

Economic Impact of the Oklahoma Manufacturing Sector

Winter 2018



Prepared by



SOUTHWESTERN OKLAHOMA STATE UNIVERSITY
BUSINESS ENTERPRISE CENTER

Prepared for



Population, Labor Force, & Employment Summary

Population in any given year is determined by adding the net natural change and the migration change to the previous year's population. The natural change is caused by births and deaths, while migration occurs for economic and non-economic reasons. Population reflects the mid-year estimates of people, including births, special populations, and survivors from the previous year, economic migrants, international migrants, and retired migrants. It is affected by changes in total population, special population (e.g. active military, active military dependents, college students and prisoners), natality and survival rates.

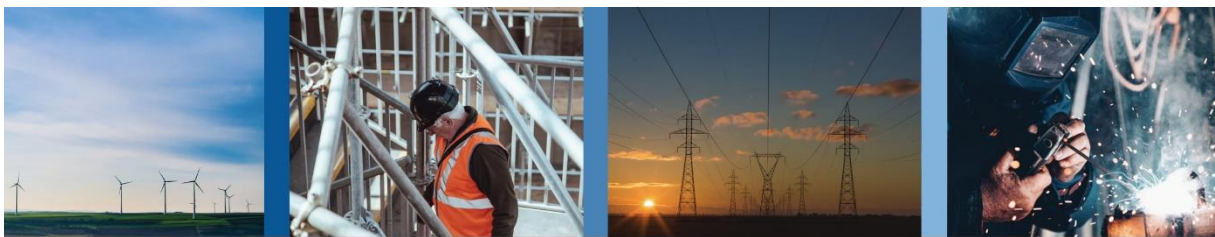
Labor Force includes the total number of people employed and those who seek employment in a given region, calculated with participation rates and age cohort. Calculation of labor force is derived by taking the total population multiplied by the participation rate. An increase in population or participation rate will result in an increased labor force in the region. The labor force participation rate represents the proportion of population that is in the labor force and may vary according to age cohort. These participation rates also respond to changes in employment relative to the potential labor force and to changes in the real after tax wage rate.

Employment includes the number of full-time and part-time jobs by place of work in the REMI model. REMI's employment data came from the Bureau of Economic Analysis. State and regional employment are estimated on a full-time and part-time basis on equal weight because of the limitations of the available source data. While employees, sole proprietors, and active partners are included in the estimate, unpaid family workers and volunteers are not included.



Population data is given for age, gender, and ethnic category, with birth and survival rates for each group. Labor force is determined by the size and labor force participation rate of each group within a region's population. For example, if there were 1,000 people within a region's population and 567 people are within the working age population (16-64 years), then the labor force estimate is 56.7 percent of the total population. Migration flow could also shape population base and labor force supply. Oklahoma ranked 25th in the nation in terms of the ability to attract out-of-state migrants, such as economic migrants.¹ Oklahoma scored 39.3 percent, in the measure of the current state population born in another state, placing Oklahoma in the middle of magnetism measure, as one of the least magnetic states.¹

Employment estimates measure the number of jobs. It can be measured either as a count of workers or as a count of jobs. In the former case, an employed worker is counted only once; in the latter case, all jobs held by the worker are counted. The state and regional employment estimates in this report count the number of jobs, full-time and part-time, by place of work. A worker's activity in each industry and location of employment is reflected in the measure, and thus employment estimates can be higher compared to population and labor force estimates. It is common for workers to hold more than one job, especially in the manufacturing sector that offers plenty of part-time jobs. Place of residence of the workers can also affect population estimates. Some workers commute into the region to work during the day, but live outside of the region near bordering states. Thus, these workers are only reflected in employment estimates but not in the population estimates.



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Executive Summary

The State Chamber of Oklahoma Research Foundation has approached the Business Enterprise Center at Southwestern Oklahoma State University for an updated study of the economic impact on Oklahoma's manufacturing sector.

The manufacturing sector has been a key driver in strengthening Oklahoma's economy and manufacturing jobs have thrived in the state in recent years. This study examines and predicts the underlying economic impacts of the manufacturing sector on Oklahoma's economy. The study utilizes the Regional Economic Models, Inc. (REMI) model, a dynamic input-output model that incorporates several modeling approaches, which include general equilibrium, multi-equation, econometric, and economic geography. Using data from the REMI baseline, the input-output model predicts the fundamental economic impacts of the manufacturing sector in Oklahoma.

The study found that *the economic impact of the manufacturing sector on Oklahoma is significant* and cascades throughout the entire state's economy. The table below is a synopsis of average economic impacts of the manufacturing sector on statewide economy from 2017 to 2019.

Average Annual Economic Impacts	
Gross State Product	\$36.2 billion
State Output	\$80.9 billion
Real Disposable Personal Income	\$20.6 billion
Employment	384,961 jobs
Residential Capital Stock	\$15.4 billion
Non-Residential Capital Stock	\$10.3 billion
Labor Force	192,246 people
Population	250,196 people



Project Information & Assumptions

The purpose of this study is to quantify and forecast the significance of the manufacturing sector to Oklahoma's economy. Key scenarios and assumptions that serve as primary inputs into the REMI model are demonstrated in this section to estimate the incremental impact of manufacturing on Gross Regional Product (GRP), Output, Employment, Income, Capital Stock, and more.

