

A Special Report

# Structural Overview of the Missouri Economy in 1990

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SR485



# Executive Summary

Four measures of economic activity were used to identify the key sections of the Missouri economy in 1990. This analysis provides information about the sectors of the economy that are likely to help the Missouri economy grow in the near future.

The following charts illustrate this activity:

Chart 1. Export base of the state of Missouri in 1990  
(values in millions of dollars)

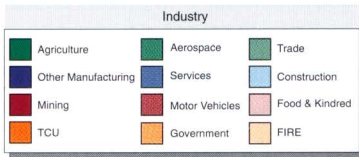
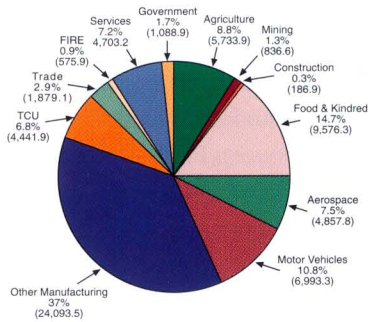


Chart 2. Industrial Employment in Missouri in 1990  
(values in millions of dollars)

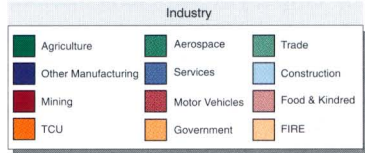
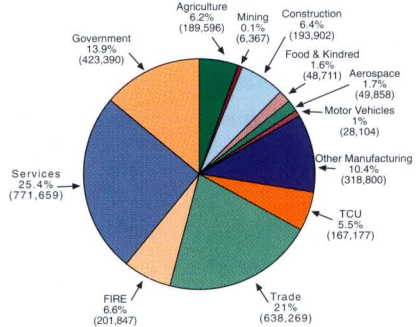


Chart 3. Value Added by Missouri Industries in 1990  
(values in millions of dollars)

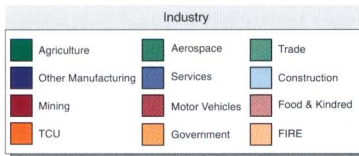
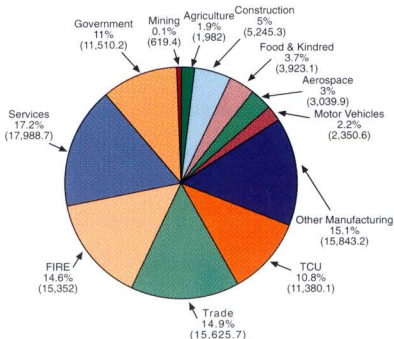
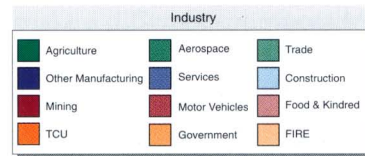
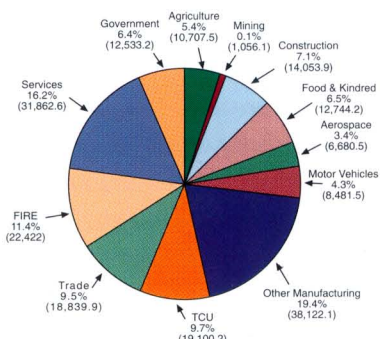


Chart 4. Total Sales by Missouri Industries in 1990  
(values in millions of dollars)



## Major conclusions

- The Missouri economy is heavily based on the goods-producing sectors of manufacturing and agriculture by all of the four measures used in this study. This was particularly true in terms of the export base.

- Growth in manufacturing and agriculture probably holds the key to much of the current output potential, as well as future growth of the Missouri economy.

- Three key industries were outlined under manufacturing. These were food and kindred products, aerospace and motor vehicles. Efforts to develop the manufacturing sector should involve at a minimum the adoption of policies to maintain, and where possible enhance, growth in these and their supplying and supporting sectors.

- The Missouri economy reflects national trends — a major shift from goods-producing to service-producing employment has gained momentum over the last two decades.

