of employees and suppliers' employees in the overall economy that can be attributed to the higher education-related expenditures.

The three types—direct, indirect, and induced—together, are considered the ***total effect***. The ***multiplier*** is the ratio of total impacts to direct effects.

Definition of Impact Variables

Employment: The number of workers (full or part-time) whose employment is due, totally or in part, to the economic effects of the higher education-related expenditures.

Employee Compensation: The wages and fringe benefits received by individuals in the economy.

Output: The dollar value of expenditures.

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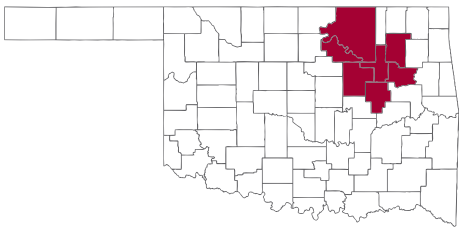
Tulsa Community College

Economic Impacts



Tulsa Community College generated expenditures of $157.4 million in FY2016 and supported approximately $251.1 million in total economic output. With a ratio of economic output to appropriations of 7.8, Tulsa Community College produced $7.80 in economic output per dollar of state appropriations.

There are direct, indirect, and induced economic benefits generated in the state and local regional economies through the operational expenditures of the faculty, staff and students of Tulsa Community College. The following table details the FY2016 expenditures used to calculate the institution's local regional economic impacts.

Expenditure Impacts (FY2016)

Expenditure	Amount ($ millions)
Employee Compensation	$83.8
General Education & Administrative Expenditures	$63.7
Sponsored Research & Programs	$0.0
Intercollegiate Athletics	$0.0
Teaching Hospitals	$0.0
Capital Expenditures	$2.7
Nonresident Student Spending	$7.1
Total Direct Expenditures	**$157.4**

The table below quantifies the broad economic impacts generated within the local region through the operations and functions of Tulsa Community College.

Operational Expenditure Spillover Effects

Impact Type	Employment	Employee Compensation ($ millions)	Output ($ millions)
Direct Effect	2,135	$96.4	$165.2
Indirect Effect	214	$8.7	$18.2
Induced Effect	961	$21.2	$67.7
Total Effect	**3,310**	**$126.3**	**$251.1**
Multiplier	1.55	1.31	1.52

A useful policy measure of the state's financial contribution to higher education is the ratio of the gross economic output of the System relative to the amount of state appropriations used to fund its operations. The table below provides an estimate of the ratio of output to appropriations for Tulsa Community College.

Ratio of Economic Output to Appropriations

Gross Economic Output ($ millions)	Final Revised FY16 Appropriations ($ millions)	Ratio of Economic Output to Appropriations
$251.1	$32.1	7.8

Impact Types

Direct Effect: The specific impact of the employment and operational expenditures related to the higher education institution.

Indirect Effect: The impact of expenditures by higher education-related suppliers.

Induced Effect: The additional impact of the spending of employees and suppliers' employees in the overall economy that can be attributed to the higher education-related expenditures.

The three types—direct, indirect, and induced—together, are considered the ***total effect***. The ***multiplier*** is the ratio of total impacts to direct effects.

Definition of Impact Variables

Employment: The number of workers (full or part-time) whose employment is due, totally or in part, to the economic effects of the higher education-related expenditures.

Employee Compensation: The wages and fringe benefits received by individuals in the economy.

Output: The dollar value of expenditures.

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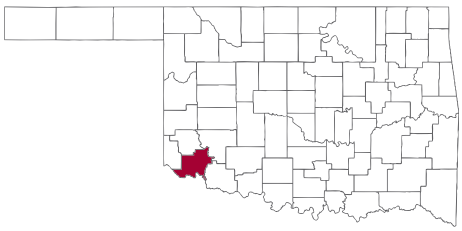
Western Oklahoma State College

Economic Impacts



Western Oklahoma State College generated expenditures of $17.8 million in FY2016 and supported approximately $26.3 million in total economic output. With a ratio of economic output to appropriations of 5.2, Western Oklahoma State College produced $5.20 in economic output per dollar of state appropriations.