As a dynamic input-output modeling software, the REMI model incorporates several different aspects of modeling approaches, which include input-output model, general equilibrium, econometrics, and economic geography that generate forecasts based on historical data. The primary national, state, and county data came from the Bureau of Economic Analysis (BEA). Other major sources of historical data were obtained from the U.S. Census Bureau, Bureau of Labor Statistics (BLS), State Employment Security Agencies (ESAs), Energy Information Administration and other related sources that serve as the foundation upon which to forecast future economic and socioeconomic variables.

The model measures the importance of the manufacturing sector by predicting the loss of jobs, output, real disposable personal income and other vital economic variables if the sector were removed from the state's economy. In order to model the economic impact of the manufacturing sector that presently exists in the economy, it is necessary to remove data associated with this sector from the modeling software in the current year and the projected future years. As a result, the subsequent forecast produces negative impact when compared to the control forecast. This approach is known as "Counterfactual Modeling." In order to explain the positive impact of the manufacturing on the economy, the results obtained were multiplied by negative one, which later refers to as a "counterfactual positive" simulation. This type of simulation assumes any dollars/ jobs removed from the model will not be re-spent or re-employed elsewhere in the economy.

The study used the employment data from the REMI baseline to serve as the primary data inputs. The primary employment data source for REMI Policy Insight is the Bureau of Economic Analysis (BEA). The BEA employment series for the state and local areas comprises estimates of number of jobs, full-time and part-time, by place of work. Both full-time and part-time jobs are counted at equal weight. Employees, sole proprietors, and active partners are included, but unpaid family workers and volunteers are not included. The employment estimates are counted as the number of jobs at which the earnings estimates and worker's activity in each industry or location of employment is reflected in the measure.



The employment numbers for the manufacturing sector included workers covered by the State Unemployment Insurance (UI) laws and federal civilian workers covered by the Unemployment Compensation for the Federal Employees (UCFE) program. The estimates of about 95 percent of wage and salary employment are derived from tabulations by the state employment security agencies (ESAs) from their state employment security reports. These tabulations summarize the data from the quarterly UI contribution reports filed with a state ESA by the employers subject to the state's UI laws.

Using the employment data from the REMI baseline, one complementary scenario (OKC MSA, Tulsa MSA, Northwest Oklahoma, Northeast Oklahoma, Southwest Oklahoma, and Southeast Oklahoma) was built and modeled as "counterfactual positive" simulation, based on a forecast time frame from 2017 to 2019.

As previously mentioned, the REMI model relies on historical data to forecast the economic impact. This data was obtained from different sources and each of these sources use different measurements to report the monetary figures. BEA has reported Gross Domestic Product (GDP) and its aggregate final demand components in chained real dollars, while BLS uses fixed real dollars for data that are at the most 'detailed' level. In order to reconcile these two sets of variables, all real dollar concepts used in the model are based on fixed weights. This allows the industry value added and final demand totals to remain balanced. In order to avoid any confusion, all monetary figures of the economic impact reported in this study are present in 'current' dollars. Current dollar is the value of a dollar at the time at which it is measured.

The first section of the report discusses the economic impact of manufacturing on Oklahoma's economy as a whole; and the second section of the report addresses the same issues, but focuses on the regional levels of the six sub-state regions. All economic impact reported represents the aggregated impact of direct, indirect, and induced impacts of the manufacturing sector on Oklahoma's economy.

The REMI control forecast predicts the economic and demographic variables into the future, if nothing changes (*ceteris paribus*) in the economy. The REMI alternative forecast predicts the same variables for the economy with a given economic stimulus, which is the manufacturing sector employment data input. The difference between the two (control forecast and alternative forecast) concludes the economic impact of the manufacturing sector upon the state and the regional economies. The aggregated economic impact is an estimate of what would have occurred in the study region over the study time period, if manufacturing had been the only stimulus that occurred in the economy and *ceteris paribus*.



Gross State Product

Gross State Product (GSP)

As a value added concept is analogous to the national concept of Gross Domestic Product. It is equal to output excluding the intermediate inputs. It represents compensation and profits.

Affected by:

- Consumption
- Net Exports
- Investment
- State & Local Government Spending

Affects:

- Commodity Access Index
- Change in Local Supply
- Employment
- Output

Gross State Product (GSP) is analogous to the nation’s Gross Domestic Product (GDP), and to the region’s Gross Regional Product (GRP). It is the total value of all goods and services produced within a region during a given time period. In general, it can be used as a barometer to gauge a region’s economic well-being.

Excluding the manufacturing sector from the state’s economy, GSP would amount to \$157.3 billion in 2017. With the addition of manufacturing, this amount is predicted to grow to as much as \$192.4 billion, representing a 22.3% increase or \$35.1 billion of GSP impact.

Without manufacturing, the GSP is predicted to amount to \$161.8 billion by 2019. Adding manufacturing into the state’s economy grows the GSP to \$198.8 billion, a 22.8% increase or \$37 billion of GSP impact.

