What is Montana's Most Important Industry?

by Barbara Wagner, Chief Economist

To an economist, there's no question more loaded than, "What is the state's most important industry?" When asked at presentations, the economist will shift uncomfortably from foot to foot, anticipating the glares and arguments from the audience when their industry is not picked as the favorite. The stock answer (and also the most accurate one) is that no industry is more important than another. The economy is a system, and the industries work together to supply goods, services, jobs, wages, and income to Montanans.

However, this answer rarely satisfies. The rephrased question, "What is Montana's largest industry?" has no simple answer either, as the answer depends on what metric is used to measure the economy – employment, wages, GDP, or another measure. This article will examine the various ways to measure economic contribution to examine the relative sizes of Montana's industries.

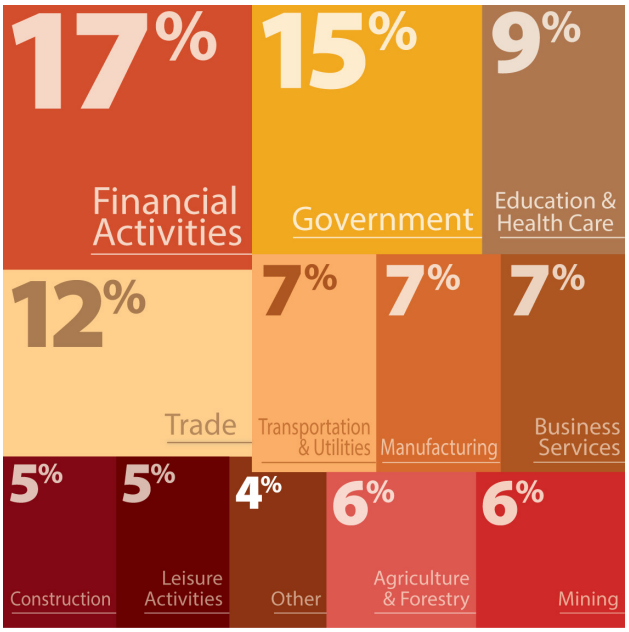
Gross Domestic Product (GDP)

Gross domestic product (GDP) is the most widely used measure of overall economic output. GDP measures the total value of goods and services created by an industry, thus measures the amount of economic activity generated within a state. State-level GDP measures usually are released in June of each year by the Bureau of Economic Analysis at the U.S. Department of Commerce.

Montana's GDP in 2013 was $44.0 billion dollars. Figure 1 illustrates the 2013 GDP produced by industry. The largest industries by GDP are Financial Activities ($7.6 billion), Government ($6.4 billion), and Trade ($5.1 billion). Trade and Transportation are often combined into one industry sector, which would make Trade and Transportation the largest industry, but Figure 1 separates the two industries. Financial Activities includes insurance companies, banks, financial firms, real estate, and rental agencies.

In comparison, the top industries in the U.S. economy are Financial Activities, Government, and Manufacturing. Figure 2 (following page) illustrates how Montana's GDP by industry compares to the national economy. Montana has a larger share of GDP in the Government sector than the U.S. as a whole, largely because there are increasing returns to scale in Government (meaning that the per person or per business cost of providing government services decreases as more people and businesses are served because the fixed costs of providing public goods are spread out among a larger customer base). As an example of increasing returns to scale in government, each state only needs one governor, regardless of the number of people and businesses in the state. Nearly half of Montana's Government sector is local governments of various types, including all 56 county governments, 417 school districts, seven reservations, and many different city governments.

