



2018

STATE OF MONTANA

MANUFACTURING

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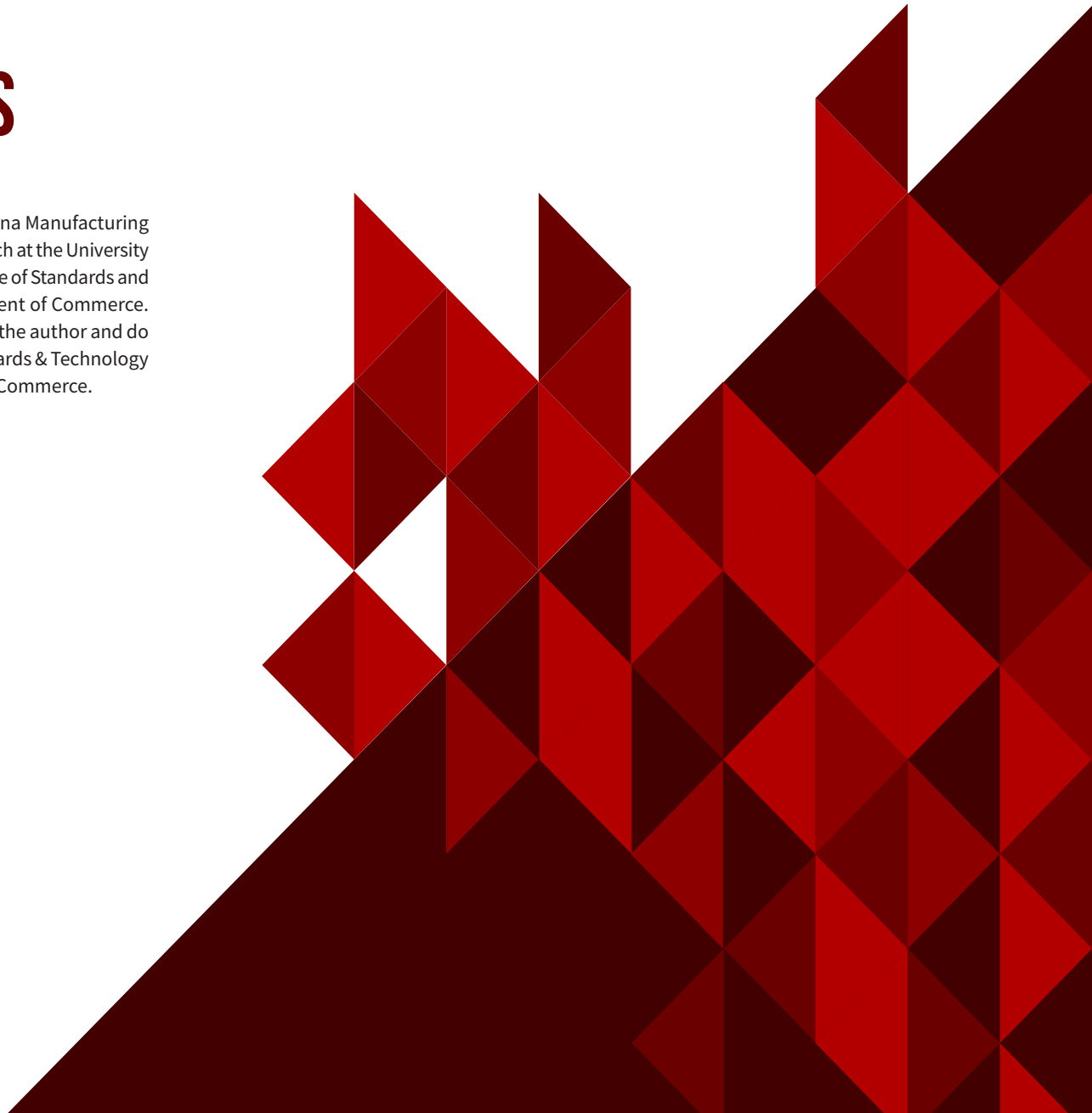
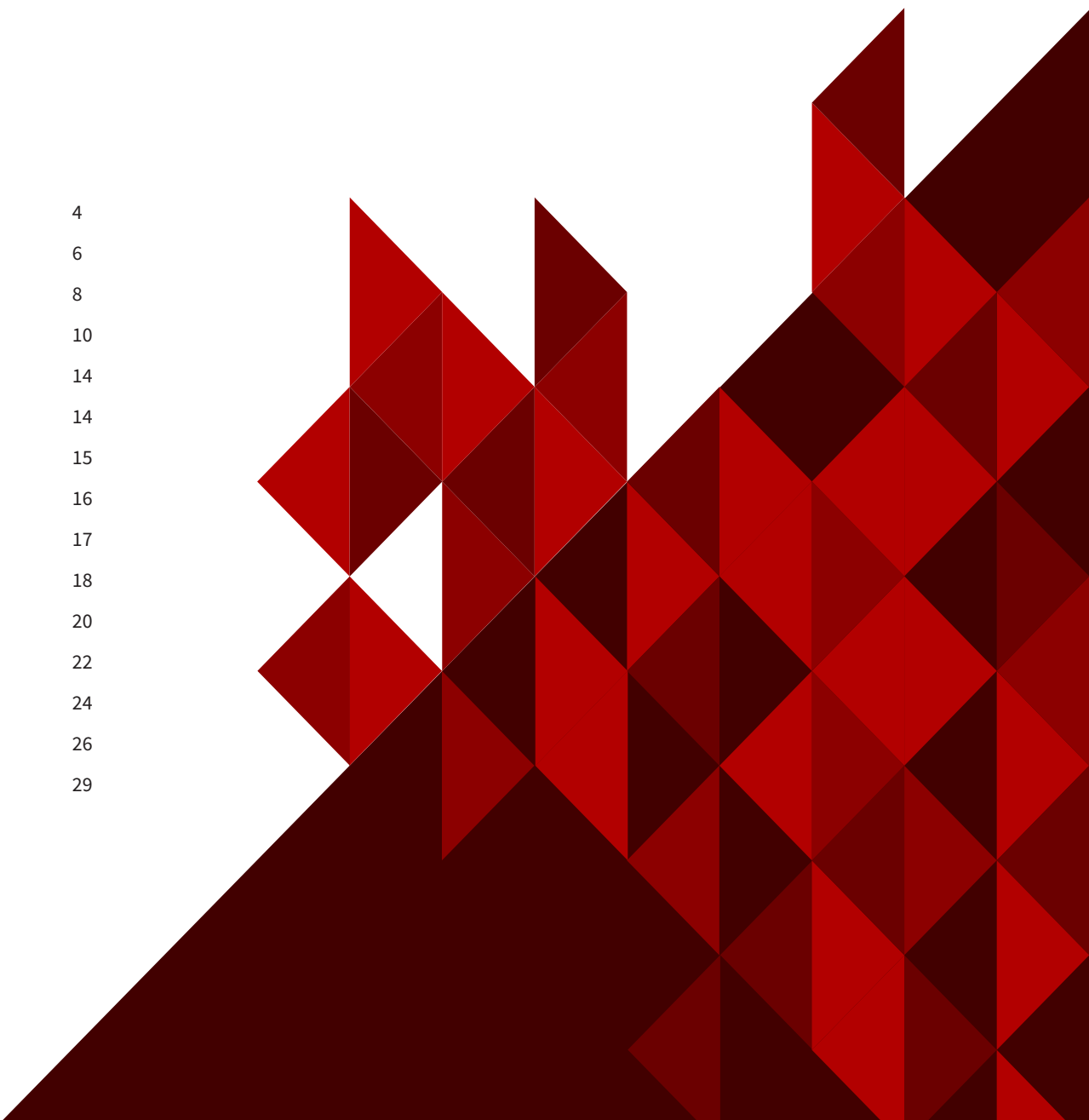


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INTRODUCTION

The good news is the U.S. economy continues to strengthen. The bad news is that it is not strengthening very much. Real GDP grew 2.3 percent in 2017. The projections for growth in 2018 and 2019 are 2.6 percent and 2.8 percent, respectively.

In addition, the length of the current recovery is a worry. The cyclic trough was in 2009 and the economic upturn is now the second longest since World War II. Recessions continue to be surprise events because all attempts to predict them reliably have failed. The business cycle has not been repealed and there will be another recession – we just do not know when.

Even though the recovery has been slow and halting, the U.S. economy has returned to full employment with the current unemployment rate hovering around 4 percent. This suggests that renewed inflation is becoming more of a concern for economic policymakers. The U.S. Federal Reserve will probably continue raising interest rates in response.

U.S. manufacturing has been a bright spot during the recovery from the trough of the Great Recession. Lower oil prices and an abundance of cheap natural gas have kept costs low and provided opportunities for new products and production facilities. Renewed worldwide growth could provide more robust markets for manufacturing exports. But the current

threats of tariffs and the possibility of trade wars cloud the outlook for manufacturing exports.

In Montana, agricultural producers have been battered by low prices and drought. An uptick in oil prices during mid-2017 could hold some promise. Extraction costs in the Bakken oilfields are relatively low compared to elsewhere in the world and only a modest but sustained increase in oil prices could stimulate activity in eastern Montana and western North Dakota. Montana's wood products industry is no longer hemorrhaging. Overall, Montana is projected to grow 2.4 to 2.6 percent in 2018 and 2019, roughly equal to the figures for 2016 and 2017.