- The Missouri economy is very dependent on trade and services for employment. These sectors employed more than 46 percent of the labor force in 1990. This is slightly below national figures, but certainly reflects national trends in this area. Value added is much less in these sectors than in manufacturing. This reflects the lower overall wages in the service and trade sectors as compared to manufacturing.

The shift of national and regional economies to trade- and service-based employment raises some very important policy questions. Among those are:

- Where and how should investments be made to enhance the productivity of the services (intangible goods) sectors?

- Where and how do private and public investments interact to enhance productivity and wage rates in the service sectors?

- How can the service sectors improve in terms of supporting the tangible goods sectors?

- What opportunities are there for venture capital firms in the Missouri economy?

- What encouragement do supporting industries need to locate or expand production in the state? What do they need to enhance and complement the key industries of agriculture and manufacturing?



# Study results

Economic growth is determined by increases in goods and services output at the national and regional level. Although growth is usually measured by increases in the dollar value of output, it is the underlying increase in the output of physical goods and services that ultimately determines the economic well-being of each citizen.

Growth in regional output over time is important in determining living standards, as well as providing employment for an expanding population and labor force. Current output in key industries reflects the areas where a state has a comparative advantage. To the extent that this persists, the key industries will continue to contribute. Given the large level of current activity, a small percent change in output will reflect substantial growth.

The major purpose of this study was to determine the major industries in the state of Missouri and their contribution to the state's output and long-term prospects for economic growth. Special reference is made to the role of agriculture and agricultural processing in contributing to Missouri's economic growth and output.

Data used for this study was from the IMPLAN model developed by the U.S. Forestry Service for 1990.<sup>1</sup> IMPLAN encompasses both a data base and a formal model of a regional economy. It provides detailed data on 528 industries in the economy. For brevity and ease of understanding, this study was based on a highly aggregated (nine sector) version of the model. The aggregation was based on the Commerce Department's Standard Industrial Classification (SIC) one-digit classification. Detailed data can be analyzed for public and private decision purposes.

## Economic variables

Customarily, several economic variables are used to determine the output and growth potential for any given economic region. In this study, Missouri's economic output and growth potential were evaluated using the following four variables. Each of these four measures have a different purpose and make a different contribution to understanding how a particular regional economy is structured.

**Exports.** An industry's export to other regions is important because it brings money into the local

economy. The dollars can be used to purchase local output or output from other regions. The exports of a region help determine the economic base of the local economy.

**Employment.** This is simply the number of people employed by a particular industry.

**Value added.** From the standpoint of national income and product accounting, this is the most important measure of a particular industry's contribution to an economy. Value added consists of the sum of wages earned, interest, dividends and proprietors income plus an adjustment for business contributions to income transfers. Value added can be interpreted as the contribution of a particular industry to the gross product of a region. Thus, it is equivalent to the gross domestic product at the national income accounting level.

**Total sales (output).** Total output or sales of an industry is the most commonly used measure. It is used when the output contribution of an industry is considered.

### **Industrial structure of the analysis**

Analysis of the Missouri economy by these four variables was first studied using a highly disaggregated four-digit SIC classification of industries. After the initial analysis, a highly aggregated version of the Missouri model was developed for exposition.

It contained nine major industries:

- Agricultural and related industries
- Mining
- Construction
- Manufacturing
- Transportation, communications and utilities (TCU)
- Wholesale and retail trade (Trade)
- Finance, insurance and real estate (FIRE)
- Services
- Government

Key clusters of the manufacturing sector were also selected on the

basis of their contributions to the Missouri economy and to the manufacturing sector. They are included in the analysis and presentation. The selected subsets of manufacturing are:

- Food and kindred products
- Aerospace
- Motor vehicles, parts and accessories

## **Export base**

The first variable evaluated was the exports of the Missouri economy. This included exports to domestic markets outside Missouri and foreign markets.

There are two concepts to keep in mind concerning the export base of a regional economy. The first is simply the concept of the relative contribution or importance of a particular industry to the overall export base of the region. In this study, we measured this importance by determining the percentage contribution of the industry to Missouri's total export base. The second concept is the region's economic growth potential.