Figure 1: 2013 Montana GDP by Industry Sector



Source: Bureau of Economic Analysis

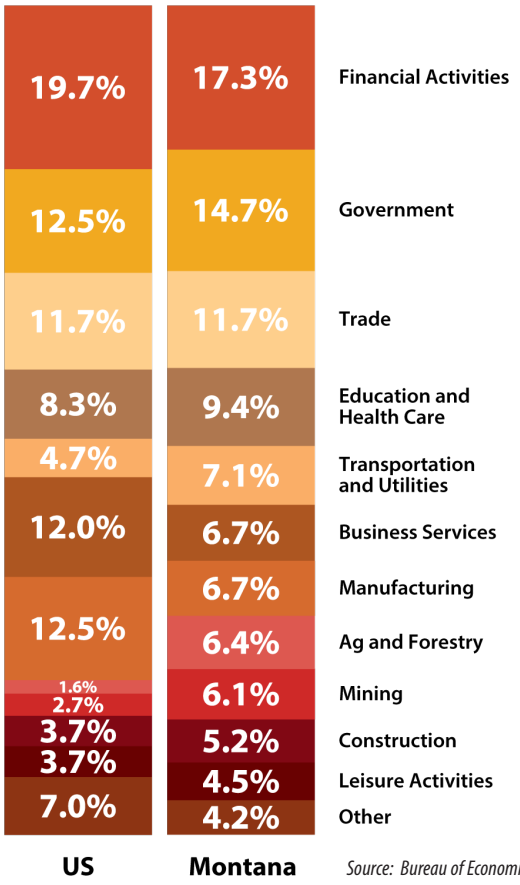
The Transportation sector comprises a larger share of Montana's economy compared to the U.S., likely because Montana's large size and rural nature requires a lot of transportation to ship our goods to consumers. The bottom four industries shown in the chart (Agriculture, Mining, Construction, and Manufacturing) are considered the goods-producing industries. While Montana has a much smaller share of Manufacturing than the U.S. as a whole (12.5% in the U.S. compared to 7% in MT), larger concentrations in Agriculture, Mining, and Construction make up this shortfall, leaving the goods-producing industries in Montana as roughly 24% of GDP (slightly higher than the 20% of U.S. GDP that lies within the goods-producing sectors). Montana's manufacturing is likely stymied by the long distance from Montana to major consumer cities and ports, which increase transportation costs for manufactured goods. Montana's manufacturing is concentrated in the value-added manufacturing of Montana's natural resources, such as petroleum, food, beverage, and wood product manufacturing, where transportation costs are minimized by co-locating manufacturing with input sources.

Although Financial Activities represents Montana's largest industry, Montana's concentration in this industry is smaller than the U.S. (17% vs. 20%). Montana also has a comparatively small Business Services sector when compared to the U.S., but the Health Care and Leisure Activities sectors are bigger than the U.S. in terms of shares. The larger health care sector in Montana is partially due to Montana's older population (demand for health services generally increases as a person gets older), while the Leisure Activities sector includes hotels, bars, restaurants, ski resorts, and other tourism-related activities.

Personal Income

Personal income measures the value of income received by Montana individuals from economic activity. Personal income is equal to Gross Domestic Product minus the profits earned by corporations, plus any dividends to Montanans distributed by the corporations (the calculation is actually more complicated, but it is easiest to understand that personal income is generally GDP minus corporate profits). While GDP is only available at the state level on an annual basis, personal income is produced quarterly. Most state-level economists use personal income as a measure of overall economic activity because the data is available in a timely manner. Personal income data is produced by the Bureau of Economic Analysis at the U.S. Department of Commerce. Montana's total personal income was about $40 billion in 2013.