There are direct, indirect, and induced economic benefits generated in the state and local regional economies through the operational expenditures of the faculty, staff and students of Western Oklahoma State College. The following table details the FY2016 expenditures used to calculate the institution's local regional economic impacts.

Expenditure Impacts (FY2016)

Expenditure	Amount ($ millions)
Employee Compensation	$7.3
General Education & Administrative Expenditures	$6.7
Sponsored Research & Programs	$0.4
Intercollegiate Athletics	$0.0
Teaching Hospitals	$0.0
Capital Expenditures	$0.4
Nonresident Student Spending	$2.9
Total Direct Expenditures	**$17.8**

The table below quantifies the broad economic impacts generated within the local region through the operations and functions of Western Oklahoma State College.

Operational Expenditure Spillover Effects

Impact Type	Employment	Employee Compensation ($ millions)	Output ($ millions)
Direct Effect	271	$8.1	$16.5
Indirect Effect	33	$0.6	$0.8
Induced Effect	76	$1.9	$9.0
Total Effect	**380**	**$10.6**	**$26.3**
Multiplier	1.40	1.31	1.59

A useful policy measure of the state's financial contribution to higher education is the ratio of the gross economic output of the System relative to the amount of state appropriations used to fund its operations. The table below provides an estimate of the ratio of output to appropriations for Western Oklahoma State College.

Ratio of Economic Output to Appropriations

Gross Economic Output ($ millions)	Final Revised FY16 Appropriations ($ millions)	Ratio of Economic Output to Appropriations
$26.3	$5.1	5.2

Impact Types

Direct Effect: The specific impact of the employment and operational expenditures related to the higher education institution.

Indirect Effect: The impact of expenditures by higher education-related suppliers.

Induced Effect: The additional impact of the spending of employees and suppliers' employees in the overall economy that can be attributed to the higher education-related expenditures.

The three types—direct, indirect, and induced—together, are considered the ***total effect***. The ***multiplier*** is the ratio of total impacts to direct effects.

Definition of Impact Variables

Employment: The number of workers (full or part-time) whose employment is due, totally or in part, to the economic effects of the higher education-related expenditures.

Employee Compensation: The wages and fringe benefits received by individuals in the economy.

Output: The dollar value of expenditures.

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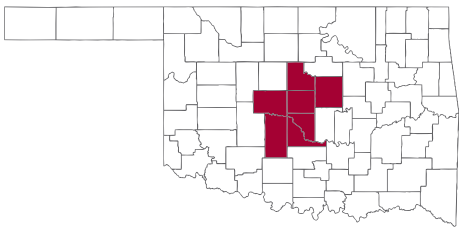
OU Health Sciences Center

Economic Impacts



OU Health Sciences Center generated expenditures of $1.0 billion in FY2016 and supported approximately $1.8 billion in total economic output. With a ratio of economic output to appropriations of 22.8, OU Health Sciences Center produced $22.80 in economic output per dollar of state appropriations.

There are direct, indirect, and induced economic benefits generated in the state and local regional economies through the operational expenditures of the faculty, staff and students of OU Health Sciences Center. The following table details the FY2016 expenditures used to calculate the institution's local regional economic impacts.

Expenditure Impacts (FY2016)

Expenditure	Amount ($ millions)
Employee Compensation	$706.3
General Education & Administrative Expenditures	$120.4
Sponsored Research & Programs	$67.2
Intercollegiate Athletics	$0.0
Teaching Hospitals	$103.7
Capital Expenditures	$6.5
Nonresident Student Spending	$9.4
Total Direct Expenditures	**$1,013.6**

The table below quantifies the broad economic impacts generated within the local region through the operations and functions of OU Health Sciences Center.