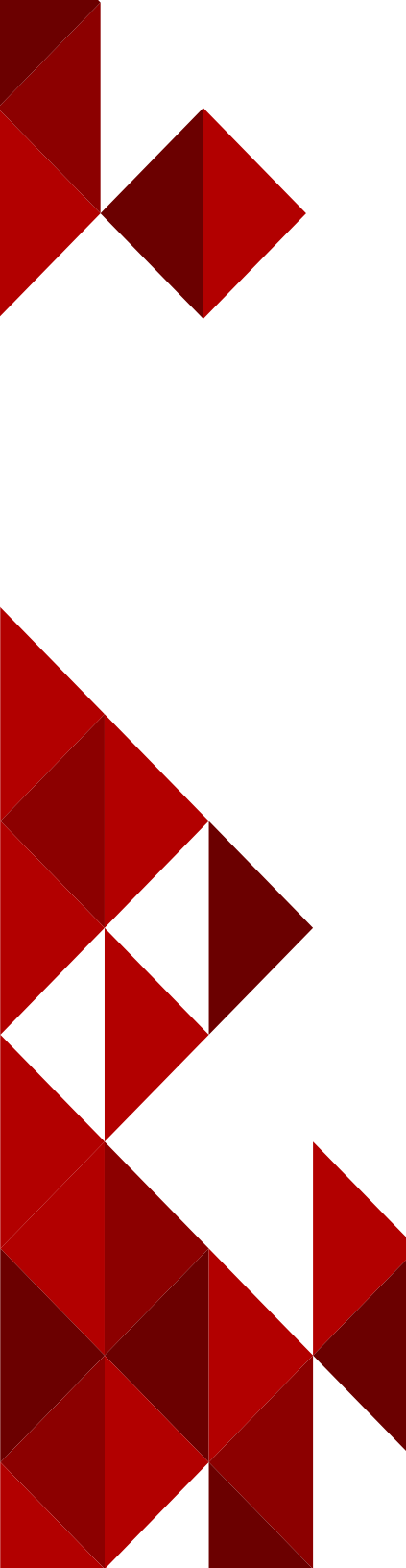
Gallatin County stands out as the fastest growing community in the state with Flathead County a bit behind. Lewis and Clark and Cascade counties have posted modest growth. Missoula and Ravalli counties have been slow to recover, but both are now growing. Missoula's most recent growth is edging closer to the state leaders. New and expanded manufacturing establishments are a major factor impacting recent trends in Cascade and Missoula counties.

Table 1 presents the manufacturing wage and salary employment for the U.S. and Montana during 2010 (Montana cycle trough) and 2017 (the

Table 1. Manufacturing wage and salary employment, U.S. and Montana, 2010 and 2017.

	2010	2017	Percent change
U.S. manufacturing	11,487,000	12,406,000	8
Montana manufacturing	16,400	19,900	21.3
Wood and paper products	3,100	2,600	-16.1
All other manufacturing	13,300	17,300	30.1

Source: U.S. Bureau of Labor Statistics, Bureau of Business and Economic Research, University of Montana.



latest data available). Comparing trends in employment reveals how manufacturing has fared in the U.S. and Montana during the recovery phase of this business cycle.

Montana manufacturing employment has grown much faster than the nation since the Great Recession. U.S. manufacturing wage and salary employment rose from 11.5 million workers in 2010 to 12.4 million in 2017, an increase of 8 percent. Montana manufacturing employment increased from 16,400 in 2010 to 19,900 in 2017, an increase of 21.3 percent.

The strong growth in Montana manufacturing employment occurred despite permanent closures in several manufacturing industries, such as the Smurfit-Stone paper mill near Missoula, which permanently closed in early 2010. This facility was the largest manufacturing plant in the state. In addition, there were shutdowns and closures in the wood products industry. Even though the closures in both industries occurred during a period of poor markets, the long-term cause was a significant decrease in the supply of raw materials due to diminished harvests on federal and some industrial lands. The paper mill and sawmills have been dismantled and those jobs will not return.

As shown in Table 1, employment in the wood and paper products industries decreased from 3,100 in 2010 to 2,600 in 2017. Despite strengthening markets in 2017, the wood and paper products industries declined about 16.1 percent during this seven-year period. Employment in all the other components of Montana manufacturing increased from 13,300 in 2010 to 17,300 in 2017, an increase of roughly 30 percent.

In summary, since the start of the recovery Montana manufacturing employment soundly outperformed its national counterpart. This strong performance was in spite of permanent closures in the wood and paper products industries. New and expanded establishments were a major contributor to Montana manufacturing's strong performance.



WORLD OUTLOOK: SYNCHRONIZED WORLDWIDE GROWTH, OUTLOOK MUCH BETTER THAN LAST YEAR

Global economic growth will be about 3.7 percent in 2018 and Goldman Sachs projects it will accelerate to 4 percent in 2019. Almost all regions of the world are now growing. Global economic conditions are important for Montana manufacturers, because several prominent firms operate in the world market and their exports depend on economic conditions worldwide.

Europe and the Eurozone – Hitting on All Cylinders

With the double-dip recession and debt crisis in the rear view mirror, the EU is projected to post consistent 2 percent real growth over the next few years. Almost all areas are experiencing positive growth, even countries such as Greece and Spain will grow at or above the EU average. The contribution of EU imports to global trade equaled that of the U.S. and China. Italy remains the EU country still saddled with political instability and a debt crisis.

Germany remains the growth leader and France lags just a bit behind. Unemployment remains high in certain countries, but has begun to decline. Rates are still in the 15 to 20 percent range in places such as Greece and Spain, but down from the 25 to 28 percent reported four or five years ago.

The U.K. economy is decelerating, but the collapse predicted by some of the Brexit skeptics has not occurred. Real GDP growth is down from the 2.3 percent in 2015, but the drop was only to 1.5 percent in 2017. The forecasts for 2018 and 2019 are in the 1.4 to 1.6 percent range. The unemployment rate is at a record low. Future Brexit and other trade negotiations are still uncertain and could become rancorous.

Hanging over the entire region is the potential for an energy crisis. The unresolved situation between Russia and Ukraine could result in a sharp drop in energy supplies to Europe and a corresponding rise in prices.

South America – Finally Growth is Projected

The South American economy should continue to show modest growth. The Brazilian economy is now growing after several years of decline. Venezuela's economy remains a basket case.

Brazil, the largest economy in South America, began to grow in early 2017 after eight consecutive quarters of decline. Brazil's inflation rate has moderated, but price stability remains a problem in other countries. For example, Argentina is projected to have annual inflation of 13 percent per year for the next decade. Venezuela continues to be plagued by low oil prices, rampant inflation and political instability. The unrest is spilling across the borders and impacting nearby countries.

Mexico – Moderate Growth Continues

The last 15 years have witnessed a period of economic stability previously unseen in Mexico. The Mexican economy is holding at about two percent growth. Fiscal policy remains moderate, but a recent hike in inflation to 6.6 percent may be troublesome. The poverty rate remains high and has not budged, and large income inequities persist. By far the biggest future uncertainty is the renegotiation of the NAFTA treaty scheduled for fall 2018.

India – Temporary Slowdown Over

Economic growth in India is projected to strengthen to more than 7 percent, beating out China in 2018 and 2019. The economy was temporarily slowed by the imposition of the Goods and Services Tax (GST) and monetary restructuring designed to choke off the black market economy. In the long-run the GST will simplify the tax system and promote growth.



China – Data Uncertainties

Reliable economic data for the Chinese economy remains problematic. Data and analyses from a number of sources place real GDP growth at slightly above 6 percent per year. The red hot housing market has cooled somewhat. Bank lending has continued to grow unabated due to lax regulatory controls and the resulting bad loans could trigger a credit crisis or even worse a recession.

Japan – Steady as She Goes

Growth picked up to 1.5 percent in 2017, but is projected to remain close to 1 percent in 2018 and 2019, as export growth remains robust. Government debt poses a serious risk. It stood at 220 percent of GDP, the highest ever recorded in an OECD country.

Canada – O Canada!

Canada had above potential growth of about 3.1 percent in 2017, having weathered the oil price shocks and mild currency strengthening. The projections are for about 2 percent growth in 2018 and 2019, less than the 2017 figure, but more in line with the long-run potential growth. Canada, like the U.S., is close to full employment and wages are accelerating. The housing market may soften a bit as interest rates move higher.

Summary – Good Economy but Considerable Geopolitical Risks

Synchronized worldwide growth portends the rosier economic outlook in years. But the world is still uncertain and almost all of the risks arise from social or political origins.

- The election of more nationalistic and euroskeptic leaders in the EU could derail the European engine of growth.
- The impacts of Brexit are still unknown.
- The refugee crisis is far from over.
- The perennial instability in the Middle East continues just short of explosive.
- A tariff war could derail growth around the world.

MEASURING AND ANALYZING **MANUFACTURING**

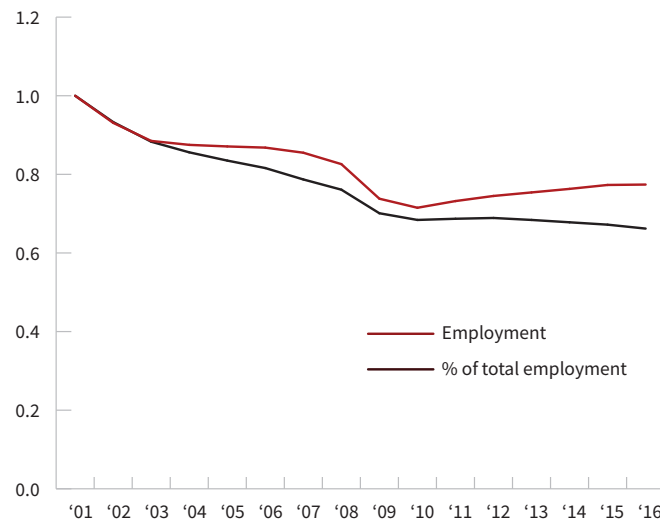
U.S. manufacturing is sometimes pictured as an archaic and increasingly irrelevant activity in a knowledge-based and technological economy. The true story is more subtle and complicated. New investments, often incorporating the latest technology, are particularly important for manufacturers as they constantly improve productivity and efficiency. In most cases, these new investments lead to more output being squeezed from a given amount of inputs or fewer inputs are required to produce a certain output.