The hypothesis advanced is that growth in the export base ultimately determines the growth of a region. Formally, this is known as the export base theory of regional growth. A region must increase its export base in order to grow.

Missouri's export base is first and foremost in the manufacturing sector. In 1990, the total export base of the Missouri economy was \$65 billion. More than 70 percent of the exports were from manufacturing, see Chart 1 on page 9 and Appendix Table 1 on page 15.

Agricultural and related forestry production accounted for nearly 9 percent of the export base. Mining and construction, the other goods-producing sectors, accounted for less than 2 percent of the export base.

Together, the four tangible-goods industries contributed \$52 billion and accounted for 80 percent of the total export base. Transportation, communications and utilities accounted for 7 percent of the export base, while services accounted for an additional 7 percent. Wholesale and retail trade; finance, insurance and real estate; and government together contributed only 5 percent to the export base.

In 1990, agricultural production and processing accounted for almost 24 percent of the export base of the state of Missouri. This includes production and processing of agricultural products, but not

the retailing of agricultural products or the manufacturing of inputs, such as agricultural machinery, fertilizer and chemicals. Food processing contributed about 15 percent to the export base. Also, aerospace and motor vehicles and accessories, two aggregates of the manufacturing sector, contributed heavily to the export base. They accounted for 11 percent and 7.5 percent, respectively.

In summary, agricultural production and processing, aerospace and motor vehicles contributed nearly 50 percent of the export base in 1990. It seems safe to say that any long-term plan for economic development of the state of Missouri needs to be centered on these basic characteristics of Missouri's economic structure.

## **Employment**

Employment by industry is another important measure of the contribution of a sector to a regional economy, see Chart 2 on page 10 and Appendix Table 2 on page 16.

Total employment in Missouri was 3.1 million with manufacturing employing 445,473 or 15 percent of the total. Agriculture and agricultural processing accounted for about 8 percent of Missouri employment in 1990. Services contributed 772,659 jobs, more than 25 percent of the state's employment. Wholesale and retail trade together provided employment for 638,296 people or about 21 percent of the labor force, while government at all levels used another 14 percent.

Although food processing, aerospace and motor vehicles contributed nearly half of the Missouri export base in 1990, the contribution of these industries was much less impressive when measured by percent of total employment. Food processing and aerospace each contributed less than 2 percent of the total state employment. Even less impressive was motor vehicles with less than 1 percent of the state's employment. These highly efficient industries accounted for only about 4 percent of the total employment in 1990.

An analysis of national data show that of the four major goods-producing sectors (agriculture, mining, manufacturing and construction), only construction had an increase in employment from 1970 through 1990. Manufacturing employment peaked around 1980, at slightly more than 21 million, but it has since declined to only slightly more than 19 million at the national level. Keep in mind that this occurred over a 20-year period, when total manufacturing output increased by 85 percent over the 1970 output.

Obviously, this results in tremendous enhancement of productivity resulting from new technology and perhaps other factors.

### **Value added**

In 1990, total value added in Missouri was \$105 billion, see Chart 3 on page 11 and Appendix Table 13 on page 17. Manufacturing contributed about \$25 billion, almost 24 percent of value added to the Missouri economy. Agricultural production accounted for slightly less \$2 billion or almost 2 percent of value added in 1990. Food processing accounted for about 4 percent. Services provided a 17 percent value added contribution, while wholesale and retail trade together accounted for another 15 percent. Finance, insurance and real estate made up slightly less than 15 percent of value added to the state's economy. Transportation, communications and utilities together added another 11 percent. Finally, government at all levels accounted for almost 11 percent of the value added to the Missouri economy.

The key manufacturing industries of food and kindred products added 3.7 percent, motor vehicles accounted for 2.2 percent and aerospace contributed 2.9 to value added to the Missouri economy in 1990. Again these three components stand out as very significant contributors upon to the manufacturing sector, which the state economy depends heavily.