Operational Expenditure Spillover Effects

Impact Type	Employment	Employee Compensation ($ millions)	Output ($ millions)
Direct Effect	7,915	$798.2	$1,094.5
Indirect Effect	475	$63.9	$54.7
Induced Effect	2,375	$271.4	$700.5
Total Effect	**10,764**	**$1,133.4**	**$1,849.8**
Multiplier	1.36	1.42	1.69

A useful policy measure of the state's financial contribution to higher education is the ratio of the gross economic output of the System relative to the amount of state appropriations used to fund its operations. The table below provides an estimate of the ratio of output to appropriations for OU Health Sciences Center.

Ratio of Economic Output to Appropriations

Gross Economic Output ($ millions)	Final Revised FY16 Appropriations ($ millions)	Ratio of Economic Output to Appropriations
$1,849.8	$81.2	22.8

Impact Types

Direct Effect: The specific impact of the employment and operational expenditures related to the higher education institution.

Indirect Effect: The impact of expenditures by higher education-related suppliers.

Induced Effect: The additional impact of the spending of employees and suppliers' employees in the overall economy that can be attributed to the higher education-related expenditures.

The three types—direct, indirect, and induced—together, are considered the ***total effect***. The ***multiplier*** is the ratio of total impacts to direct effects.

Definition of Impact Variables

Employment: The number of workers (full or part-time) whose employment is due, totally or in part, to the economic effects of the higher education-related expenditures.

Employee Compensation: The wages and fringe benefits received by individuals in the economy.

Output: The dollar value of expenditures.

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OU – Tulsa

Economic Impacts

OU – Tulsa generated expenditures of $17.4 million in FY2016 and supported approximately $28.4 million in total economic output. With a ratio of economic output to appropriations of 4.0, OU – Tulsa produced $4.00 in economic output per dollar of state appropriations.

There are direct, indirect, and induced economic benefits generated in the state and local regional economies through the operational expenditures of the faculty, staff and students of OU – Tulsa. The following table details the FY2016 expenditures used to calculate the institution's local regional economic impacts.

Expenditure Impacts (FY2016)

Expenditure	Amount ($ millions)
Employee Compensation	$11.4
General Education & Administrative Expenditures	$3.6
Sponsored Research & Programs	$0.0
Intercollegiate Athletics	$0.0
Teaching Hospitals	$0.0
Capital Expenditures	$0.0
Nonresident Student Spending	$2.4
Total Direct Expenditures	**$17.4**

The table below quantifies the broad economic impacts generated within the local region through the operations and functions of OU – Tulsa.

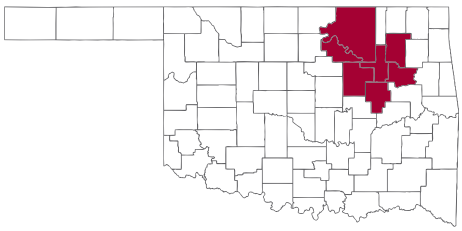
Operational Expenditure Spillover Effects

Impact Type	Employment	Employee Compensation ($ millions)	Output ($ millions)
Direct Effect	171	$12.8	$16.2
Indirect Effect	12	$1.0	$1.8
Induced Effect	46	$3.4	$10.4
Total Effect	**229**	**$17.2**	**$28.4**
Multiplier	1.34	1.34	1.75

A useful policy measure of the state's financial contribution to higher education is the ratio of the gross economic output of the System relative to the amount of state appropriations used to fund its operations. The table below provides an estimate of the ratio of output to appropriations for OU – Tulsa.

Ratio of Economic Output to Appropriations

Gross Economic Output ($ millions)	Final Revised FY16 Appropriations ($ millions)	Ratio of Economic Output to Appropriations
$28.4	$7.1	4.0



Impact Types

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Indirect Effect: The impact of expenditures by higher education-related suppliers.

Induced Effect: The additional impact of the spending of employees and suppliers' employees in the overall economy that can be attributed to the higher education-related expenditures.

The three types—direct, indirect, and induced—together, are considered the ***total effect***. The ***multiplier*** is the ratio of total impacts to direct effects.

Definition of Impact Variables

Employment: The number of workers (full or part-time) whose employment is due, totally or in part, to the economic effects of the higher education-related expenditures.