Figure 2: Share of GDP by Industry, US vs. Montana



Source: Bureau of Economic Analysis

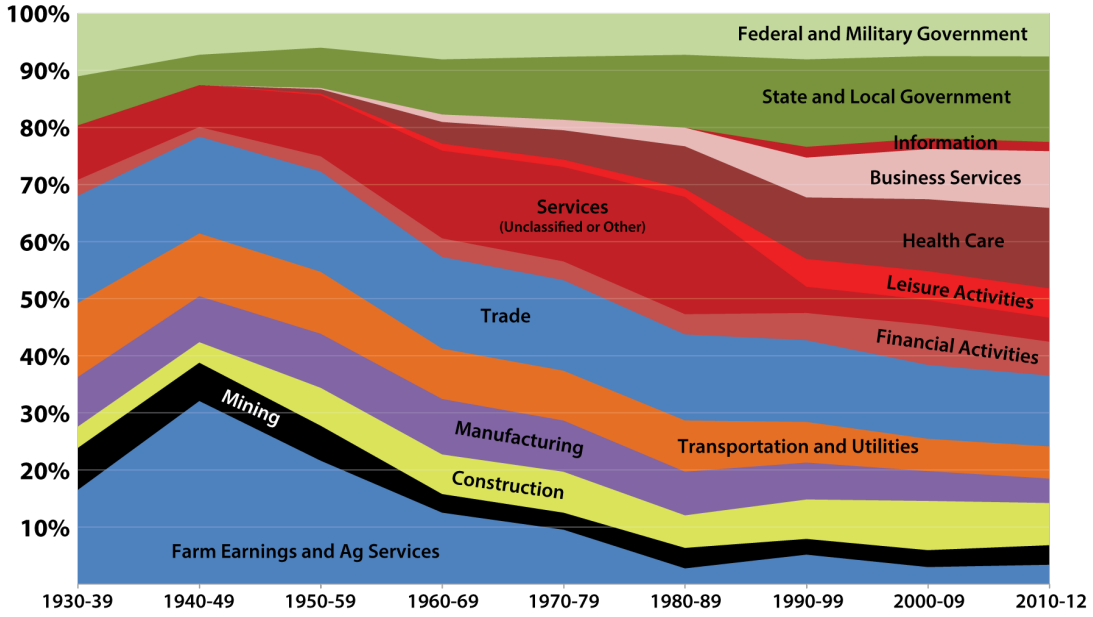
Figure 3: Montana's Largest Industries by Personal Income, 2013

Rank	Industry	Earnings In Billions	% of Total Earnings
1	Health Care and Education	$3.80	14.3%
2	State and Local Gov.	$3.79	14.2%
3	Trade	$3.30	12.4%
4	Business Activities	$2.54	9.6%
5	Construction	$2.02	7.6%
6	Financial Activities	$1.58	5.9%
7	Federal Government	$1.57	5.9%
8	Transportation and Utilities	$1.56	5.9%
9	Other	$1.44	5.4%
10	Leisure Activities	$1.41	5.3%
11	Mining	$1.27	4.8%
12	Farm, Ag & Forestry	$1.22	4.6%
13	Manufacturing	$1.10	4.2%
	Total Work Earnings	**$26.62**	**100.0%**
	Dividends, Royalties, and Other Personal Income	***$13.18***	
Total Earnings		**$39.79**	

Source: Bureau of Economic Analysis

Montana's personal income primarily comes from the work earnings of workers and businesses owners, with $26.6 billion (66.8%) of personal income coming from work earnings. The term "work earnings" includes wages, benefits, and proprietor income that Montanans earn in the course of doing work, including federal government payments to farm operators or other businesses in exchange for goods or services performed. The remaining $13.18 billion of Montana's personal income comes from "non-work income", meaning dividends, royalties, and current transfer receipts. Current transfer receipts are primarily payments from governments to individuals, such as social security, medical benefits, workers compensation, veterans' benefits, education assistance, refundable child tax credits, etc.

Figure 4: Share of Montana Personal Income by Industry



Source: Bureau of Economic Analysis. Conversion to NAICS over years by the Montana Department of Labor and Industry

Figure 3 illustrates the calculation of personal income by first ranking Montana's industries by the value of their work earnings, then adding in the dividends, royalties, and other non-work income to reach the total personal income of $39.79 billion in 2013. Health Care comprises 14.3% of work earnings at $3.8 billion, followed closely by State and Local Government and the Trade sector.