### **Total industry sales (output)**

The final variable used in this analysis was total industry sales or output. This variable has some use and interest in evaluating the contribution of a particular industry to a state economy.<sup>2</sup>

In 1990, total industry sales in Missouri were \$196.6 billion. Manufacturing was by far the largest contributor to Missouri's total sales, accounting for nearly 34 percent, see Chart 4 on page 12 and Appendix Table 4 on page 18.

Agricultural Production and Processing contributed another 12 percent of total sales. Aerospace and motor vehicles were the most important components of manufacturing, contributing 4.3 percent followed by food processing with 3.4 percent of total sales.

Services accounted for 16 percent of total sales with finance, insurance and real estate at 11 percent. Construction contributed 7 percent and all levels of government another 6 percent. Mining, by all

four measures, accounted for less than 1 percent of the state's total economic activity.

## Conclusion

This study of the Missouri economy used four measures of state economic activity to assess the relative contributions of different sectors to total state economic activity. These four measures were the export base, employment, value added and total industry sales. All four measures make a different contribution to understanding the Missouri economy, in formulating policies to enhance the economic growth of the state and for predicting the possible consequences of alternative economic policies.

Although the percentage contribution to the Missouri economy varied widely among the four variables, the results seem to be internally consistent, see Charts 1, 2, 3 and 4 on pages 9, 10, 11 and 12 and Appendix Tables 1, 2, 3, 4 and 5 on pages 15, 16, 17, 18 and 19.

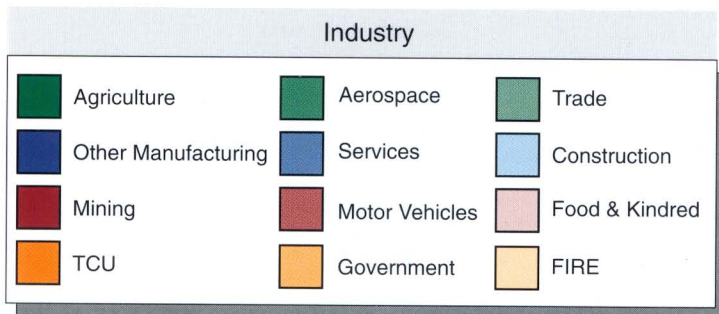
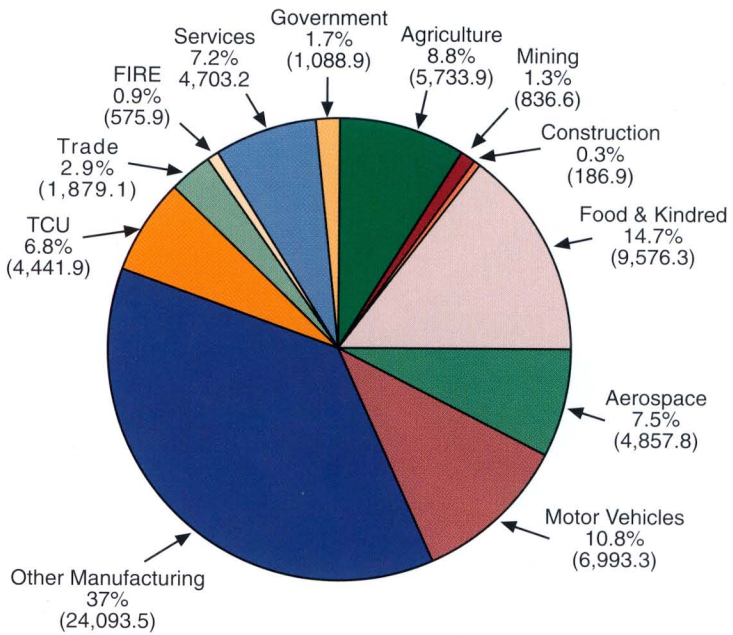
The results of the analysis are consistent with the notion that the hard-goods industries of agriculture and manufacturing provide the basis for both current output, as well as future growth of the Missouri economy.

This argument is based on the export-base theory of economic growth. For example, services accounted for more than 25 percent of total employment, but was only a little more than 7 percent of the export base. Yet manufacturing, while employing only 14 percent of the labor force, generated more than 70 percent of the state export base. This suggests that manufacturing is very efficient. As productivity in hard-goods production improves, services act as a residual recipient for labor displaced by new technology in agriculture and manufacturing.