\$36.2 billion



Over the years, average manufacturing GSP impact is projected to be \$36.2 billion annually; 22.7% more than without the manufacturing sector.



State Output

The amount of production in dollars, including all intermediate goods purchased as well as value-added (compensation and profit). Can also be thought of as sales (Output = Self-Supply – Export + Intra-regional Trade – Exogenous Production).

Affected by:

- Consumption
- International Exports
- Investment
- State & Local Government Spending
- Intermediate Inputs
- Share of Domestic Markets

Affects:

- Commodity Access Index
- Change in Local Supply
- Employment
- Intermediate Inputs

State Output

State Output, reflecting broader economic activities that include the amount of production, is comprised of all the intermediate goods purchased as well as value-added (compensation and profit). Briefly, it is the sum of Gross State Product plus intermediate goods and services.

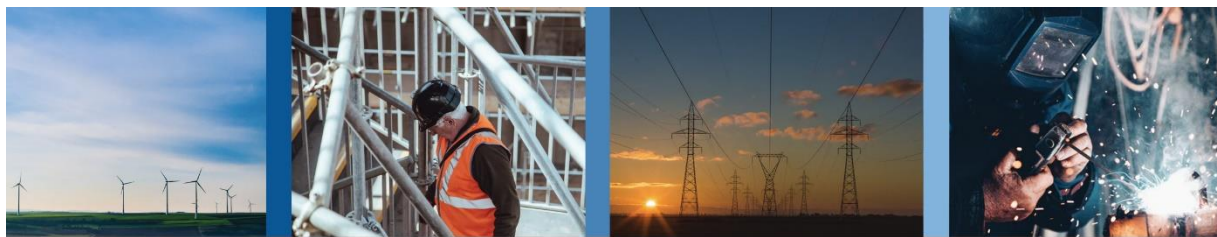
Output is affected by changes in industry demand in all regions in the nation, the home region's share of each market, and international exports from the region. Variables affecting and affected by the state output are the same variables affecting and affected by GSP, except that state output includes the measurement of intermediate inputs.

Excluding the manufacturing sector from the state's economy, state output is predicted to account for \$242.9 billion in 2017. With the addition of manufacturing, this amount is predicted to grow to as much as \$321.7 billion, representing a 32.4% increase or \$78.8 billion of state output impact.

Without manufacturing, the state output is predicted to amount to \$250.1 billion in 2019. Adding manufacturing into the state's economy grows the state output to \$332.5 billion, a 33% increase or \$82.4 billion of state output impact.

The average output impact is projected to be \$80.9 billion per year; 32.8% more than without manufacturing.

**\$80.9
billion**



Real Disposable Personal Income

Real Disposable Personal Income

Disposable personal income deflated by the PCE-Price Index (the personal consumption expenditure price index).

Affected By:

- Employment
- Commuter Income or Outflow
- Property Income Transfers
- Taxes
- Social Security Payments
- Compensation
- Consumer Prices

Affects:

- Consumption
- Optimal Residential Capital Stock

Real Disposable Personal Income represents the after tax, inflation adjusted income that can be spent or saved by income earners. Real Disposable Personal Income is directly affected by Disposable Personal Income, so a change in Real Disposable Personal Income will lead to a change in Personal Consumption.

In REMI's terms, Real Disposable Personal Income equals Disposable Personal Income deflated by the PCE-Price Index. Briefly, an increase in real disposable personal income can be caused by an increase in disposable personal income or a decrease in the PCE-Price index.

Excluding the manufacturing sector from the state's economy, Real Disposable Personal Income would account for \$141 billion in 2017. With the addition of manufacturing, this amount is predicted to grow to as much as \$160.1 billion, representing a 13.5% increase or \$19.1 billion of Real Disposable Personal Income impact.

Without manufacturing, the Real Disposable Personal Income is predicted to amount to \$145.4 billion in 2019. Adding manufacturing into the state's economy grows the Real Disposable Personal Income to \$167.2 billion, a 15% increase or \$21.8 billion of Real Disposable Personal Income impact.

Over the years, average manufacturing activities stimulate the economy to grow Real Disposable Personal Income to a projected impact of \$20.6 billion annually; 14.4% more than without the manufacturing sector.



\$20.6 billion



Employment

Employment

Bureau of Economic Analysis (BEA) concept based on place of work; includes full-time and part-time employees.

Affected By:

- Labor / Output Ratio
- Output
- Labor Productivity

Affects:

- Capital Stock
- Real Disposable Income
- Employment Opportunity
- Wage Rate

Employment includes the number of full-time and part-time jobs by place of work, with full-time and part-time jobs carrying equal weight in the REMI model. While employees, sole proprietors, and active partners are included in the estimate, unpaid family workers and volunteers are not included.

Without manufacturing in the economy, 2017 employment would be 2 million jobs. The existence of Manufacturing in the economy would drive the statewide employment up 19.2% to 2.3 million jobs in 2017; a difference of 376,001 jobs.