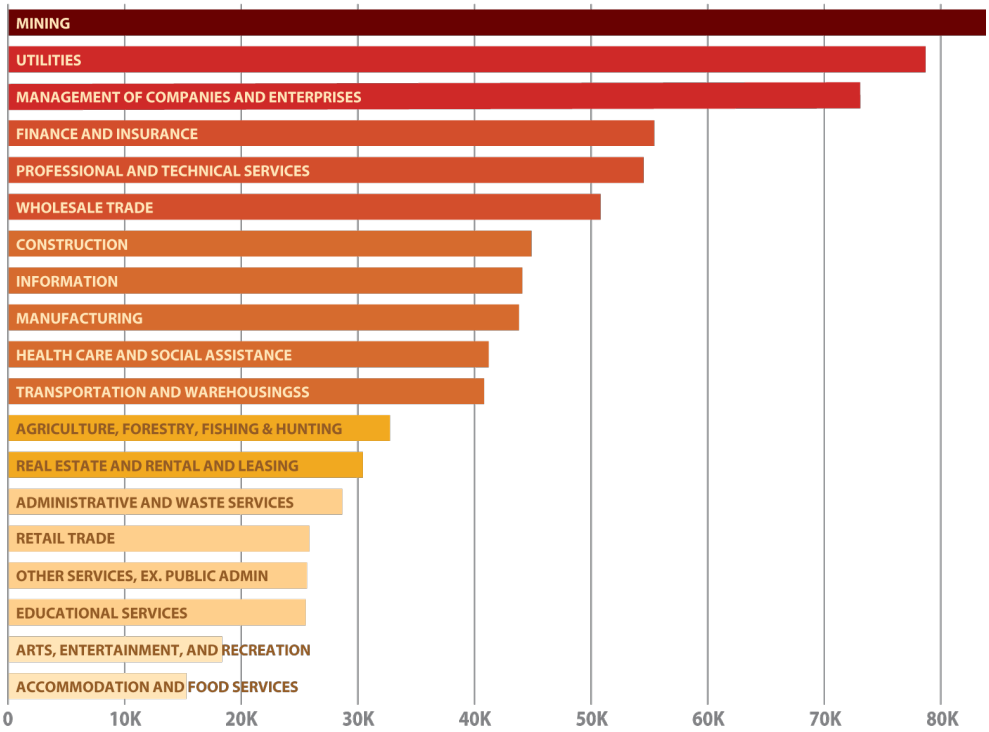
The personal income statistics are also popular because they are the only source of data prior to 1970. Figure 4 illustrates how the Montana economy has changed over time since 1930 in terms of industry shares of personal income. Like the U.S. and other developed countries worldwide, Montana has become more of a service-based industry over time as consumers have demanded more services than goods. The goods-based industries of manufacturing, construction, mining, and agriculture now comprise about 20% of Montana's economy. The goods-producing industries are still expanding in terms of the amount of personal income produced, generally increasing production value in real terms over time, but their share of the overall economy has shrunk because the service-sector industries are growing at a faster rate than the goods-based industries. This trend is expected to continue as Montana builds its post-industrial economy.

Wages

Wages are an important component of personal income (and of GDP), comprising roughly 45% of personal income received by Montanans. There are multiple data sources available to track wage income, but the most frequently used data is from the Quarterly Census of Employment and Wages (QCEW) from the Bureau of Labor Statistics and the Montana Department of Labor and Industry. The QCEW is a very accurate data source because it is derived from an actual count of employment and wages, rather than calculated from survey estimates. This data source is also the most commonly used because it is available six months after the employment occurred, which is the most timely of the possible options.

Figure 5 illustrates the 2013 average wage by private industry from the QCEW data. The Mining, Utilities, and Management of Companies industries pay the highest average wage, while Accommodation and Food Services industry pays the lowest wages. The lower annual average wage in the Accommodations industry both due to a high-concentration of part-time workers (who earn lower annual wages due to fewer hours worked) and because of low hourly wages. The average wage in Montana for 2013 was $37,575, with local government workers and private sector workers earning slightly below this average wage at $36,150 and $36,500 respectively. State and federal workers have higher average wages at $43,320 and $61,630, respectively. State and federal jobs are more likely to be full-time, concentrated in the professional services occupations (instead of in retail and leisure services like private sector employment), and generally require higher levels of education and training than the average private sector job. These characteristics of state and federal employment result in higher wages being paid in the public sector.