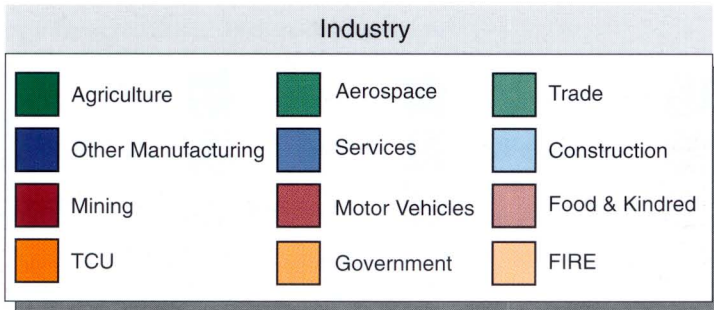
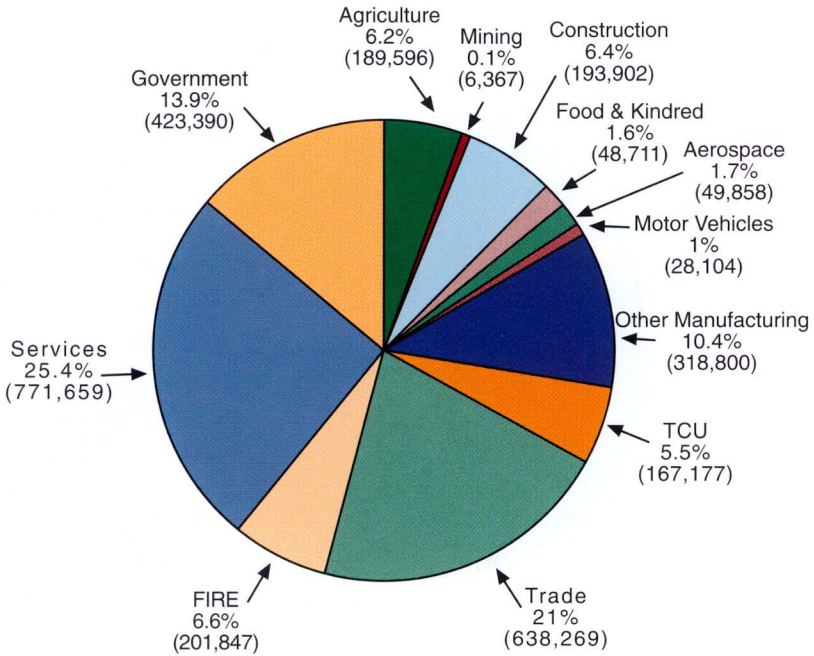
The following are major conclusions:

- Manufacturing, by almost any measure, was by far the most important sector of the Missouri economy. It contributed over 70 percent of the state's export base. It also accounted for 24 percent of value added to the economy and 34 percent of total sales. Even with these large contributions, manufacturing employed slightly less than 15 percent of the total state labor force.
- Agriculture and agricultural processing together can be considered key industries for the Missouri economy by all measures of economic activity. In this context, you may safely consider the Missouri economy to be based on the hard-goods sectors of agriculture and manufacturing.