Without manufacturing, employment is predicted to remain at 2 million jobs in 2019. Adding manufacturing into the state's economy grows employment to 2.4 million jobs, a 19.8% increase or an impact of 388,964 jobs.

Employment is expected to grow by an average of 384,961 jobs per year. The state has an employment multiplier² of 1.8. This means, with every 10 new jobs created in Manufacturing, an additional 8 jobs will be created.



Residential Capital Stock

The amount of residential capital (housing structures) existing in the economy. It is further divided into Residential Actual Capital Stock and Non-Residential Actual Capital Stock.

Affected By:

- Cumulative effects of Investment

Affects:

- Gap between Actual & Optimal Capital Stock
- Investment Spending

Residential Capital Stock

Capital Stock is divided into two major categories. These include Residential Capital Stock and Non-Residential Capital Stock. Each of these categories is further disaggregated into actual or optimal capital stock. As a reminder, all reported Actual Capital Stock is the cumulative impact that would occur in the state, which is triggered by the jobs supported in Manufacturing. Only the actual capital stocks are graphed to show the actual amount of capital stock impacted by manufacturing in the economy.

Oklahoma Residential Actual Capital Stock is the amount of residential capital (housing structures) in the region accumulated over time net of depreciation. Oklahoma Residential Actual Capital Stock is affected by changes in residential investment.

Residential Capital billion. This amount \$21.2 billion by 2019. on Residential Capital billion per year manufacturing.



\$15.4
billion

In 2017, the manufacturing sector's impact on Stock is forecasted to be \$9.5 would increase to as much as The average annual impact Stock is predicted to be \$15.4 brought about by



Non-Residential Capital Stock

The amount of non-residential capital stock (non-housing structures) existing in the economy. It is further divided into Residential Actual Capital Stock and Non-Residential Actual Capital Stock.

Affected By:

- Cumulative effects of Investment

Affecting:

- Gap between Actual & Optimal Capital Stock
- Investment Spending

Non-Residential Capital Stock

Capital Stock is divided into two major categories. These include Residential Capital Stock and Non-Residential Capital Stock. Each of these categories is further disaggregated into actual or optimal capital stock. As a reminder, all reported Actual Capital Stock is the cumulative impact that would occur in the state, which is triggered by the jobs supported in Manufacturing. Only the actual capital stocks are graphed to show the actual amount of capital stock impacted by manufacturing in the economy.

Oklahoma Non-Residential Actual Capital Stock is the amount of non-residential capital (non-housing structures) in the region accumulated over time net of depreciation.

In 2017, the manufacturing sector's impact on total Non-Residential Capital Stock is forecasted to be \$6.6 billion. This amount would increase to as much as \$14 billion by 2019. The average annual impact on Non-Residential Capital Stock is predicted to be \$10.3 billion per year brought about by manufacturing.



\$10.3
billion



Labor Force

The number of people in the labor force, i.e., employed or seeking work.

Affected By:

- Population and Participation Rate

Affects:

- Employment Opportunity
- Wage Rate

Labor Force

Labor force includes the total number of people employed and those who seek employment in a given region, calculated with the participation rates and age cohort.

Calculation of the labor force is derived by taking the total population multiplied by the participation rate. An increase in population or participation rate will result in an increased labor force in the region, and vice versa.

Excluding the manufacturing sector from the state's economy, labor force would account for 1,677,863 employees in 2017. With the addition of manufacturing, this amount is predicted to grow to 1,831,374 employees, representing a 9.1% increase or 153,511 jobs of labor force impact.

Without manufacturing, labor force would be 1,617,100 employees in 2019. With the addition of manufacturing in the economy, labor force is projected to be 1,843,649 employees in 2019, which is a 14% increase, or an impact of 226,549 jobs.

Over the years, average manufacturing labor force impact is projected to be 192,246 jobs annually; 11.7% more than without the manufacturing sector.



Population

Mid-year estimates of population, including survivors from the previous years, births, special populations, and three types of migrants (economic, international, and retired).

Affected By:

- Total Migration
- Special Population
- Natality Rates
- Survival Rates

Affects:

- Potential Labor Force
- Labor force
- Local / State Government Spending
- Consumption Spending
- Housing Prices

Population

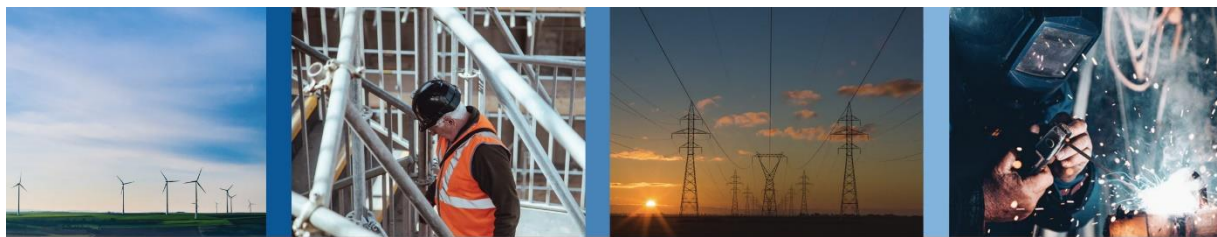
Population reflects the mid-year estimates of people, including births, special populations, survivors from the previous year, economic migrants, international migrants, and retired migrants. It is affected by changes in total migration, special populations, natality and survival rates.