Employee Compensation: The wages and fringe benefits received by individuals in the economy.

Output: The dollar value of expenditures.

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OSU – Tulsa

Economic Impacts

OSU – Tulsa generated expenditures of $25.9 million in FY2016 and supported approximately $41.6 million in total economic output. With a ratio of economic output to appropriations of 4.2, OSU – Tulsa produced $4.20 in economic output per dollar of state appropriations.

There are direct, indirect, and induced economic benefits generated in the state and local regional economies through the operational expenditures of the faculty, staff and students of OSU – Tulsa. The following table details the FY2016 expenditures used to calculate the institution's local regional economic impacts.

Expenditure Impacts (FY2016)

Expenditure	Amount ($ millions)
Employee Compensation	$17.0
General Education & Administrative Expenditures	$5.4
Sponsored Research & Programs	$0.0
Intercollegiate Athletics	$0.0
Teaching Hospitals	$0.0
Capital Expenditures	$1.5
Nonresident Student Spending	$2.1
Total Direct Expenditures	**$25.9**

The table below quantifies the broad economic impacts generated within the local region through the operations and functions of OSU – Tulsa.

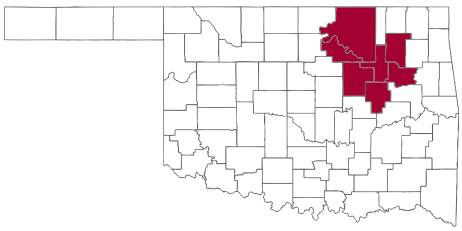
Operational Expenditure Spillover Effects

Impact Type	Employment	Employee Compensation ($ millions)	Output ($ millions)
Direct Effect	266	$18.8	$27.2
Indirect Effect	16	$1.5	$2.2
Induced Effect	91	$4.3	$12.2
Total Effect	**373**	**$24.7**	**$41.6**
Multiplier	1.40	1.31	1.53

A useful policy measure of the state's financial contribution to higher education is the ratio of the gross economic output of the System relative to the amount of state appropriations used to fund its operations. The table below provides an estimate of the ratio of output to appropriations for OSU – Tulsa.

Ratio of Economic Output to Appropriations

Gross Economic Output ($ millions)	Final Revised FY16 Appropriations ($ millions)	Ratio of Economic Output to Appropriations
$41.6	$9.8	4.2



Impact Types

Direct Effect: The specific impact of the employment and operational expenditures related to the higher education institution.

Indirect Effect: The impact of expenditures by higher education-related suppliers.

Induced Effect: The additional impact of the spending of employees and suppliers' employees in the overall economy that can be attributed to the higher education-related expenditures.

The three types—direct, indirect, and induced—together, are considered the ***total effect***. The ***multiplier*** is the ratio of total impacts to direct effects.

Definition of Impact Variables

Employment: The number of workers (full or part-time) whose employment is due, totally or in part, to the economic effects of the higher education-related expenditures.

Employee Compensation: The wages and fringe benefits received by individuals in the economy.

Output: The dollar value of expenditures.

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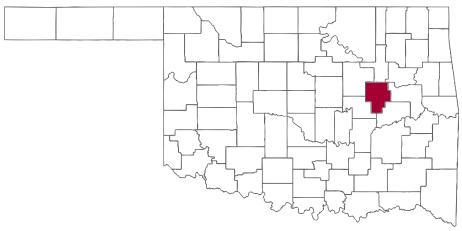
OSU Institute of Technology

Economic Impacts



The OSU Institute of Technology generated expenditures of $51.8 million in FY2016 and supported approximately $88.1 million in total economic output. With a ratio of economic output to appropriations of 7.0, the OSU Institute of Technology produced $7.00 in economic output per dollar of state appropriations.

There are direct, indirect, and induced economic benefits generated in the state and local regional economies through the operational expenditures of the faculty, staff and students of the OSU Institute of Technology. The following table details the FY2016 expenditures used to calculate the institution's local regional economic impacts.