**Chart 1. Export base of the state of Missouri in 1990**  
 (values in millions of dollars)

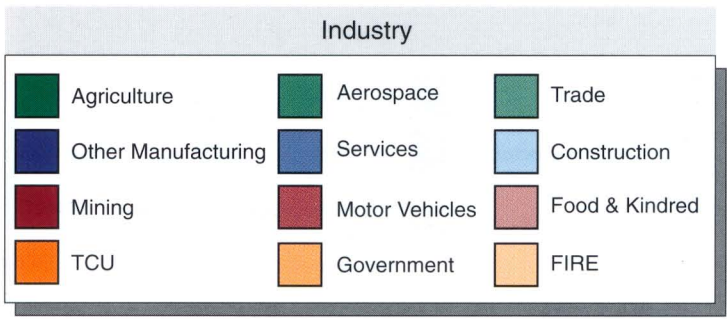
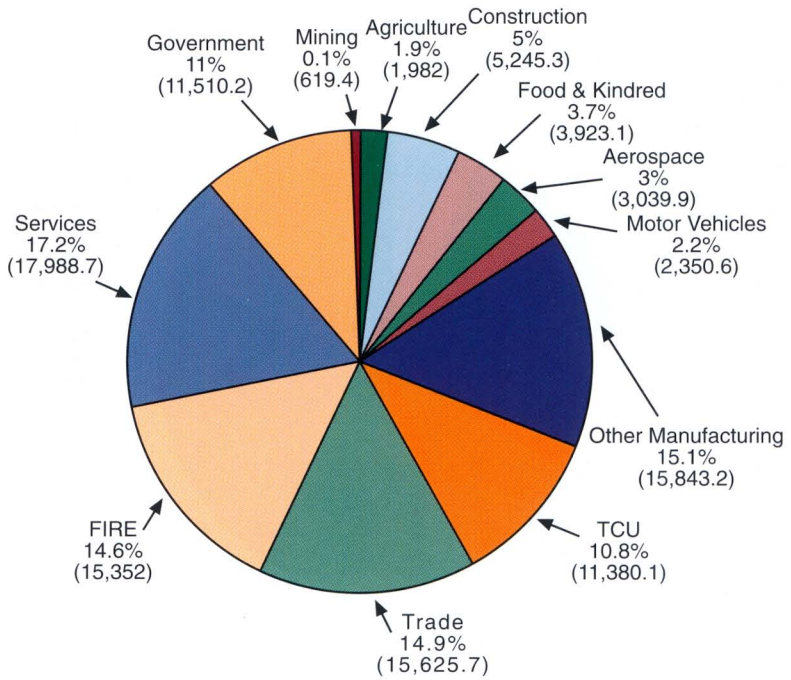


**Chart 2. Industrial Employment in Missouri in 1990**  
 (values in millions of dollars)

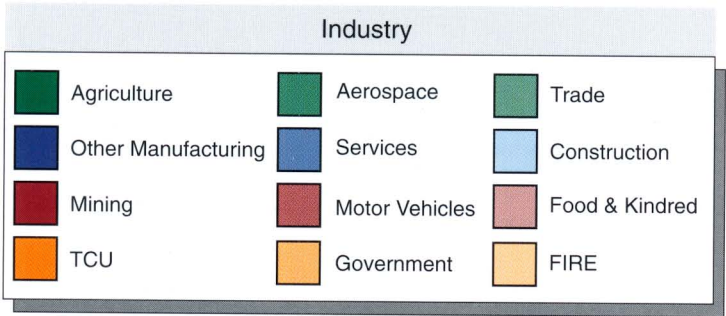
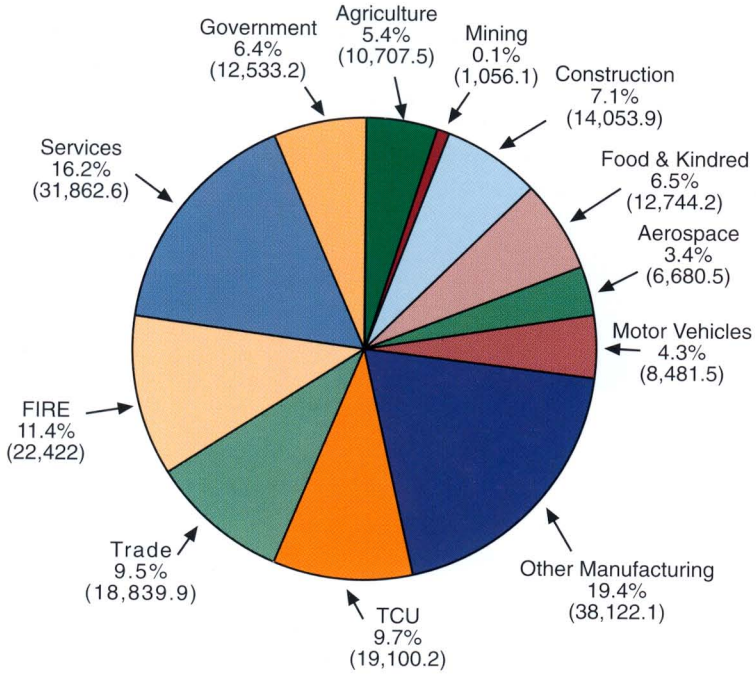