Population appears not only as a determinant of Real Disposable Personal Income Per Capita, but also as a determinant of Consumption, State and Local Government Spending, and the Relative Housing or Land Prices. A change in Population will result in a change of these variables.

The major determinant of Population itself is Economic Migration. Economic migrants are migrants under age 65 (who were part of the civilian population the preceding year) who respond to economic and amenity factors. Increased amenity factors translate into a higher economic migrant impact with more people moving into the region. A positive economic migration becomes indicative of the growing population impact. The number of economic migrants would eventually taper off over time as the stimulus (Manufacturing) approaches the end of the forecast time period, and more economic migrants are

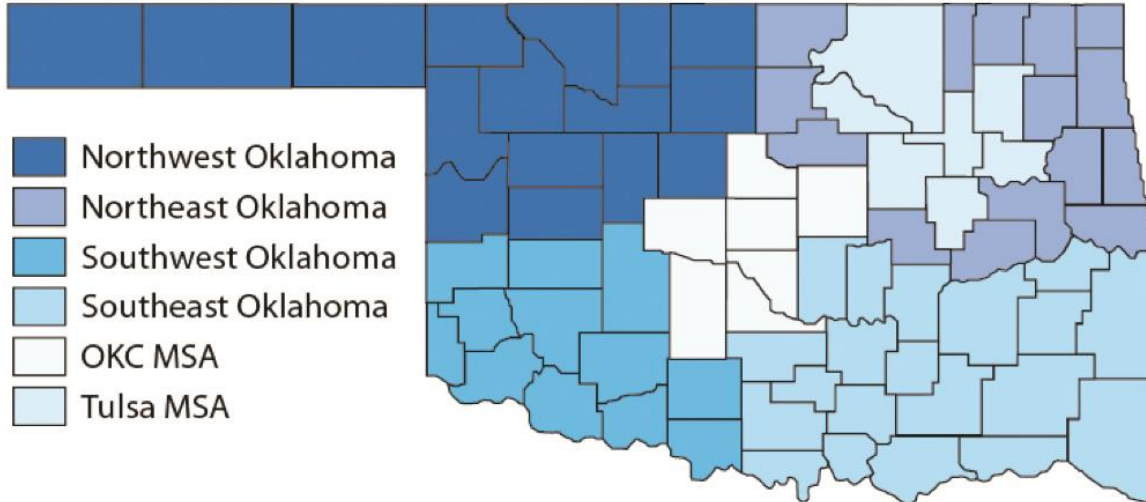
anticipated to leave the state.

From 2017 to 2019, manufacturing’s impact on population is predicted to grow from 184,329 people to 311,480 people, an average annual growth of 250,196 people.



Regional Economic Impacts

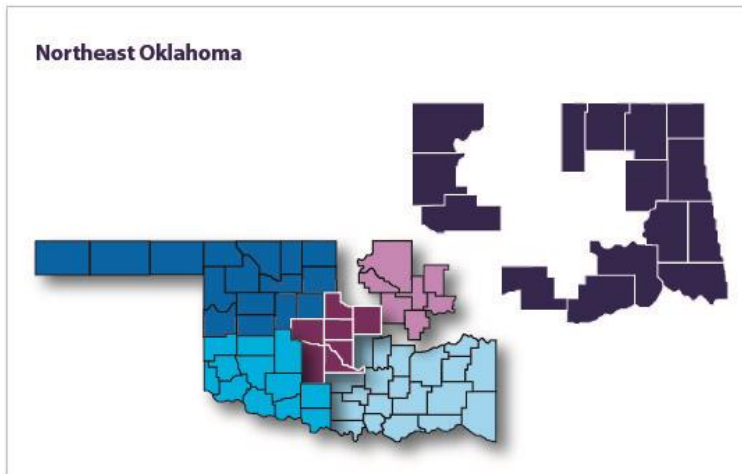
To analyze the economic impact of the manufacturing sector at the regional level, the state of Oklahoma is divided into 6 sub-state regions. The magnitude of economic impact for each region differs depending on the volume of economic activity stimulated by manufacturing, and stems from the nature of the economic structure, activities, and labor market condition of the region.



Northeast Oklahoma	Northwest Oklahoma	Southeast Oklahoma	Southwest Oklahoma	OKC MSA	Tulsa MSA
Adair Cherokee Craig Delaware Kay McIntosh Mayes Muskogee Noble Nowata Okfuskee Ottawa Payne Sequoyah Washington	Alfalfa Beaver Blaine Cimarron Custer Dewey Ellis Garfield Grant Harper Kingfisher Major Roger Mills Texas Woods Woodward	Atoka Bryan Carter Choctaw Coal Garvin Haskell Hughes Johnston Latimer Le Flore Love McCurtain Marshall Murray Pittsburg Pontotoc Pottawatomie Pushmataha Seminole	Beckham Caddo Cotton Greer Harmon Jackson Jefferson Kiowa Stephens Tillman Washita	Canadian Cleveland Grady Lincoln Logan McClain Oklahoma	Creek Okmulgee Osage Pawnee Rogers Tulsa Wagoner

PROVIDING ECONOMIC IMPACT ANALYSIS FOR OKLAHOMA AND SIX DISTINCT REGIONS

Northeast Oklahoma



In 2016, there were 511 manufacturing employers³ in the northeast region supporting 14,548 manufacturing jobs, both full and part time, with an average salary of \$48,268 per year.