Expenditure Impacts (FY2016)

Expenditure	Amount ($ millions)
Employee Compensation	$23.4
General Education & Administrative Expenditures	$23.4
Sponsored Research & Programs	$1.4
Intercollegiate Athletics	$0.0
Teaching Hospitals	$0.0
Capital Expenditures	$1.0
Nonresident Student Spending	$2.6
Total Direct Expenditures	**$51.8**

The table below quantifies the broad economic impacts generated within the local region through the operations and functions of the OSU Institute of Technology.

Operational Expenditure Spillover Effects

Impact Type	Employment	Employee Compensation ($ millions)	Output ($ millions)
Direct Effect	594	$24.8	$56.1
Indirect Effect	42	$1.5	$3.9
Induced Effect	172	$6.9	$28.0
Total Effect	**808**	**$33.2**	**$88.1**
Multiplier	1.36	1.34	1.57

A useful policy measure of the state's financial contribution to higher education is the ratio of the gross economic output of the System relative to the amount of state appropriations used to fund its operations. The table below provides an estimate of the ratio of output to appropriations for the OSU Institute of Technology.

Ratio of Economic Output to Appropriations

Gross Economic Output ($ millions)	Final Revised FY16 Appropriations ($ millions)	Ratio of Economic Output to Appropriations
$88.1	$12.7	7.0

Impact Types

Direct Effect: The specific impact of the employment and operational expenditures related to the higher education institution.

Indirect Effect: The impact of expenditures by higher education-related suppliers.

Induced Effect: The additional impact of the spending of employees and suppliers' employees in the overall economy that can be attributed to the higher education-related expenditures.

The three types—direct, indirect, and induced—together, are considered the ***total effect***. The ***multiplier*** is the ratio of total impacts to direct effects.

Definition of Impact Variables

Employment: The number of workers (full or part-time) whose employment is due, totally or in part, to the economic effects of the higher education-related expenditures.

Employee Compensation: The wages and fringe benefits received by individuals in the economy.

Output: The dollar value of expenditures.

STATE CHAMBER RESEARCH FOUNDATION

Prepared by the State Chamber Research Foundation with data from RegionTrack's *The Economic Role of Oklahoma's Public Colleges and Universities* 2018 report

OSU – OKC

Economic Impacts

OSU – OKC generated expenditures of $74.8 million in FY2016 and supported approximately $133.2 million in total economic output. With a ratio of economic output to appropriations of 13.1, OSU – OKC produced $13.10 in economic output per dollar of state appropriations.

There are direct, indirect, and induced economic benefits generated in the state and local regional economies through the operational expenditures of the faculty, staff and students of OSU – OKC. The following table details the FY2016 expenditures used to calculate the institution's local regional economic impacts.

Expenditure Impacts (FY2016)

Expenditure	Amount ($ millions)
Employee Compensation	$21.5
General Education & Administrative Expenditures	$30.5
Sponsored Research & Programs	$8.4
Intercollegiate Athletics	$0.0
Teaching Hospitals	$0.0
Capital Expenditures	$13.5
Nonresident Student Spending	$0.9
Total Direct Expenditures	**$74.8**

The table below quantifies the broad economic impacts generated within the local region through the operations and functions of OSU – OKC.

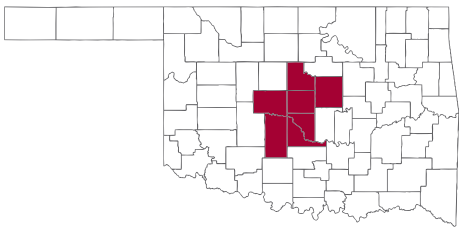
Operational Expenditure Spillover Effects

Impact Type	Employment	Employee Compensation ($ millions)	Output ($ millions)
Direct Effect	577	$24.5	$82.7
Indirect Effect	35	$1.5	$7.4
Induced Effect	150	$7.3	$43.0
Total Effect	**762**	**$33.3**	**$133.2**
Multiplier	1.32	1.36	1.61

A useful policy measure of the state's financial contribution to higher education is the ratio of the gross economic output of the System relative to the amount of state appropriations used to fund its operations. The table below provides an estimate of the ratio of output to appropriations for OSU – OKC.