Figure 5: Montana Average Wage by Industry, 2013



Source: Quarterly Census of Employment and Wages, Bureau of Labor Statistics, and the Montana Department of Labor and Industry

There are several concerns with the QCEW data that make it less desirable for ranking industries in Montana. First, the QCEW data only includes payroll employment that report to the Unemployment Insurance program. While this covers a majority of workers in Montana, it does not include self-employed workers or some agricultural workers unless these workers choose to pay into the UI system. The QCEW also does not account for full vs. part-time workers. It also does not include a calculation of benefits, which are an important component of workers compensation. Benefits comprised roughly 21% of the total compensation paid to workers in 2013, according to the personal income statistics.

Figures 6 and 7 illustrate the differences between the QCEW data published by the BLS (which only includes payroll wages) and the compensation data from the Bureau of Economic Analysis (which includes benefits and self-employed workers). A drawback of the BEA compensation data is that it is an estimate based on data from the BLS, the U.S. Department of Agriculture, the U.S. Census, and the Internal Revenue Service, along with other sources. Compiling this data takes time, and the information lags behind the more timely QCEW data. Further, the estimates include modeling error, whereas the QCEW payroll wage data contains little error because it is a full census of businesses.

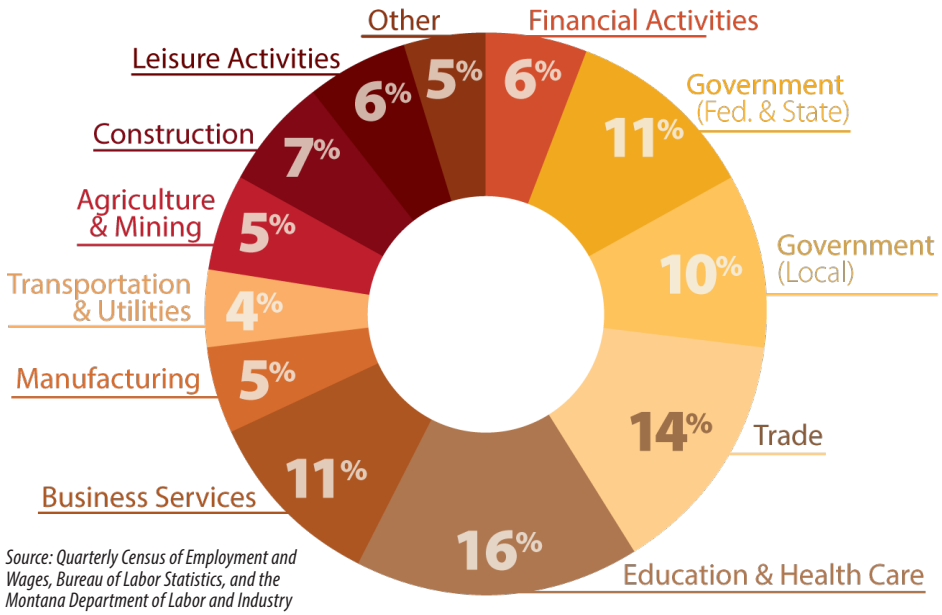
As Figures 6 and 7 illustrate, non-wage compensation can change the understanding of the amount each industry contributes to the Montana economy. For example, the government sector pays 21% of the 2013 wages, but also pays fairly good benefits compared to other sectors of the economy. The government share of total compensation is 24%. In contrast, the trade sector does not offer benefits to most workers. The wage share for trade is greater than its share of total compensation (14% vs. 13%).