The manufacturing sector’s **Gross Regional Product** impact for the northeast region is forecasted to be an average of \$4 billion per year. Regional **output** impact is projected to be \$9.8 billion annually. Regional

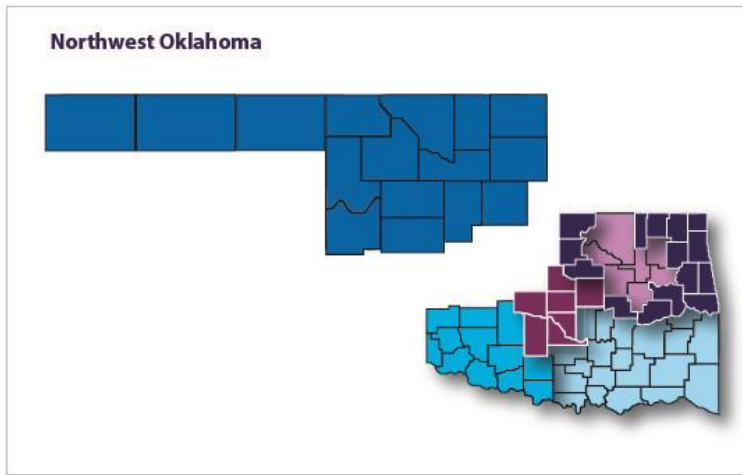
real disposable personal income impact is estimated to realize an average of \$2.1 billion per year.

Manufacturing’s average annual impact on regional **residential actual capital stock** would increase to \$1.6 billion while the sector’s impact on regional **non-residential actual capital** stock is expected to be \$1.3 billion per year. The manufacturing sector’s average annual impact on the region’s **population** should be 28,295 people, with an **employment** impact of 42,242 jobs and 23,298 employees in the **labor force**.

Northeast Oklahoma Manufacturing Economic Impact	
Gross Regional Product	\$4,035,251,379
Regional Output	\$9,776,086,051
Real Disposable Personal Income	\$2,055,674,832
Employment (people)	42,242
Residential Capital Stock	\$1,559,666,667
Non-Residential Capital Stock	\$1,264,333,333
Labor Force (people)	23,298
Population (people)	28,295



Northwest Oklahoma



In 2016, there were 231 manufacturing employers³ in the northwest region supporting 5,087 manufacturing jobs, both full and part time, with an average salary of 46,684 per year.

The manufacturing sector’s **Gross Regional Product** impact for the northwest region is forecasted to be an average of \$957.5 million per year. Regional **output** impact is projected to be \$2.7 billion annually.

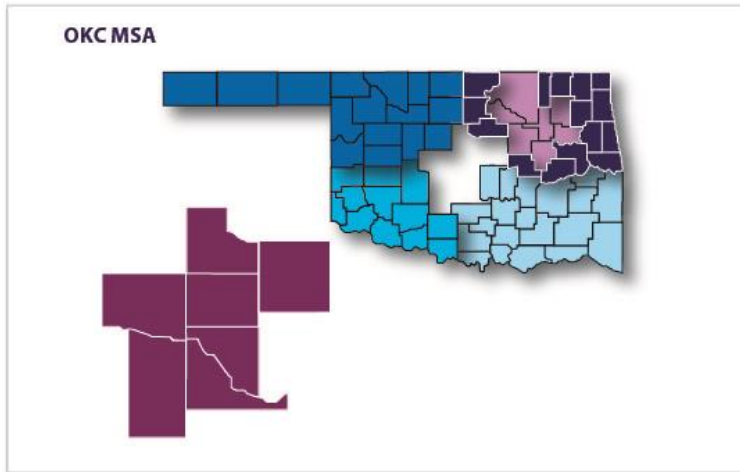
Regional **real disposable personal income** impact is estimated to realize an average of \$604 million per year.

Manufacturing’s average annual impact on regional **residential actual capital stock** would increase to \$461.3 million while the sector’s impact on regional **non-residential actual capital** stock is expected to be \$481 million per year. The manufacturing sector’s average annual impact on the region’s **population** should be 9,179 people, with an **employment** impact of 11,978 jobs and 5,749 employees in the **labor force**.

Northwest Oklahoma Manufacturing Economic Impact	
Gross Regional Product	\$957,458,736
Regional Output	\$2,704,731,133
Real Disposable Personal Income	\$603,952,237
Employment (people)	11,978
Residential Capital Stock	\$461,333,333
Non-Residential Capital Stock	\$480,666,667
Labor Force (people)	5,749
Population (people)	9,179



Oklahoma City MSA



In 2016, there were 1,313 manufacturing employers³ in the Oklahoma City MSA region supporting 34,785 manufacturing jobs, both full and part time, with an average salary of \$53,740 per year.