**Chart 3. Value Added by Missouri Industries in 1990**  
 (values in millions of dollars)



**Chart 4. Total Sales by Missouri Industries in 1990**  
(values in millions of dollars)



## Footnotes

<sup>1</sup>For more information regarding the IMPLAN model, contact Curtis Braschler, 226C Mumford Hall, University of Missouri, Columbia, MO 65211 or Gary Devino, 214C Mumford Hall, University of Missouri, Columbia, MO 65211.

<sup>2</sup>Total industry output counts twice in the sense that it contains numbers both in trade between processing sectors and final demand. It is in this sense that double counting occurs. Thus, total sales of an industry needs to be evaluated in this double-counting context when it is used in a contributory sense.



## Appendixes

The following tables provide data to support the charts on page 1 and pages 9 through 12.

| <b>Industry</b>  | <b>Value Percent of total</b> |        |
|--|-------------------------------|--------|
|  | (million dollars)             |        |
| Agriculture  | 5,733.9                       | 8.8    |
| Mining   | 836.6                         | 1.3    |
| Construction   | 186.9                         | 0.3    |
| Manufacturing  | 45,520.9                      | 70.1   |
| TCU  | 4,441.9                       | 6.8    |
| Trade  | 1,879.1                       | 2.9    |
| FIRE   | 575.9                         | 0.9    |
| Services   | 4,703.2                       | 7.2    |
| Government   | 1,088.9                       | 1.7    |
| Total  | 64,967.2                      | 100.0* |
| <b>Key Manufacturing Subsections</b>                               |                               |        |
| Food & Kindred   | 9,576.3                       | 14.7   |
| Aerospace  | 4,857.8                       | 7.5    |
| Motor Vehicles   | 6,993.3                       | 10.8   |
| Other Manufacturing  | 24,093.5                      | 37.0   |
| Total  | 45,520.9                      | 70.1   |
| *Due to rounding, this column may not total to exactly 100 percent |                               |        |

**Table 1 (Chart 1). Export base of the state of Missouri in 1990**

| <b>Industry</b>   | <b>Employment</b> | <b>Percent<br/>of Employment</b> |
|---|-------------------|----------------------------------|
| Agriculture   | 189,596           | 6.2                              |
| Mining  | 6,367             | less than 0.1                    |
| Construction  | 193,902           | 6.4                              |
| Manufacturing   | 445,473           | 14.7                             |
| TCU   | 167,177           | 5.5                              |
| Trade   | 638,269           | 21.0                             |
| FIRE  | 201,847           | 6.6                              |
| Services  | 771,659           | 25.4                             |
| Government  | 423,390           | 13.9                             |
| Total   | 3,037,680         | 100.0*                           |
| <b>Key Manufacturing Subsections</b>                                |                   |                                  |
| Food & Kindred  | 48,711            | 1.6                              |
| Aerospace   | 49,858            | 1.7                              |
| Motor Vehicles  | 28,104            | 1.0                              |
| Other Manufacturing   | 318,800           | 10.4                             |
| Total   | 445,473           | 14.7                             |
| *Due to rounding, this column may not total to exactly 100 percent. |                   |                                  |