Improvements in productivity and efficiency change the relationships between inputs and outputs. Decreases in employment do not necessarily mean less output is produced or a 10 percent growth in output may not be associated with an equivalent change in some or all of the inputs. In other

words, when analyzing manufacturing trends one must be very careful to note whether the indicator measures inputs or outputs.

The long-term decline in manufacturing employment is sometimes misinterpreted as an indicator of the poor overall health of the industry. Figure 1 presents U.S. manufacturing employment. The graph is expressed in relative terms, so that both employment and manufacturing's share of total employment can be presented side by side. Both show a definite downward trend from 2001 to 2016. In absolute terms, manufacturing employment decreased from 16.9 million workers in 2001 to 13.1 million in 2016, while its share of total employment dropped from 10.2 percent to 6.8 percent during the same period.

Figure 1. U.S. manufacturing employment (2001 = 1.00).



Source: U.S. Bureau of Economic Analysis.

A decline in employment, which is the labor input, does not mean decreasing output or production of manufactured goods. Figure 2 presents two measures of manufacturing real Gross Domestic Product (GDP), which represents the value of output or production in inflation-adjusted terms. The first is manufacturing GDP in billions of constant dollars and the second is manufacturing GDP as a percent of total GDP, both in constant dollars. They have been converted to relatives in order to easily present them side by side.

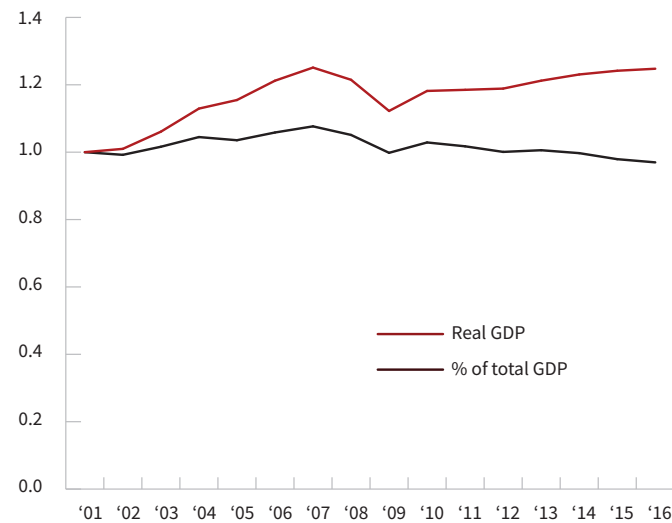
Both measures show general upward trends, except for the recession years in 2008 and 2009. Real manufacturing GDP rose from \$1.5 trillion (constant dollars) in 2001 to \$1.9 trillion (constant dollars) in 2016, a rise of 26.8 percent.

Manufacturing represented 12.1 percent of total U.S. GDP in 2001 and 11.7 percent in 2016. In other words, manufacturing output has been rising after adjusting for inflation and the growth in manufacturing has been

equal to the economy-wide average, as indicated by its constant share of total real GDP.

The following sections use a variety of data to analyze manufacturing and compare manufacturing to other industries. Sometimes employment statistics will be analyzed, sometimes worker earnings and sometimes output and production. Which data is chosen will depend on the purpose of the analysis. For example, comparing manufacturing with other industries requires that similar data be available for both. On the other hand, analysis of the latest trends for manufacturing requires the most current figures. In each case, the characteristics of the data will be discussed so that they may be interpreted correctly.

Figure 2. U.S. manufacturing real GDP (2001=1.00).



Source: U.S. Bureau of Economic Analysis.



MANUFACTURING AND THE MONTANA ECONOMY

Trends in the Montana economy are primarily determined by the basic industries. Basic industries are those that are located in a state, but sell most of their products elsewhere or are otherwise influenced by factors beyond the state's borders. Basic industries inject new funds into the state economy and are responsible for creating further income and jobs.

The role of manufacturing in every state is presented in Table 2. Manufacturing's share of each state's economic base as measured by GDP was calculated for 1997 and 2015. The economic base of each state was estimated using a method developed by the U.S. Bureau of Economic Analysis (BEA). There are other methods of identifying the basic industries, which may yield slightly different findings.

The BEA method assigns certain industries to the basic sector in each state. These industries include manufacturing, mining, agriculture, the federal government and rail/truck transportation. Other industries may also be classified in basic sector in certain cases. For example, financial services in New York, insurance in Connecticut and Indiana, and amusement places, such as casinos in Nevada, all serve nonlocal markets and are part of their state's economic base.

During 1997, the top five states in terms of manufacturing's share of the economic base were Indiana, North Carolina, Wisconsin, South Carolina and Oregon. By 2015, Oregon vaulted to the second spot and North Carolina dropped to fourth and Wisconsin was out of the top five. The reason for Oregon's rise was the rapid growth of computer and electronics manufacturing in the state.

Montana manufacturing has traditionally ranked relatively low in terms of its contribution to the economic base. Montana was 39th in 1997 when manufacturing accounted for 25.8 percent of the economic base. Eighteen years later in 2015, Montana rose to 31st with manufacturing representing about 27.5 percent of the economic base. One of the causes for Montana manufacturing's rise in importance and rank has been oil refining. GDP is a measure of the value of output and the price of refined oil increased significantly between 1997 and 2015.

GDP data is not well-suited to analyze trends in manufacturing from one year to the next. The disadvantage of GDP data is that it is not available prior to 1997 and the most current figures are several years old or do not provide detail for specific sub-sectors within manufacturing.

Earnings data is more appropriate for analyzing trends from one year to the next and for periods of a decade or more. But earnings data also has its own characteristics. For example, net farm income of family-owned farms and ranches, a major component of farm earnings, is extremely volatile and not a reliable measure of output, revenues or overall economic conditions in the agricultural sector. Consequently, the following sections will analyze nonfarm earnings to identify overall economic trends. Using nonfarm earnings does not imply that agriculture is ignored. Earnings in agricultural services are explicitly included. Excluding farm earnings eliminates a volatile component that could mask important trends elsewhere in the economy.

Specific industries within manufacturing might be changing due to evolving and improving practices. One example is a greater emphasis on supply chain management. Increased use of supply chain methods suggest that today's production processes may be very different from those used only a few years ago.

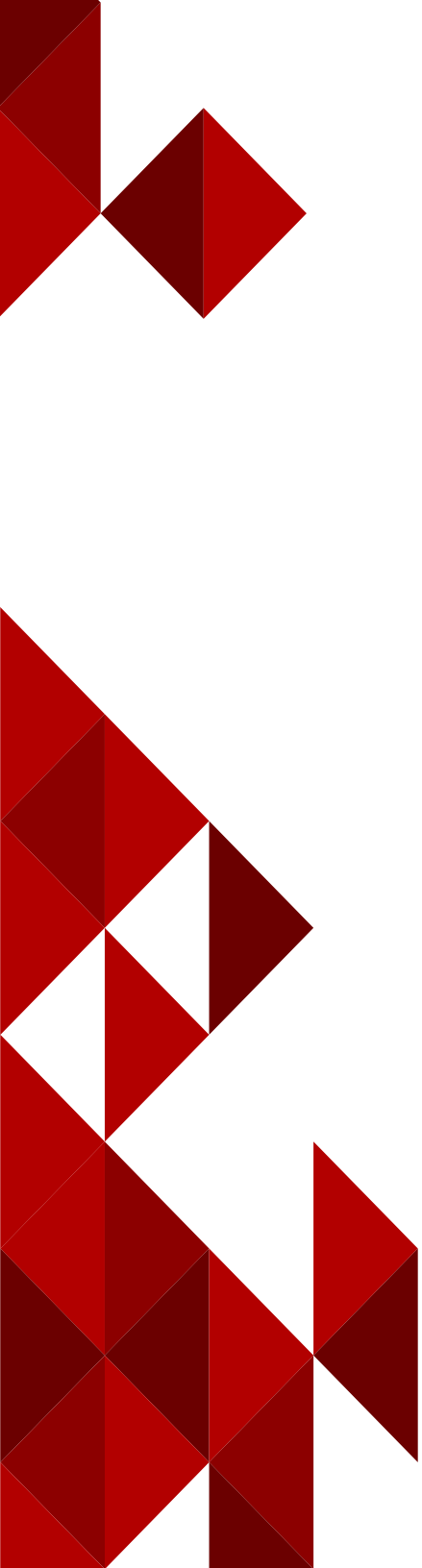
Manufacturing is a basic industry because most of its output and production is shipped out of Montana. As shown later in Table 7, about 50 percent of the state's manufacturing earnings are in industries such as wood products, petroleum refining, fabricated metal products and machinery, where almost all of the products immediately leave the state. Even the smaller manufacturing industries, such as transportation equipment and nonmetallic metal products, include firms that sell nationwide or even worldwide.

The Montana Department of Labor and Industry reported that the employment multiplier for manufacturing is 3.58. This means that there will be 2.58 new jobs created elsewhere in the economy as a result of one new manufacturing job. The earnings multiplier is 2.72, suggesting that an additional \$1.72 will be created in other Montana industries for each

Table 2. Manufacturing as percent of economic base gross state product for states, 1997 and 2015.