The manufacturing sector’s **Gross Regional Product** impact for the Oklahoma City MSA is forecasted to be an average of \$9.9 billion per year. Regional **output** impact is projected to be \$21 billion annually.

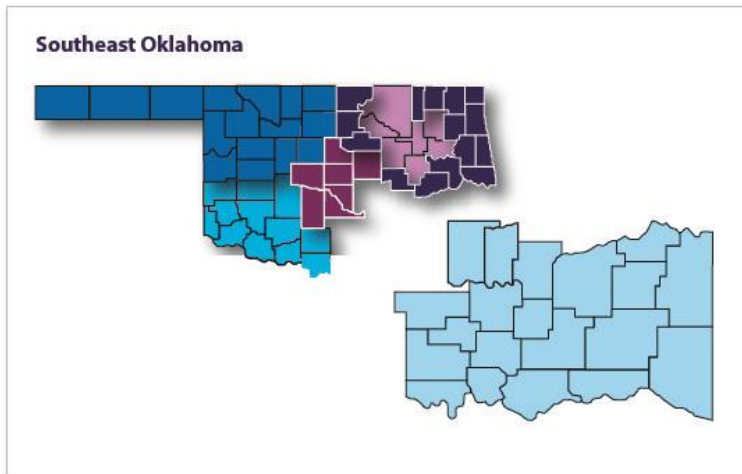
Regional **real disposable personal income** impact is estimated to realize an average of \$5.6 billion per year.

Manufacturing’s average annual impact on regional **residential actual capital stock** would increase to \$4.1 billion while the sector’s impact on regional **non-residential actual capital** stock is expected to be \$2 billion per year. The manufacturing sector’s average annual impact on the region’s **population** should be 67,135 people, with an **employment** impact of 108,232 jobs and 51,902 employees in the **labor force**.

Oklahoma City MSA Manufacturing Economic Impact	
Gross Regional Product	\$9,917,240,665
Regional Output	\$20,922,807,821
Real Disposable Personal Income	\$5,552,644,388
Employment (people)	108,232
Residential Capital Stock	\$4,074,666,667
Non-Residential Capital Stock	\$1,955,333,333
Labor Force (people)	51,902
Population (people)	67,135



Southeast Oklahoma



In 2016, there were 461 manufacturing employers³ in the southeast region supporting 20,824 manufacturing jobs, both full and part time, with an average salary of \$48,866 per year.

The manufacturing sector’s **Gross Regional Product** impact for the southeast region is forecasted to be an average of \$4.5 billion per year. Regional **output** impact is projected to be \$11 billion annually. Regional

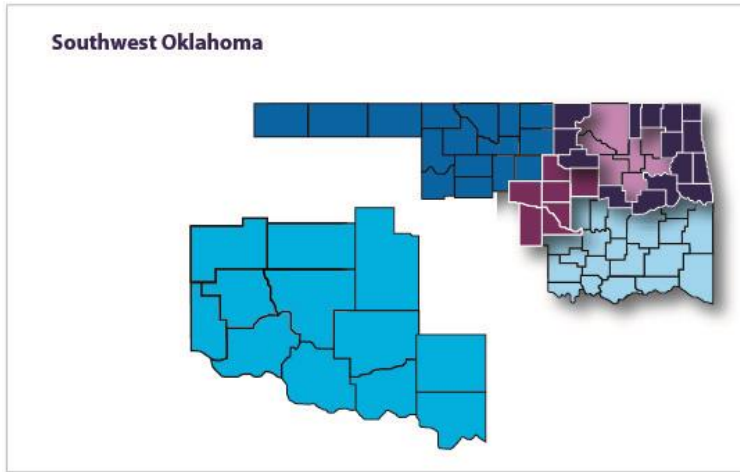
real disposable personal income impact is estimated to realize an average of \$2.4 billion per year.

Manufacturing’s average annual impact on regional **residential actual capital stock** would increase to \$1.8 billion while the sector’s impact on regional **non-residential actual capital** stock is expected to be \$2.5 billion per year. The manufacturing sector’s average annual impact on the region’s **population** should be 35,086 people, with an **employment** impact of 56,922 jobs and 29,191 employees in the **labor force**.

Southeast Oklahoma Manufacturing Economic Impact	
Gross Regional Product	\$4,491,674,042
Regional Output	\$10,905,966,106
Real Disposable Personal Income	\$2,406,539,031
Employment (people)	56,922
Residential Capital Stock	\$1,784,666,667
Non-Residential Capital Stock	\$2,533,000,000
Labor Force (people)	29,191
Population (people)	35,086



Southwest Oklahoma



In 2016, there were 202 manufacturing employers³ in the southwest region supporting 6,257 manufacturing jobs, both full and part time, with an average salary of \$60,500 per year.