**Table 2 (Chart 2). Industrial employment in Missouri in 1990**

| <b>Industry</b>   | <b>Total Value Added<br/>(Million Dollars)</b> | <b>Percent<br/>of Total</b> |
|---|--|-----------------------------|
| Agriculture   | 1,982.0  | 1.9                         |
| Mining  | 619.4  | less than 0.1               |
| Construction  | 5,245.3  | 5.0                         |
| Manufacturing   | 25,156.8                                       | 24.0                        |
| TCU   | 11,380.1                                       | 10.8                        |
| Trade   | 15,625.7                                       | 14.9                        |
| FIRE  | 15,352.0                                       | 14.6                        |
| Services  | 17,988.7                                       | 17.2                        |
| Government  | 11,510.2                                       | 11.0                        |
| Total   | 104,860.2                                      | 100.0*                      |
| <b>Key Manufacturing Subsections</b>                                |  |                             |
| Food & Kindred  | 3,923.1  | 3.7                         |
| Aerospace   | 3,039.9  | 3.0                         |
| Motor Vehicles  | 2,350.6  | 2.2                         |
| Other Manufacturing   | 15,843.2                                       | 15.1                        |
| Total   | 25,156.8                                       | 24.0                        |
| *Due to rounding, this column may not total to exactly 100 percent. |  |                             |

**Table 3 (Chart 3). Value Added by Missouri Industries in 1990**

| <b>Industry</b>   | <b>Total Sales<br/>(Million Dollars)</b> | <b>Percent<br/>of Total</b> |
|---|--|-----------------------------|
| Agriculture   | 10,707.5                                 | 5.4                         |
| Mining  | 1,056.1                                  | less than 0.1               |
| Construction  | 14,053.9                                 | 7.1                         |
| Manufacturing   | 66,028.3                                 | 33.6                        |
| TCU   | 19,100.2                                 | 9.7                         |
| Trade   | 18,839.9                                 | 9.5                         |
| FIRE  | 22,422.0                                 | 11.4                        |
| Services  | 31,862.6                                 | 16.2                        |
| Government  | 12,533.2                                 | 6.4                         |
| Total   | 196,603.7                                | 100.0*                      |
| <b>Key Manufacturing Subsections</b>                                |  |                             |
| Food & Kindred  | 12,744.2                                 | 6.5                         |
| Aerospace   | 6,680.5                                  | 3.4                         |
| Motor Vehicles  | 8,481.5                                  | 4.3                         |
| Other Manufacturing   | 38,122.1                                 | 19.4                        |
| Total   | 66,028.3                                 | 33.6                        |
| *Due to rounding, this column may not total to exactly 100 percent. |  |                             |

**Table 4 (Chart 4). Total Sales by Missouri Industries in 1990**



| <b>Industry</b>   | <b>Export</b> | <b>Employment</b> | <b>Value<br/>Added</b> | <b>Total<br/>Sales</b> |
|---|---------------|-------------------|------------------------|------------------------|
| Agriculture   | 8.8           | 6.2               | 1.8                    | 5.4                    |
| Mining  | 1.3           | 0.2               | .06                    | 0.5                    |
| Construction  | 0.3           | 6.4               | 5.0                    | 7.1                    |
| Manufacturing   | 70.1          | 14.7              | 24.0                   | 33.6                   |
| TCU   | 6.8           | 5.5               | 10.9                   | 9.7                    |
| Trade   | 2.9           | 21.0              | 14.9                   | 9.6                    |
| FIRE  | 0.9           | 6.6               | 14.6                   | 11.4                   |
| Services  | 7.2           | 25.4              | 17.1                   | 16.2                   |
| Government  | 1.7           | 13.9              | 11.0                   | 6.4                    |
| Total   | 110.0*        | 100.0*            | 100.0*                 | 100.0*                 |
| <b>Key Manufacturing Subsections</b>                                |               |                   |                        |                        |
| Food & Kindred  | 14.7          | 1.6               | 3.7                    | 6.5                    |
| Aerospace   | 7.5           | 1.6               | 2.9                    | 3.4                    |
| Motor Vehicles  | 10.8          | 1.0               | 2.2                    | 4.3                    |
| Other Manufacturing   | 37.0          | 10.4              | 15.1                   | 19.4                   |
| Total   | 70.1          | 19.7              | 24.0                   | 33.6                   |
| *Due to rounding, this column may not total to exactly 100 percent. |               |                   |                        |                        |

**Table 5 (summary of Charts 1, 2, 3, and 4 ).  
Percentage contributions to the Missouri economy of  
Major Industry groups in 1990**







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