1997			2015			1997			2015		
Rank	State	Percent	Rank	State	Percent	Rank	State	Percent	Rank	State	Percent
1	Indiana	74.88	1	Indiana	74.14	27	Louisiana	44.70	27	Illinois	32.74
2	North Carolina	74.28	2	Oregon	71.33	28	Oklahoma	43.78	28	Nebraska	31.73
3	Wisconsin	70.64	3	South Carolina	67.78	29	Idaho	42.30	29	California	31.22
4	South Carolina	70.00	4	North Carolina	63.30	30	West Virginia	41.68	30	Rhode Island	28.55
5	Oregon	67.97	5	Kentucky	60.91	31	Rhode Island	41.06	31	Washington	27.66
6	Kentucky	66.91	6	West Virginia	58.94	32	Illinois	39.45	32	Montana	27.56
7	Pennsylvania	66.34	7	Louisiana	58.23	33	California	39.15	33	Oklahoma	26.15
8	Ohio	65.36	8	Michigan	57.68	34	Nebraska	36.45	34	South Dakota	24.99
9	Michigan	64.61	9	Alabama	57.05	35	New Jersey	35.03	35	Connecticut	24.45
10	New Hampshire	62.01	10	Kansas	54.75	36	South Dakota	34.26	36	New Jersey	22.92
11	Arkansas	61.80	11	Pennsylvania	51.54	37	Connecticut	31.97	37	Virginia	21.10
12	Iowa	58.76	12	Ohio	50.64	38	Virginia	31.65	38	Massachusetts	20.70
13	Arizona	58.47	13	Iowa	49.95	39	Massachusetts	31.42	39	Florida	18.46
14	Alabama	57.58	14	Arkansas	49.09	40	Delaware	30.49	40	North Dakota	18.03
15	Vermont	56.09	15	Minnesota	45.84	41	Montana	25.82	41	Colorado	17.39
16	Maine	54.07	16	Mississippi	44.58	42	Florida	24.85	42	Delaware	16.57
17	Kansas	53.02	17	Tennessee	44.35	43	Colorado	24.84	43	Nevada	16.25
18	Missouri	51.09	18	Missouri	43.56	44	North Dakota	22.55	44	Maryland	13.92
19	Minnesota	50.89	19	New Hampshire	42.13	45	Maryland	21.02	45	Wisconsin	13.85
20	Tennessee	50.71	20	Texas	41.29	46	New York	16.90	46	Wyoming	13.85
21	Georgia	50.17	21	Georgia	41.25	47	Nevada	15.72	47	New Mexico	12.31
22	Mississippi	49.58	22	Maine	39.09	48	Wyoming	14.42	48	New York	10.74
23	New Mexico	45.71	23	Arizona	38.91	49	Alaska	8.32	49	Alaska	7.29
24	Utah	45.58	24	Vermont	38.12	50	Hawaii	5.57	50	Hawaii	6.27
25	Texas	45.29	25	Idaho	38.07	51	District of Columbia	0.79	51	District of Columbia	0.32
26	Washington	45.27	26	Utah	32.88						

Source: U.S. Bureau of Economic Analysis.



\$1.00 in new manufacturing earnings. Earnings in each of Montana's basic industries are shown in Figure 3.

As shown in Figure 3, manufacturing accounts for about 18 percent of total earnings in basic industries and is the third largest basic industry. This percentage differs from that reported in Table 2 because GDP is a measure of the value of production or output, while the data in Figure 3 are the earnings of workers. Mining accounts for about 19 percent of basic earnings and ranks second. Mining includes the oil and gas extraction industry. The recent decline in oil prices will probably lead to fewer workers and reduce the size of this industry.

Manufacturing is a significant contributor to recent economic trends in Montana despite accounting for a relatively modest portion of the economic base. This importance is illustrated by the data in Figure 4, which presents the year-to-year changes in nonfarm basic earnings by industry from 2009 to 2016. The changes in basic earnings are presented for each nonfarm basic industry below, starting with the cycle trough in 2009 and each year thereafter:

2009-10: The economic recovery began. Total nonfarm basic earnings grew \$199 million. The largest increases were in mining (\$114 million) and nonresident travel (\$50 million). The recession continued for one more year in manufacturing, which declined about \$17 million.

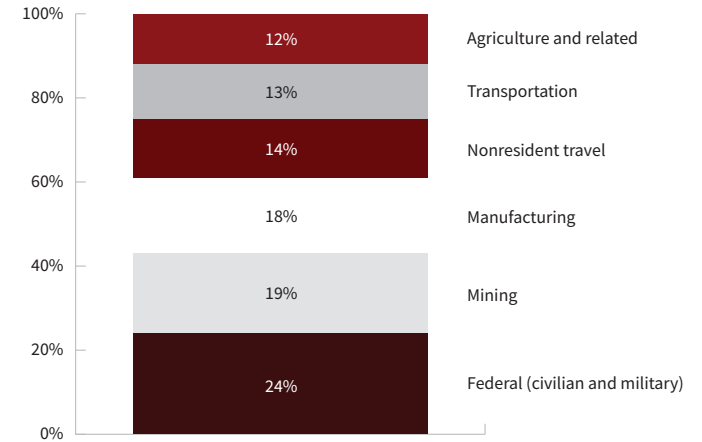
2010-11: Total nonfarm basic earnings grew about \$461 million. The largest increases were in mining (\$361 million) and transportation (\$106 million). The change in manufacturing turned positive (\$13 million) and federal government earnings declined (-\$32 million).

2011-12: Total nonfarm basic earnings increased about \$319 million. The largest increases were in mining (\$156 million) and nonresident travel (\$92 million). Manufacturing grew roughly \$52 million and the federal government continued to decrease (-\$28 million).

2012-13: Total nonfarm basic earnings rose about \$190 million. The largest increases were in nonresident travel (\$169 million) and transportation (\$74 million). Manufacturing grew about \$32 million, mining declined by \$12 million and the federal government decreased \$72 million.

2013-14: Total nonfarm basic earnings increased \$20 million. Manufacturing experienced the largest growth (\$56 million). Next were transportation

Figure 3. Worker earnings in basic industries, Montana 2013-2016.



Source: Bureau of Business and Economic Research, University of Montana-Missoula; Bureau of Economic Analysis, U.S. Department of Commerce.

(\$37 million) and nonresident travel (\$14 million). Mining declined about \$89 million and federal earnings decreased roughly \$9 million.

2014-15. Total nonfarm basic earnings decreased \$180 million. Manufacturing and the federal government were the only basic industries to grow (\$35 million and \$29 million, respectively). Transportation decreased \$22 million, nonresident travel declined 83 million and mining dropped \$138.

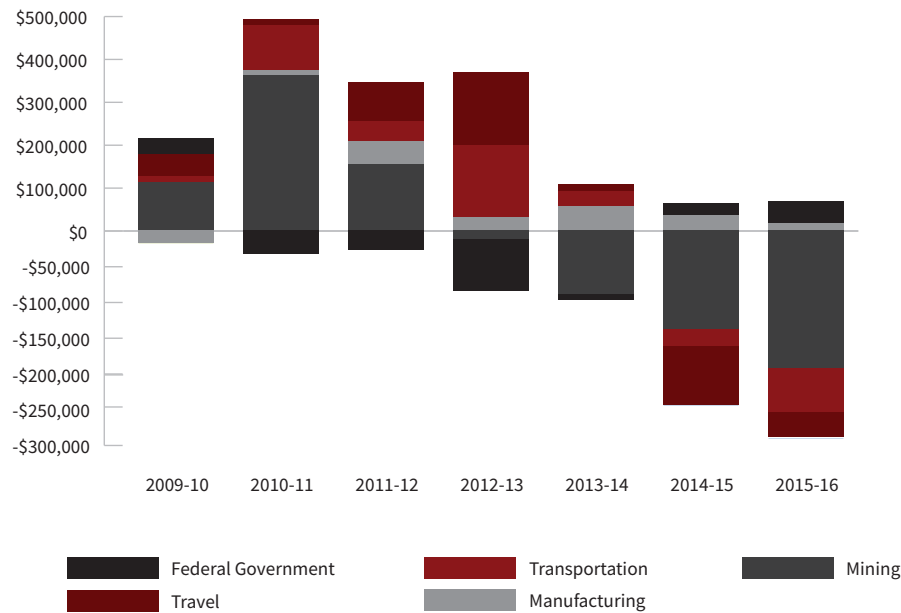
2015-16. Total nonfarm basic earnings declined \$221 million. As in 2015-2016, manufacturing and the federal government were the only nonfarm basic industries to grow (\$16 million and \$52 million, respectively). Nonresident travel \$36 million, transportation decreased \$61 million and mining continued downward by \$193 million.

This analysis illustrates a number of important points about the causes of economic growth in Montana. First, overall growth or decline in basic industries is the net result of events in each of the basic industries. There are always some industries that are growing or declining faster or slower than others.

Secondly, there is usually no single cause of growth. None of the nonfarm basic industries were consistently the fastest or slowest growing during this period.

Finally, and perhaps most importantly, manufacturing was a major contributor to Montana's post-recession economic growth despite accounting for only 18 percent of the nonfarm economic base. Manufacturing earnings grew each year after the recession trough. It was the only nonfarm basic industry to post such a record.

Figure 4. *Change in nonfarm basic earnings, Montana.*



Source: U.S. Bureau of Economic Analysis.

MANUFACTURING ESTABLISHMENTS

There were 3,372 manufacturing establishments in Montana during 2016, as shown in Table 3. The largest category was miscellaneous manufacturing (NAICS 339) with 668 establishments. The next largest categories were fabricated metal manufacturing (NAICS 332) with 508 establishments, food products (NAICS 312) with 372 establishments and wood products with 370 establishments.