Exports

Exports are an important component to any industry, as exports bring in new money from out-of-state to be used in the Montana economy. In fact, one theory of economic development, economic base theory, argues that a state's economic growth depends on the expansion of exports, and exporting

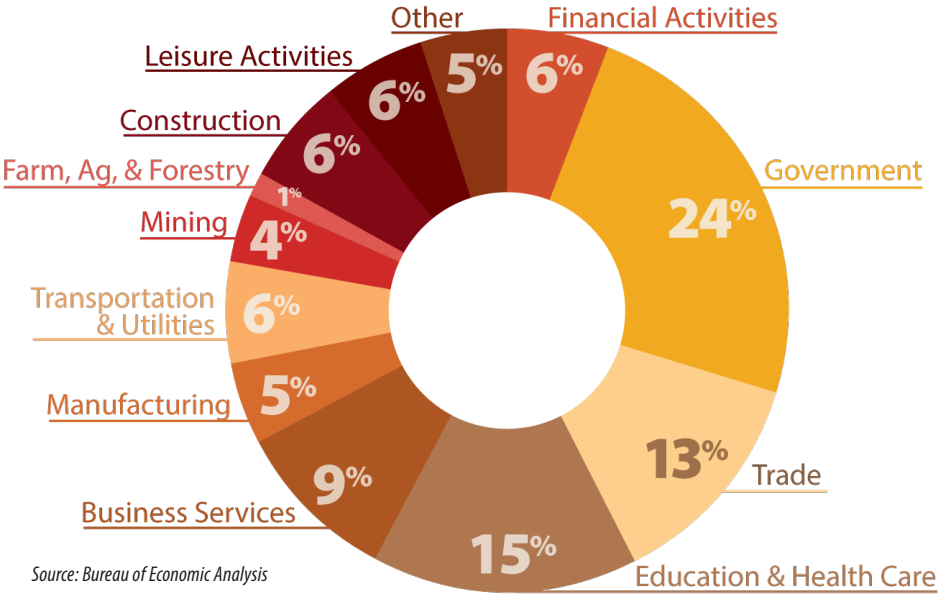
industries have greater importance than non-exporting industries. Economic base theory has now been updated with more modern economic development theories with a broader understanding of how regional economies develop, which include a more balanced view of the role that amenities, the environment, service-industries, and technology play in the development of the economy. While more modern, post-industrial development theories still support the expansion of exports to bring more money into the state, newer models expand the consideration of economic drivers beyond just exports.

Figure 6: 2013 Wages Paid by Industry (Payroll Only)



Source: Quarterly Census of Employment and Wages, Bureau of Labor Statistics, and the Montana Department of Labor and Industry

Figure 7: 2013 Compensation by Industry



Source: Bureau of Economic Analysis

Unfortunately, there is not great data on Montana's exports. Montana's official export statistics are produced by the Montana Department of Commerce using data produced by the private company, U.S. Wiser Trade. Wiser Trade uses U.S. Census data collected at ports to produce their data, and the Montana Dept. of Commerce adds in estimates of bulk wheat production to produce the official export statistics. However, these statistics only include tangible goods shipped through U.S. ports, which means that the export statistics only measure manufactured goods destined for foreign markets. Exports to other states are not included, nor are nontangible goods such as intellectual property or services. Further, agricultural products that are combined with products from other states before reaching the port are generally attributed to the state with the port, not the state of origination. The MT Dept. of Commerce addresses this issue by including an estimate for bulk wheat exports, but not for other agricultural products due to a lack of data.

More importantly, these statistics do not include any nontangible services that are provided to out-of-state customers. For example, Bozeman's Oracle provides cloud-based customer relationship management software to customers world-wide, but the service is not included in export statistics. Missoula's Envirocon provides environmental remediation services to mines in Canada, but engineering services are not included in export statistics because these services are not tangible and don't travel through a port. The exclusion of nontangible goods and services from the export statistics can lead to a biased view of Montana's economy, making it seem as though Montana's exporting industries are very natural-resource dominant instead of more balanced in the provision of both goods and services. A resource-dominant bias could result in inefficient policy decisions, such as directing worker training or economic

development resources away from the high-knowledge service jobs and towards traditional extraction and production jobs.