Ratio of Economic Output to Appropriations

Gross Economic Output ($ millions)	Final Revised FY16 Appropriations ($ millions)	Ratio of Economic Output to Appropriations
$133.2	$10.1	13.1



Impact Types

Direct Effect: The specific impact of the employment and operational expenditures related to the higher education institution.

Indirect Effect: The impact of expenditures by higher education-related suppliers.

Induced Effect: The additional impact of the spending of employees and suppliers' employees in the overall economy that can be attributed to the higher education-related expenditures.

The three types—direct, indirect, and induced—together, are considered the ***total effect***. The ***multiplier*** is the ratio of total impacts to direct effects.

Definition of Impact Variables

Employment: The number of workers (full or part-time) whose employment is due, totally or in part, to the economic effects of the higher education-related expenditures.

Employee Compensation: The wages and fringe benefits received by individuals in the economy.

Output: The dollar value of expenditures.

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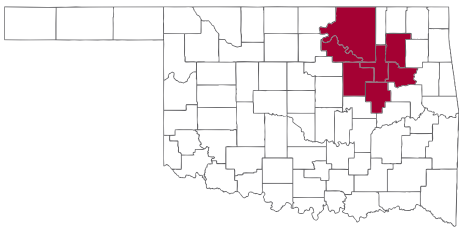
OSU Center for Health Sciences

Economic Impacts



OSU Center for Health Sciences generated expenditures of $227.2 million in FY2016 and supported approximately $366.5 million in total economic output. With a ratio of economic output to appropriations of 29.7, OSU Center for Health Sciences produced $29.70 in economic output per dollar of state appropriations.

There are direct, indirect, and induced economic benefits generated in the state and local regional economies through the operational expenditures of the faculty, staff and students of OSU Center for Health Sciences. The following table details the FY2016 expenditures used to calculate the institution's local regional economic impacts.

Expenditure Impacts (FY2016)

Expenditure	Amount ($ millions)
Employee Compensation	$49.0
General Education & Administrative Expenditures	$119.8
Sponsored Research & Programs	$3.8
Intercollegiate Athletics	$0.0
Teaching Hospitals	$5.6
Capital Expenditures	$47.0
Nonresident Student Spending	$2.0
Total Direct Expenditures	**$227.2**

The table below quantifies the broad economic impacts generated within the local region through the operations and functions of OSU Center for Health Sciences.

Operational Expenditure Spillover Effects

Impact Type	Employment	Employee Compensation ($ millions)	Output ($ millions)
Direct Effect	606	$53.4	$236.4
Indirect Effect	42	$4.3	$11.8
Induced Effect	200	$16.0	$118.2
Total Effect	**848**	**$73.7**	**$366.5**
Multiplier	1.40	1.38	1.55

A useful policy measure of the state's financial contribution to higher education is the ratio of the gross economic output of the System relative to the amount of state appropriations used to fund its operations. The table below provides an estimate of the ratio of output to appropriations for OSU Center for Health Sciences.

Ratio of Economic Output to Appropriations

Gross Economic Output ($ millions)	Final Revised FY16 Appropriations ($ millions)	Ratio of Economic Output to Appropriations
$366.5	$12.3	29.7

Impact Types

Direct Effect: The specific impact of the employment and operational expenditures related to the higher education institution.

Indirect Effect: The impact of expenditures by higher education-related suppliers.

Induced Effect: The additional impact of the spending of employees and suppliers' employees in the overall economy that can be attributed to the higher education-related expenditures.

The three types—direct, indirect, and induced—together, are considered the ***total effect***. The ***multiplier*** is the ratio of total impacts to direct effects.

Definition of Impact Variables

Employment: The number of workers (full or part-time) whose employment is due, totally or in part, to the economic effects of the higher education-related expenditures.

Employee Compensation: The wages and fringe benefits received by individuals in the economy.

Output: The dollar value of expenditures.

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