Table 3. Manufacturing establishments, Montana, 2016.

NAICS Code	Industry	# of establishments
	Manufacturing	3,372
311	Food products	372
312	Beverages and tobacco	102
313	Textile mills	16
314	Textile product mills	62
315	Apparel	140
316	Leather and allied products	139
321	Wood products	370
322	Paper manufacturing	2
323	Printing and related	151
324	Petroleum and coal products	16
325	Chemicals	85
326	Rubber and plastic products	37
327	Nonmetallic mineral products	141
331	Primary metals	48
332	Fabricated metal products	508
333	Machinery	120
334	Computer and elec. products	63
335	Elec. equipment and appliances	22
336	Transportation equipment	63
337	Furniture and related	247
339	Miscellaneous	668

Source: U.S. Bureau of the Census. Note: Includes establishments with no employees.



EMPLOYMENT SIZE

Montana manufacturers are mostly small businesses. As shown in Table 4, there were 643 establishments with one to four workers. They represented 49.8 percent of the 1,291 establishments with employees. There were 898 establishments with less than 10 workers or 69.6 percent of the total. There were no Montana manufacturers with 500 employees or more.

Table 4. Manufacturing establishments by employment size, Montana, 2016.

Employment	# of establishments
Total	1,291
1 to 4	643
5 to 9	255
10 to 19	198
20 to 49	115
50 to 99	40
100 to 249	34
250 to 499	6
500 to 999	0
1,000 or more	0

Source: U.S. Bureau of the Census. **Note:** Includes only establishments with employees.

COMPOSITION OF MANUFACTURING

Montana manufacturing does not have the same composition as U.S. manufacturing. Industries that are important in Montana are not necessarily important nationwide and vice versa.

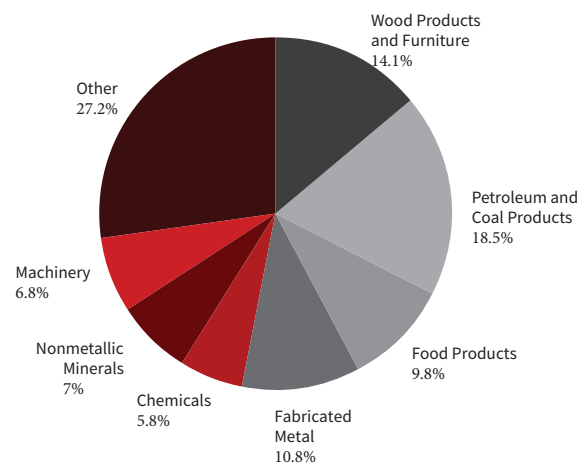
Figures 5 and 6 present the composition of manufacturing earnings in Montana and the United States in 2016. The volatility of energy prices have distorted value of output measures for certain industries, such as petroleum refining. Consequently, worker earnings becomes the best measure of the composition of manufacturing, because it is the amount earned by manufacturing workers in the state.

The largest component of U.S. manufacturing during 2016 was computers and electronics, which accounted for 13.3 percent of total manufacturing earnings. The next four industries were chemical products (10.6 percent), fabricated metals (9.4 percent), food products (8.9 percent), and machinery (8.9 percent).

The two largest Montana manufacturing industries in 2016 were associated with the processing of crude oil and forest resources. Petroleum and coal products (primarily oil refining) was the largest manufacturing industry accounting for 18.5 percent of total manufacturing earnings in 2016. The next largest industry was wood products and furniture (the paper products industry is now minuscule due to the 2010 shutdown of Smurfit-Stone) representing 14.1 percent of earnings. The wood products and furniture industry is the largest when measured by employment (see Table 6).

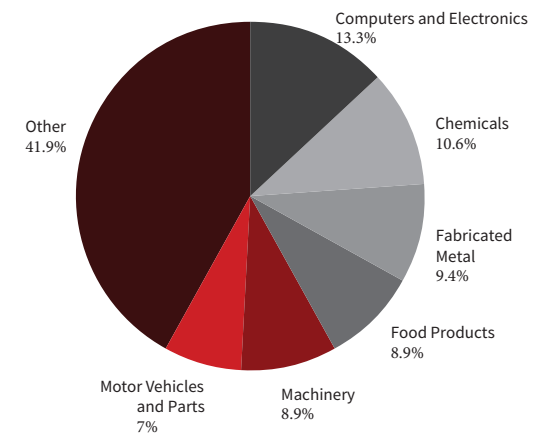
Fabricated metals and food products are the third and fourth largest sectors accounting for 10.8 percent and 9.8 percent respectively. Earnings in non-metallic minerals represented 7 percent of the total and machinery, which includes Applied Materials (formerly Semitool) accounted for 6.8 percent.

Figure 5. Composition of manufacturing, Montana, 2016 (percent of manufacturing earnings).



Source: U.S. Bureau of Economic Analysis.

Figure 6. Composition of manufacturing, United States, 2016 (percent of manufacturing earnings).



Source: U.S. Bureau of Economic Analysis.

MANUFACTURING EMPLOYMENT

The number of manufacturing workers in the U.S. declined from 2006 to 2016, as shown in Table 5. In Montana, manufacturing employment remained steady between these two endpoints, but experienced a sharp drop during the Great Recession and the wood and paper products closures. Since 2010, Montana manufacturing employment has experienced a healthy recovery.

U.S. manufacturing employment decreased from 14.7 million workers in 2006 to 13.1 million in 2016, a drop of 10.9 percent. Manufacturing's share of total employment declined from 8.3 percent to 6.8 percent during this period.

Montana manufacturing employment increased slightly from about 23,400 workers in 2006 to approximately 23,900 workers in 2016, an increase of

roughly 2.1 percent. This increase masks decreases concentrated in wood and paper products, and primary metals refining. These declines occurred during in 2008 and 2009. As noted earlier, manufacturing employment has risen steadily since this low point. The sectors experiencing the greatest increases will be identified later.

Manufacturing's share of total Montana employment decreased from 3.8 percent in 2006 to 3.6 percent in 2016. Montana's decrease in relative importance was 0.2 percentage points as compared to 1.5 percentage points nationwide.

Table 5. Full- and part-time employment, total and manufacturing, Montana and United States.

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Total, United States	176.1	179.9	179.6	174.2	173	176.3	179.1	182.4	186.4	190.4	193.7
(Millions of workers)											
Manufacturing	14.7	14.5	14	12.5	12.1	12.4	12.6	12.8	12.9	13.1	13.1
(Millions of workers)											
Percent of total	8.3	8.1	7.8	7.2	7	7	7	7	6.9	6.9	6.8
Total, Montana	617.7	636.6	637.6	621.5	616.8	623.9	633.4	642.2	649.4	660.6	669.4
(Thousands of workers)											
Manufacturing	23.4	24	23.4	21.2	19.8	20.7	21.5	22.6	23	23.5	23.9
(Thousands of workers)											
Percent of total	3.8	3.8	3.7	3.4	3.2	3.3	3.4	3.5	3.5	3.6	3.6

Source: U.S. Bureau of Economic Analysis. Note: Includes the self-employed.



MONTANA MANUFACTURING EMPLOYMENT BY INDUSTRY

Detailed manufacturing employment data from 2006 to 2016 is presented in Table 6. Total manufacturing employment barely increased by about 500 workers over this 10-year period. This analysis concentrates on the period from 2010 to 2016, which includes the recovery from the Great Recession.

The national business cycle trough was in 2009. Here in Montana, the data in Table 6 show that the low point for manufacturing was 2010. Since then, total manufacturing employment has increased by 4,055 workers or a little more than 20 percent. The largest growth in employment occurred in 2013 when there was an increase of more than 1,100 new jobs. The following paragraphs take a closer look at the 2010 to 2016 period. Detailed discussions of events prior to 2010 can be found in earlier editions of this publication.

Before looking at the individual sectors of Montana manufacturing, a major data reclassification needs to be explained because it impacts two large manufacturing industries. REC Silicon, located near Butte, is a Montana high-tech manufacturing firm. The Montana Department of Labor and Industry reclassified it in 2012 from the chemicals industry to the nonmetallic mineral products industry. This reclassification accounts for most of the 498 workers increase in nonmetallic minerals and the modest increase in chemicals between 2010 and 2016. REC Silicon produces raw materials for the international solar and electronic industries. It was formerly named ASIMI.

Fabricated metal products experienced the largest employment increase between 2010 and 2016. The number of workers grew from 1,890 in 2010 to 3,121 in 2016, a rise of 1,231 employees or roughly 65.1 percent. Fabricated metals include a variety of firms producing everything from structural metal buildings to spring and wire products and will be discussed in more detail in a later section.

The second largest employment increase was in the beverage and tobacco industry. From 2010 to 2016 it grew by 572 workers or 74.6 percent. Almost

all of this increase was in alcoholic beverage manufacturing, which will be discussed in detail later in this report.

The 477 employment increase in miscellaneous manufacturing between 2010 and 2016 was the third largest of the categories listed in Table 6. As the name implies, this category contains a number of firms producing a wide variety of projects. The two most notable subcategories are sporting goods and equipment, and medical equipment and supplies (including dental labs).

The worst seems to be over for the wood products industry. Between 2010 and 2016 employment decreased by only 73 workers. This relatively modest decrease stands in contrast to decades of declines. The Montana wood products industry is but a shell of what it was. Employment in 2016 was less than one-half of the 2000 figure.