The manufacturing sector’s **Gross Regional Product** impact for the southwest region is forecasted to be an average of \$1.4 billion per year. Regional **output** impact is projected to be \$3.3 billion annually. Regional

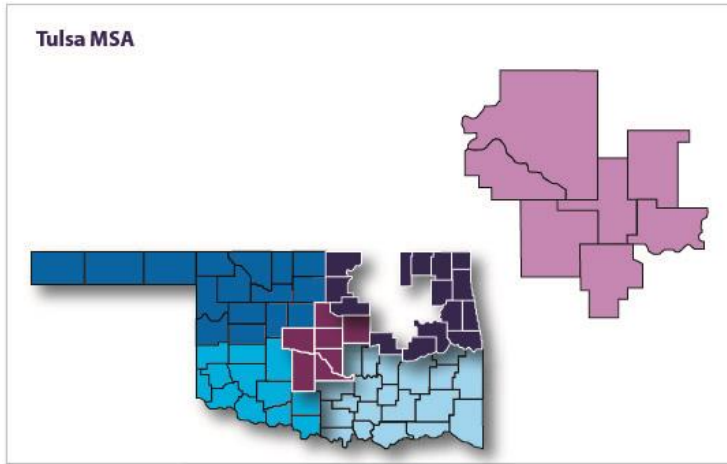
real disposable personal income impact is estimated to realize an average of \$776 million per year.

Manufacturing’s average annual impact on regional **residential actual capital stock** would increase to \$590 million while the sector’s impact on regional **non-residential actual capital stock** is expected to be \$510 million per year. The manufacturing sector’s average annual impact on the region’s **population** should be 11,530 people, with an **employment** impact of 14,746 jobs and 8,923 employees in the **labor force**.

Southwest Oklahoma Manufacturing Economic Impact	
Gross Regional Product	\$1,379,303,611
Regional Output	\$3,345,061,544
Real Disposable Personal Income	\$776,286,463
Employment (people)	14,746
Residential Capital Stock	\$590,000,000
Non-Residential Capital Stock	\$510,000,000
Labor Force (people)	8,923
Population (people)	11,530



Tulsa MSA



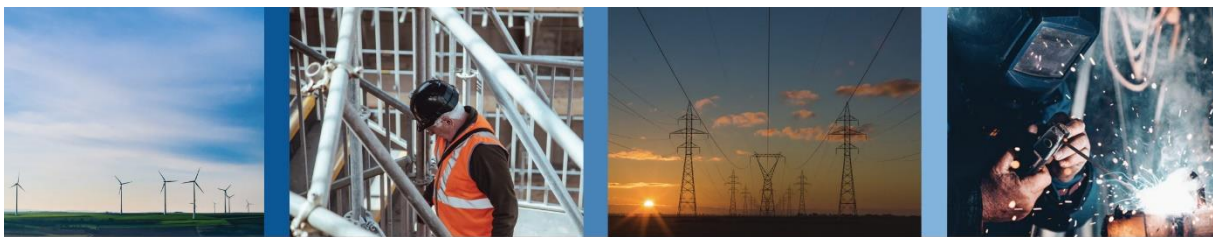
In 2016, there were 1,161 manufacturing employers³ in the Tulsa MSA region supporting 46,079 manufacturing jobs, both full and part time, with an average salary of \$57,450 per year.

The manufacturing sector’s **Gross Regional Product** impact for the Tulsa MSA is forecasted to be an average of \$15.4 billion per year. Regional **output** impact is projected to be \$33.2 billion annually. Regional **real**

disposable personal income impact is estimated to realize an average of \$9.2 billion per year.

Manufacturing’s average annual impact on regional **residential actual capital stock** would increase to \$6.9 billion while the sector’s impact on regional **non-residential actual capital** stock is expected to be \$3.6 billion per year. The manufacturing sector’s average annual impact on the region’s **population** should be 98,971 people, with an **employment** impact of 150,842 jobs and 73,183 employees in the **labor force**.

Tulsa MSA Manufacturing Economic Impact	
Gross Regional Product	\$15,413,502,281
Regional Output	\$33,230,962,462
Real Disposable Personal Income	\$9,170,437,414
Employment (people)	150,842
Residential Capital Stock	\$6,941,000,000
Non-Residential Capital Stock	\$3,602,333,333
Labor Force (people)	73,183
Population (people)	98,971



References

1. Pew Research Social & Demographic Trends, Magnet or Sticky? A State by State Typology, 2009
2. The input-output model in this report is Emsi's gravitational flows multi-regional social account matrix model (MR-SAM). It is based on data from the Census Bureau's Current Population Survey and American Community Survey; as well as the Bureau of Economic Analysis' National Income and Product Accounts, Input-Output Make and Use Tables, and Gross State Product data. In addition, several Emsi in-house data sets are used, as well as data from Oak Ridge National Labs on the cost of transportation between counties.
3. Manufacturing Employment Data from the Oklahoma Employment Security Commission's Oklahoma Quarterly Census of Employment and Wages (QCEW). QCEW Online provides monthly, quarterly and annual published quarterly count of employment and wages reported by employers covering 95 percent of Oklahoma jobs at the county, MSA, state levels by industry and by ownership. The data is obtained from the Bureau of Labor Statistics (BLS) website.