Individuals interested in how Montana's industries rank in terms of exports should review the Economy at a Glance article from July 2013 produced by the Montana Department of Labor and Industry, available at www.lmi.mt.gov. The article provides several charts illustrating various ways to measure exports, each one leading to a different understanding of the economy. The article also provides a summary of out-of-state exports, which shows a larger role for petroleum and coal mining and manufacturing than foreign exports, as most of Montana's refined oil is shipped to domestic distribution centers for consumption.

Revenue or Sales Data

Another source of industry data that is more rarely used for industry comparison is sales or revenue data, which is infrequently used largely because it is available only once every five years from the U.S. Census Bureau's Economic Census. The most recent Economic Census data available is 2007; the 2012 data is available nationally, but won't be made available for states until later in 2014. Figure 8 illustrates the 2007 Economic Census data by industry, ranking the data by the industry with the largest sales. Retail and wholesale trade are the top two industries, with a combined $25 billion in sales. Total sales across all the non-farm industries was roughly $60 billion in 2007.

Figure 8: 2007 Sales or Revenue by Industry

		Billions
1	Retail trade	$14.69
2	Wholesale trade	$10.74
3	Manufacturing	$10.64
4	Construction	$6.16
5	Health care and social assistance	$4.97
6	Mining, quarrying, and oil and gas extraction	$3.51
7	Accommodation and food services	$2.08
8	Professional, scientific, and technical services	$1.80
9	Transportation and warehousing	$1.64
10	Other services (except public administration)	$1.00
11	Admin support and waste services	$0.98
12	Real estate and rental and leasing	$0.85
13	Arts, entertainment, and recreation	$0.67
14	Educational services	$0.06

Source: 2007 Economic Census, U.S. Census Bureau

Observant readers will notice that agriculture is not included in Figure 8. Agriculture sales data is instead collected by the U.S. Department of Agriculture's National Agriculture Statistic Service in their Census of Agriculture. As both data sources measure the total sales or total receipts of businesses, the Economic Census data is generally comparable to the Census of Agriculture's sales data, even though the data from the Economic Census is delayed. In 2012, Montana farms and ranches sold $4.2 billion of agricultural products. Until the Economic Census data is released, the 2007 figure of $2.8 billion in agricultural sales is more appropriate, ranking agriculture in 7th place.

However, sales data is rarely used to measure an industry's contribution to the economy because it doesn't account for the cost of inputs. For example, agriculture sold $4.2 billion of agricultural goods in 2012, but we know from the GDP statistics that agriculture only added $1.3 billion to the Montana economy in terms of value-added production. The remaining $2.9 billion was paid by farmers to other industries and producers (some of them not in Montana) for the equipment, fertilizer, fuel, food, and other inputs necessary to produce agricultural products.

Conclusions

There are nearly unlimited statistics available to measure and rank Montana's industries, and certainly even more methods of manipulating the data to achieve a conclusion. GDP and personal income statistics are the most commonly used measures due to their timeliness and because they measure every industry equally, allowing for easy comparison. Other statistics, like employment, wages, or revenue data, include certain drawbacks of not including the self-employed (including farmers), of not including all of the employment or goods in the data, or of not being released in a timely manner.

Ultimately though, the point remains that determination of the largest industry vary depending on the metric of interest. Further, such discussions of which industry is the largest in any particular metric generally lead to some sort of belief structure on the industry's "importance" in the economy. Yet the delineation of industry is not a method to suggest that some businesses and workers are important, and others are not. Such a ranking would ignore the interdependence of industries on all other industries for upstream and downstream delivery of inputs and products. All industries work together to create a dynamic economy.