The Smurfit-Stone paper mill near Missoula was the largest manufacturing facility in the state. It shut down in early 2010 due to a combination of market and structural factors. Although the exact number of jobs lost in the paper industry is not reported in the data, there were 500-600 jobs at this facility. This plant has been scrapped and will not reopen.

Table 6. Full- and part-time manufacturing employment, Montana 2006-2016.

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	Change 2010-16
Manufacturing	23,407	23,954	23,413	21,220	19,841	20,681	21,540	22,648	23,026	23,449	23,896	4,055
Durable goods	14,945	15,337	14,702	12,712	11,831	12,352	13,237	14,048	14,314	14,670	14,831	3,000
Wood products	5,220	4,955	4,391	3,354	3,064	3,095	3,094	3,269	3,271	3,161	2,991	-73
Nonmetallic mineral products	1,109	1,170	1,091	1,003	945	1,016	1,467	1,494	1,430	1,467	1,443	498
Primary metals	334	482	435	267	149	186	185	202	237	225	224	75
Fabricated metal products	1,781	1,986	2,051	1,988	1,890	2,152	2,565	2,723	2,945	3,002	3,121	1,231
Machinery manufacturing	1,589	1,608	1,547	1,205	1,167	1,230	1,309	1,236	1,185	1,224	1,268	101
Computer and electronic products	579	578	591	447	434	554	564	629	647	708	821	387
Electrical equipment and appliances	216	228	259	237	211	206	182	177	183	207	213	2
Motor vehicles and parts	408	413	(D)	(D)	301	302	250	287	321	387	381	80
Other transportation equipment	244	239	(D)	(D)	321	293	310	366	347	395	404	83
Furniture and related	1,310	1,237	1,260	1,090	973	968	911	1,046	1,064	1,095	1,112	139
Miscellaneous	2,155	2,441	2,372	2,484	2,376	2,350	2,400	2,619	2,684	2,799	2,853	477
Nondurable goods	8,462	8,617	8,711	8,508	8,010	8,329	8,303	8,600	8,712	8,779	9,065	1,055
Food products	2,892	2,963	2,916	2,875	2,779	2,831	2,928	3,017	2,991	2,952	2,933	154
Beverage and tobacco	858	779	761	757	766	844	946	1,103	1,160	1,099	1,338	572
Textile mills	(D)	43	34	44	(D)	(D)	38	(D)	48	44	46	(D)
Textile product mills	208	232	235	234	231	240	219	229	213	234	245	14
Apparel	338	(D)	(D)	(D)	(D)	(D)	(D)	263	(D)	(D)	(D)	(D)
Leather and allied products	217	174	206	213	203	285	297	231	234	269	289	86
Paper	(D)	(D)	(D)	(D)	179	(D)	(D)	(D)	(D)	(D)	(D)	(D)
Printing and related	1,295	1,338	1,340	1,176	1,099	1,131	1,148	1,164	1,199	1,175	1,161	62
Petroleum and coal	966	991	1,078	1,115	1,092	1,157	1,108	1,111	1,180	1,263	1,305	213
Chemical	747	880	951	963	992	1,117	859	946	985	1,026	1,028	36
Plastics and rubber products	363	350	392	341	321	364	383	446	414	454	468	147

Source: U.S. Bureau of Economic Analysis. Note: Includes the self-employed. (D) denotes not shown to avoid disclosure of confidential information.



MANUFACTURING EARNINGS

Montana manufacturing earnings from 2006 to 2016 are presented in Table 7. Earnings have been corrected for inflation by converting them to 2016 dollars. Earnings are the wages and salaries, plus certain employer paid fringe benefits, such as retirement and health insurance, paid to full- and part-time manufacturing workers.

A comparison of the data in Tables 6 and 7 reveals both similar and different trends in manufacturing earnings and employment. Trends in employment and earnings may diverge for a number of reasons. Employment trends reflect improvements in labor productivity and structural changes. On the other hand, earnings trends more closely mirror those of production and value of output rather than just the labor input.

Since the recovery began, manufacturing employment has been increasing at about the same rate as earnings. From 2010 to 2016, employment rose 20.4 percent while earnings grew 19.4 percent. Over the longer run, between 2006 and 2016, earnings increased 5 percent while employment grew 2 percent.

The reclassification of REC Silicon explains the 104 percent increase in nonmetallic mineral products and the 4.2 percent decrease in the chemical industry. The doubling in the relatively small other transportation equipment industry is mostly due to the purchase of a Helena firm by Boeing, its subsequent expansion and the opening of a trailer manufacturer in Missoula.

The small 1.1 percent decrease in food products earnings is surprising given the 147 worker growth in employment from 2010 to 2016. Detailed data are not yet available, so there are no details concerning the 12 percent decline in electrical equipment or the 34.1 percent increase in plastics and rubber products, which do not jive with the smaller changes in employment.

Table 7. Manufacturing earnings, Montana (thousands of 2016 dollars).

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	% change 2010-2016
Manufacturing	1,181,762	1,224,598	1,185,839	1,058,226	1,040,018	1,058,235	1,099,499	1,132,926	1,188,202	1,221,772	1,241,423	19.4
Durable goods	702,034	737,678	686,724	550,602	535,013	562,535	613,120	649,115	661,907	686,847	694,148	29.7
Wood products	258,943	248,874	214,277	148,571	138,597	141,526	140,436	155,662	153,410	144,488	136,362	-1.6
Nonmetallic mineral products	52,491	58,544	55,198	46,010	42,745	44,467	79,272	83,336	82,967	90,459	87,182	104
Primary metals	19,315	31,917	29,391	14,471	4,986	6,628	6,315	7,679	8,796	9,504	9,584	92.2
Fabricated metal products	75,064	86,551	88,942	79,624	81,741	94,885	116,733	118,337	129,736	130,448	134,166	64.1
Machinery manufacturing	96,824	91,804	89,662	72,219	77,395	76,005	77,258	80,501	77,839	81,540	83,876	8.4
Computer and electronic products	29,845	33,139	31,268	23,733	23,431	31,556	30,777	32,766	34,320	39,371	43,036	83.7
Electrical equipment and appliances	12,233	12,621	15,477	13,626	13,122	11,817	11,348	8,359	8,962	10,636	11,547	-12
Motor vehicles and parts	20,658	21,882	(D)	(D)	15,875	18,908	14,183	17,639	13,515	15,363	16,965	6.9
Other transportation equipment	8,234	8,354	(D)	(D)	8,078	14,298	18,964	20,509	15,927	14,684	14,110	74.7
Furniture and related	45,266	44,139	44,464	34,434	30,580	29,774	27,850	29,949	32,464	36,781	38,085	24.5
Miscellaneous	83,159	99,854	94,671	98,543	98,463	92,670	89,983	94,379	103,970	113,572	119,235	21.1
Nondurable goods	479,728	486,920	499,115	507,624	505,004	495,700	486,379	483,811	526,295	534,925	547,275	8.4
Food Products	112,826	111,517	112,891	119,409	123,622	117,923	113,536	112,570	121,720	122,905	122,266	-1.1
Beverages and tobacco	36,020	32,508	33,215	34,353	39,206	40,877	43,700	45,637	45,849	38,129	42,135	7.5
Textile mills	(D)	834	649	719	(D)	(D)	721	(D)	640	634	604	(D)
Textile product mills	5,653	6,363	5,978	6,286	6,522	6,435	6,015	5,625	5,547	6,339	6,794	4.2
Apparel	8,095	(D)	(D)	(D)	(D)	(D)	(D)	2,739	(D)	(D)	(D)	(D)
Leather and allied products	2,719	2,252	2,429	2,647	2,649	2,611	2,886	3,553	3,312	3,577	3,373	27.3
Paper	(D)	(D)	(D)	(D)	24,395	(D)	(D)	(D)	(D)	(D)	(D)	(D)
Printing and related	46,923	51,105	51,644	42,830	40,201	41,761	43,745	45,367	47,508	48,200	49,115	22.2
Petroleum and coal products	150,002	147,452	158,724	172,203	172,506	176,197	195,185	189,558	215,510	223,961	229,685	33.1
Chemicals	52,984	66,383	68,191	70,027	75,228	83,569	54,061	57,439	65,535	71,382	72,033	-4.2
Plastics and rubber products	12,796	14,180	14,234	13,633	14,828	16,052	16,998	18,549	17,935	18,388	19,881	34.1

Source: U.S. Bureau of Economic Analysis. Note: Includes the income of the self-employed. (D) denotes not shown to avoid disclosure of confidential information.



SPOTLIGHT ON GROWING INDUSTRIES **WITHIN** MANUFACTURING

Tables 6 and 7 provide insights concerning 22 broad categories of manufacturing. This level of detail may hide very important trends, because growth in one subcategory may be counterbalanced by declines in another subcategory. Table 8 presents the number of firms and wage and salary employment for six detailed manufacturing industries. Information about the self-employed is not available at this level of detail and the employment data in Table 8 is not comparable with that presented in Table 6.

The information presented in Table 8 can begin to identify the dynamics of growth in specific manufacturing industries. Specifically, looking at both employment and the number of firms helps to determine if it is more employees at existing firms or is it an increase in the number of firms that lead to overall growth in an industry.

Alcoholic beverage manufacturing has increased significantly since the Great Recession. Breweries are that largest sub category with 2016 wage and salary employment of 752 and 64 firms. There are 14 distilleries employing 154 workers and nine wineries employing 44 workers.

The growth in breweries was caused by both increased employment at existing facilities and more firms. The number of wage and salary workers and firms roughly doubled from 2013 to 2016. For distilleries and wineries, the growth at existing firms contributed more than increases in new firms. The number of wineries was roughly stable from 2013 to 2016 as was the number of distilleries from 2014 to 2016. At the same time, wage and salary employment increased significantly in both industries.

Alcoholic beverages are a good example of important trends that can be hidden in aggregate data. Table 6 shows modest overall growth in the beverage and tobacco industry, but not the triple digit growth in the three detailed industries reported in Table 8.

Table 8 also reports the wage and salaries employment and the number of firms for two of the fastest growing subcategories within fabricated metal products. Small arms manufacturing (NAICS 332994) employment increased from 148 workers in 2010 to 450 in 2016, a 204.1 percent increase. Since the number of firms remained relatively stable, the employment growth was associated with more jobs at existing firms. These firms are located throughout the state, but many are in the Flathead and Bitterroot valleys.

Employment in structural metals manufacturing rose from 727 in 2010 to 1,016 in 2016, an increase of 39.8 percent. There were both new firms and growth in existing firms. One example is a new firm located just north of Great Falls, which produces prefabricated buildings.

Electronic instrument manufacturing (NAICS 33451) is part of Montana high-tech manufacturing sector. Employment almost tripled from 107 in 2010 to 302 in 2016. Most of this growth was due to expansion of existing plants, because the number of firms remained nearly constant from 2012 to 2016. Much of this industry is concentrated in and near Bozeman.

Table 8. Wages and salary employment, number of firms, Montana, selected manufacturing industries, 2010 to 2016.

	2010	2011	2012	2013	2014	2015	2016	Percent change
NAICS 31212 Breweries								
Wage and salary employment	192	238	309	405	467	575	752	291.7 ^b
Firms	22	24	28	34	41	53	64	190.9 ^b
NAICS 31213 Wineries								
Wage and salary employment	(D)	19	22	25	32	34	44	131.6 ^a
Firms	3	5	7	7	8	8	9	80 ^a
NAICS 31214 Distilleries								
Wage and salary employment	(D)	10	26	66	82	102	154	1,440 ^a
Firms	(D)	4	6	8	10	11	14	250 ^a
NAICS 3323 Architectural and structural metals mfg.								
	727	700	764	806	877	998	1016	39.8 ^b
	53	55	62	68	71	72	79	49.1 ^b
NAICS 332994 Small arms and ordnance manufacturing								
	148	277	419	447	457	381	450	204.1 ^b
	15	17	18	18	19	20	21	40 ^b
NAICS 33451 Electronic instrument manufacturing								
	107	118	196	212	218	261	302	182.2 ^b
	15	14	18	19	20	19	20	33.3 ^b

Source: U.S. Bureau of Labor Statistics, QCEW. Note: (D) denotes not disclosable. ^a2011 to 2016, ^b2010 to 2016.



WAGE AND SALARY EMPLOYMENT AND **PER** **WORKER WAGES**

This section presents Montana employment, per worker wages and salaries in manufacturing and compares them to other industries in the state and to corresponding nationwide data. Montana 2016 employment, per worker wages and salaries are presented in Table 9. These employment and wage figures differ from those reported in Tables 6 and 7, because they do not include the self-employed.

Wages and salaries directly measure the payments to workers and represent the amount they have available for current spending. Other compensation measures, such as earnings, include estimates of employer paid benefits that may not lead to local spending by workers.

The average Montana manufacturing worker earned \$47,831 in 2016, about 16.7 percent higher than the average of \$40,943 for all workers. The highest wages within manufacturing reported in Table 8 were the \$115,205 in petroleum and coal products. This industry is dominated by highly skilled workers at oil refineries near Billings and Great Falls.

After petroleum and coal products, the highest per worker wages and salaries were the \$60,665 earned in transportation equipment, which includes the Boeing workers near Helena. Next was the \$58,905 earned in the machinery manufacturing industry. The lowest paying manufacturing jobs were in textile mills with an average of \$19,455.

Montana incomes are generally less than their corresponding U.S. averages. This is also true for wages and salaries per worker. Average wages and salaries for all Montana workers were \$40,943 in 2016, about 76.0 percent of the national average. Montana manufacturing wages per worker were about 72.5 percent of the U.S. figure. Within manufacturing, only the wood products and the petroleum and coal industries, which includes the oil refineries, have average wages above their respective national average.

Table 9. Employment and wages and salaries per worker by industry, Montana, 2016.

	Wage and salary employment	Wages and salaries per worker (current dollars)	Wages and salaries per worker (% of U.S.)		Wage and salary employment	Wages and salaries per worker (current dollars)	Wages and salaries per worker (% of U.S.)
Total, all industries	484,911	40,943	76	Apparel	(D)	(D)	(D)
Farm	6,954	37,277	118.2	Leather and allied products	81	25,506	57.4
Nonfarm	477,957	40,996	75.9	Paper	(D)	(D)	(D)
Forestry, fishing and other	3,843	35,910	110.4	Printing and related	994	37,868	76.7
Mining	6,380	88,066	85.2	Petroleum and coal	1,276	115,205	101.5
Utilities	3,029	86,279	82.2	Chemical	944	56,728	59.9
Construction	27,818	48,659	82.2	Plastics and rubber products	424	36,816	69.7
Manufacturing	19,494	47,831	72.5	Wholesale trade	17,386	55,010	73.5
Durable goods	11,790	46,452	66.5	Retail trade	59,782	28,325	91.3
Wood products	2,626	46,447	105.8	Transportation and warehousing	15,263	51,724	96.7
Nonmetallic minerals	1,301	56,035	98.3	Information	6,337	50,178	50.3
Primary metals	180	40,678	61.9	Finance and insurance	16,230	61,491	60.6
Fabricated metal products	2,486	43,447	78	Real estate and rental and leasing	5,695	34,971	62.8
Machinery	1,057	58,905	85.8	Professional and technical services	21,799	59,320	64.7
Computer and electronics	682	48,889	42.4	Management of companies	2,074	75,238	64.4
Electrical equipment and appliances	155	53,729	81	Administrative and waste services	16,948	33,559	86.5
Motor vehicles and parts	355	43,113	69	Educational services	6,219	23,144	56.7
Other transportation equipment	248	60,665	68.6	Health care and social assistance	67,359	45,459	93.4
Furniture and related	747	36,321	81.4	Arts, entertainment, and recreation	11,933	24,069	60
Miscellaneous	1,953	38,940	61.8	Accommodation and food services	52,939	19,565	85
Nondurable goods	7,704	49,942	83.7	Other services	21,047	30,095	83.9
Food	2,500	36,849	78.4	Federal, civilian	13,326	67,006	85
Beverage and tobacco	1,230	24,276	45.3	Military	7,836	36,965	76.8
Textile mills	22	19,455	42.4	State and local	75,220	40,282	81
Textile product mills	202	26,658	64.9				

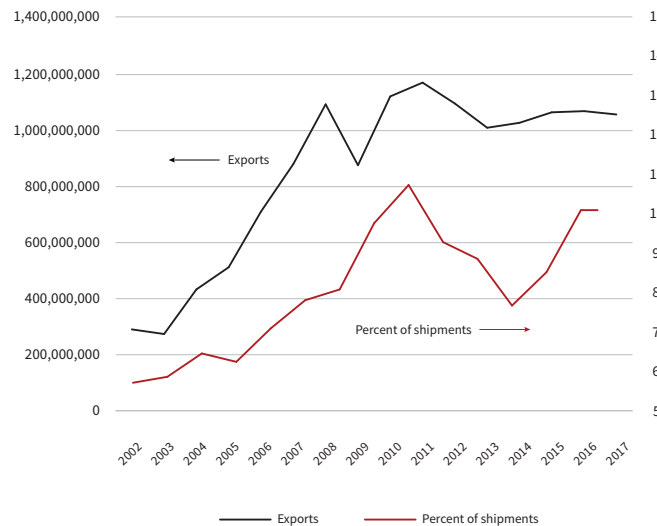
Source: U.S. Bureau of Economic Analysis.

MONTANA'S MANUFACTURING EXPORTS

Montana manufacturers are competitive in international markets. There was burst of growth in the mid-2000s, but the volume of Montana exports has remained relatively stable since the end of the Great Recession. The recent upturn in worldwide economic trends is promising, but has not yet stimulated growth for Montana manufacturing exports.

The trend in Montana manufacturing exports from 2002 to 2017 is presented in Figure 7. The data are reported in nominal dollars because there are no price deflators available for these products. Also shown in Figure 7 are exports as a percent of total manufacturing shipments, which are an indicator of the importance of foreign markets to specific Montana industries.

Figure 7. Montana manufacturing exports 2002-17 and exports as a percent of total manufacturing shipments.



Sources: www.wisertrade.org (via Montana Department of Commerce), U.S. Bureau of the Census, *Census of Manufacturers and Annual Surveys of Manufacturers*.

The value of manufacturing exports more than tripled from 2002 to 2011, growing from about \$290 million to slightly more than a billion dollars. At the same time, their relative importance increased from about 6 percent of shipments to approximately 11 percent. The value of exports then stabilized at approximately 1 billion from 2011 to 2017. Exports as a percent of shipments declined from 2011 to 2013, but most recently returned to its 2011 level of roughly 11 percent. The slowdown of the world economy may be a major cause of the lack of growth in Montana manufacturing exports.

Montana manufacturing exports by industry are reported in Table 10. Exports as a percent of shipments during 2016 are also presented. Shipment data for 2017 are not yet available.

The detailed data in Table 10 must be interpreted carefully. For example, in the apparel industry (NAICS 315) reported exports exceed the value of shipments. Since the value of exports are derived from a sample, while the value of shipments are based on a census, the error is more likely in the former than the latter. In addition, the figures for the beverages and tobacco (NAICS 312) may be misleading. Exports in this industry have grown significantly in recent years.

Further inquiries established that a tobacco packaging/distribution center for cigarettes shipped to Canada opened in Shelby. This establishment should probably be classified in wholesale trade rather than manufacturing.

Excluding the beverage and tobacco industry, the three largest manufacturing export industries are chemicals (NAICS 325), machinery (NAICS 332) and transportation equipment (NAICS 336). Taken together, these three industries accounted for more than one-half of manufacturing exports in 2016. Each of these industries include at least one firm who is very active on worldwide markets.

REC Silicon is classified in the chemical industry in this data and this firm exports much of its production of polysilicon. Applied Materials (formerly Semitool) is a major component of the machinery industry and sells high-tech products worldwide. Boeing recently acquired a company in

Table 10. Exports and value of shipments, 2016 and 2017 (thousands of current dollars).

NAICS Code		2016			2017	
		Exports	Shipments	Exports as percent of shipments	Exports	2016-17 change
	Manufacturing, Total	1,069,570	9,395,915	11.4	1,057,638	-11,932
311	Food Products	48,970	945,890	5.2	46,703	-2,267
312	Beverages and tobacco	193,444	300,976	64.3	217,268	23,824
313	Textile mills	2,032	4,808	42.3	2,285	253
314	Textile product mills	390	45,498	0.9	566	176
315	Apparel	3,518	1,149	306.2	4,704	1,186
316	Leather and allied products	3,206	(D)	(D)	5,794	2,588
321	Wood products	40,674	989,679	4.1	39,508	-1,166
322	Paper	288	(D)	(D)	442	154
323	Printing and related	1,958	142,706	1.4	1,254	-704
324	Petroleum and coal products	40,611	3,885,299	1	31,610	-9,001
325	Chemicals	243,535	(D)	(D)	284,595	41,060
326	Plastics and rubber products	5,924	63,020	9.4	7,638	1,714
327	Nonmetallic mineral products	79,771	336,499	23.7	81,058	1,287
331	Primary metals	39,760	1,085,544	3.7	36,888	-2,872
332	Fabricated metal products	9,867	431,061	2.3	9,419	-448
333	Machinery manufacturing	144,870	209,069	69.3	138,916	-5,954
334	Computer and electronic products	30,915	52,710	58.7	35,000	4,085
335	Electrical equipment and appliances	19,991	25,604	78.1	26,655	6,664
336	Transportation equipment	127,593	192,338	66.3	60,700	-66,893
337	Furniture and related	2,273	65,261	3.5	2,023	-250
339	Miscellaneous	29,980	332,635	9	24,614	-5,366

Source: www.wisertrade.org (via Montana Department of Commerce). U.S. Bureau of the Census, *Census of Manufacturers and Annual Surveys of Manufacturers*. **Note:** (D) denotes not shown to avoid disclosure of information. NA denotes not available.

Helena and the output of this facility is incorporated into airplanes sold around the globe.

The approximate stability of overall manufacturing exports from 2016 to 2017 is the net result of growth in some industries and declines in others. Excluding beverages and tobacco, 10 of the industries lists increased, while 10 other decreased.

Table 11 identifies the destination of Montana manufacturing exports. Canada consistently ranks No. 1 as the major destination. China now ranks

second after vaulting up from 10th in 2002. Korea ranks third and Taiwan fourth. After Canada, five of the remaining nine export destinations are in Asia. The largest non-Asian destinations are Belgium, Germany and the United Kingdom.

The growth of China as a destination for Montana manufacturing exports has been dramatic. During the 15 years from 2002 to 2017, the average increase was 133 percent per year. During 2017 exports to China grew by 17 percent, despite the overall stability and declines reported for many other countries.

Table 11. Montana manufacturing exports, by country, selected years (thousands of current dollars).

Country	2002		2008		2012		2016		2017		Average annual percent change	
	Exports	Rank	Exports	Rank	Exports	Rank	Exports	Rank	Exports	Rank	2002-17	2016-17
Total, All Countries	290,417		1,093,952		1,096,746		1,069,572		1,057,638		17.6	-1.1
Canada	155,787	1	473,829	1	514,656	1	528,621	1	494,537	1	14.5	-6.4
China	5,064	10	60,864	5	80,866	2	90,693	2	106,215	2	133.2	17.1
Korea, Republic Of	6,343	8	67,274	4	52,381	5	70,176	3	76,374	3	73.6	8.8
Taiwan	13,949	4	75,004	3	63,935	4	53,841	4	37,657	4	11.3	-30.1
Belgium	26,459	2	53,169	11	68,228	3	27,163	7	33,882	5	1.9	24.7
Japan	4,232	11	130,808	2	44,135	6	46,693	5	33,312	6	45.8	-28.7
Mexico	3,370	12	24,032	8	31,928	8	26,649	6	28,960	7	50.6	8.7
Germany	22,784	3	22,943	9	37,438	7	20,529	8	27,417	8	1.4	33.6
United Kingdom	6,692	7	34,144	6	19,512	10	18,401	9	22,345	9	15.6	21.4
Singapore	7,938	6	27,313	7	10,670	16	10,115	14	16,243	10	7	60.6

Source: www.wisertrade.org (via Montana Department of Commerce).



MANUFACTURERS' OUTLOOK

Montana manufacturers are a diverse group of small- to medium-sized firms producing everything from beer to high-tech products. With these differences, it is difficult to summarize the outlook with a simple equation or economic forecasting model. Instead, the Bureau of Business and Economic Research surveys manufacturers each winter and queries them about their outlook for the next year. This section summarizes the responses to the 2018 Manufacturers Survey. The responses are summarized for broad manufacturing categories.

As discussed earlier, the U.S. economy is now approaching full employment and shortages of workers are reported. The Montana impacts of the national labor market conditions are summarized in Table 12. About 71 percent of Montana manufacturers said they had a shortage of workers in 2017, up sharply from the 31 percent who gave the same response for 2016. The most severe shortages were reported in wood products and food and beverage manufacturing. All of the subsectors of manufacturing reported more severe shortages of workers in 2017 than in 2016.

Montana manufacturers were queried about a number of indicators and whether they thought the indicator would increase, decrease or stay the same during 2018. The tables report the percentage of respondents who said the indicator would increase or remain unchanged in 2018. The value for decrease is not reported, but can be calculated. Also, reported is the percentage of respondents who expected an increase in response to the same question in the previous year's survey, which provides a measure of changes in optimism between 2017 and 2018.

Table 12. Did your plant have a shortage of workers?

	Yes in 2016	Yes in 2017
Total manufacturing	31%	71%
Wood products	29%	81%
Chemical/refining/metallic products	39%	67%
Food and beverage	30%	84%
Machinery/equipment	20%	70%
All other manufacturing	41%	63%

Production. About 62 percent of manufacturing plants said that their production would increase in 2018 over that of 2017. This was about the same optimism as was expressed in the 2017 survey. The largest increase in optimism was for food and beverage producers (35 to 68 percent), while the greatest decrease in optimism was in other manufacturing (72 to 54 percent).

Table 13. What will happen to your plant's production?

	Unchanged in 2018	Increased in 2018	Increased in 2017
Total manufacturing	32%	62%	60%
Wood products	38%	57%	61%
Chemical/refining/metallic products	37%	52%	53%
Food and beverage	32%	68%	35%
Machinery/equipment	20%	77%	68%
All other manufacturing	37%	54%	72%

Profits. Montana manufacturers are generally optimistic about future profits, but their degree of optimism is unchanged from a year earlier. About 59 percent said they expect their plants to have increased profits in 2018, as compared to 61 percent in 2017. The greatest increases in optimism were in food and beverage and machinery/equipment manufacturers while the other three categories reported declines in profit expectations.

Table 14. What will happen to your plant's profits?

	Unchanged in 2018	Increased in 2018	Increased in 2017
Total manufacturing	32%	59%	61%
Wood products	45%	46%	57%
Chemical/refining/metallic products	33%	52%	64%
Food and beverage	35%	59%	35%
Machinery/equipment	16%	84%	70%
All other manufacturing	35%	50%	69%

Employment. About half of the manufactures expect their employment to remain unchanged in 2018. Overall, approximately 42 percent anticipated an increase in 2018, nearly equal to the 39 percent who gave the same answer for 2017. Wood products manufacturers were the least likely to expect an increase. Increased employment was mentioned more often in the food and beverage and machinery/equipment categories and they also had the greatest increases in optimism about employment between 2017 and 2018.

Table 15. What will happen to your plant's employment?

	Unchanged in 2018	Increased in 2018	Increased in 2017
Total manufacturing	50%	42%	39%
Wood products	77%	14%	22%
Chemical/refining/metallic products	56%	37%	32%
Food and beverage	53%	42%	22%
Machinery/equipment	28%	69%	56%
All other manufacturing	49%	36%	47%

Overall Outlook. Montana manufacturers were optimistic about 2018. About 65 percent said they expected 2018 to be better, up from the 55 percent who answered the same last year. Machinery/equipment plants had the best overall outlook with 84 percent saying the 2018 would be better. The greatest increases in overall outlook between 2017 and 2018 were in machinery/equipment, food and beverage and chemical/refining/metallic products firms. Modest declines in overall outlook were reported in wood products and all other manufacturing.

Table 16. What is your overall outlook for your plant?

	Unchanged in 2018	Better in 2018	Better in 2017
Total manufacturing	30%	65%	55%
Wood products	50%	50%	57%
Chemical/refining/metallic products	19%	69%	51%
Food and beverage	37%	63%	44%
Machinery/equipment	16%	84%	64%
All other manufacturing	35%	53%	54%



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