Assessing the Economic Impact of
TAMKO Building Products, Inc.

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Executive Summary

TAMKO Building Products, Inc. (TAMKO) is a privately owned company based in Joplin, MO, that was formed in 1944. Initially, TAMKO specialized in producing roofing products for both residential and commercial buildings. Over the last 75 years, TAMKO has grown into a national leader in the manufacturing of building products.

The purpose of this report is to quantify the economic impact that TAMKO has had on the local and state economy. The assessment is divided into two parts. First, there is the historical review that presents evidence on the importance of TAMKO for the local and state economy. Our review will focus on employment and production data supplied by TAMKO in relation to the data for the Joplin, Missouri Metropolitan Statistical Area. Second, we consider the economic impact by projecting forward two versions of the Joplin economy and then two versions of the Missouri economy: for each economy, there is a projection in which TAMKO continues to operate while the other projection is a counterfactual example in which TAMKO did not exist. The difference between the two scenarios is a measure of the overall economic impact of TAMKO. Together, the two pieces give one a complete past and future gauge of the economic impact that TAMKO has on state and local economies.

Our findings are summarized in the following points:

• Three partners purchased Lehrack Asphalt Roofs Inc in 1944. Mary Ethel Craig, wife of partner E.L. Craig, suggested TAMKO, based on the acronym of the five states originally thought to comprise the company’s market. And TAMKO officially started operations on March 19, 1945 with 35 employees.

• In April 2018, TAMKO reported employing 828 people in Missouri. Thus, TAMKO Building Product’s has reported 4.35 percent average annual employment growth in Missouri over the past 75 years.

• By 2017, TAMKO was the sixth largest employer in Joplin, MO and accounts for nearly one percent of the payroll employment in the Joplin MSA.

• TAMKO’s economic impact on the Joplin MSA economy is $3.2 billion over the next generation. If TAMKO were to no longer operate facilities in the Joplin MSA,
Newton and Jasper counties combined would lose nearly $11 million in collections to their General Revenue Fund.

- TAMKO’s economic impact on the State of Missouri economy is even bigger. Over the next generation, TAMKO’s economic impact on the Missouri economy is over $3.9 billion. The impact on Net General Revenue collected by the State of Missouri is projected to be over $113 million.

There are a number of other large employers in the Joplin area like Eagle-Picher Industries, AT&T Communications, FAG Bearings, Leggett & Platt, and several trucking lines. Since 1944, TAMKO has emerged as one of the area’s largest and most stable employers. Its employment impact is described in greater detail in this report.
1. Introduction

TAMKO Building Products, Inc. (hereafter TAMKO) is a privately owned company based in Joplin, MO. Three partners purchased Lehrack Asphalt Roofs Inc in 1944. Based on the five states that were believed to be the new company’s market area, TAMKO—the acronym for Texas, Arkansas, Missouri, Kansas and Oklahoma—was an idea attributed to Mary Ethel Craig, wife of partner E. L. Craig. TAMKO officially started operations on March 19, 1945.¹ At the time of this report, TAMKO has been in business for nearly 75 years, building a reputation for innovation, quality and long-standing customer relationships with a wide variety of building products. This success is the direct result of teamwork, enduring relationships with customers, suppliers and employees. A commitment to continuous improvement, including the Six Sigma program, and a management philosophy designed to improve processes and products have bolstered this success.

TAMKO operates 17 different facilities across the United States. In order to secure its own raw materials, TAMKO was an innovator with respect to vertical integration. There are twelve production facilities and five warehouses from Salt Lake City to Florida. Through vertical integration, TAMKO has greater control over its entire manufacturing and distribution process. TAMKO’s footprint stretches throughout the United States from its headquarters in Joplin, MO.

Seventy five years of commercial success can only be achieved with a true partnership with its employees. In 2018, TAMKO was voted the Best Industrial Employer by the Joplin Globe newspaper in the Readers’ Choice Favorites of the Four States contest. TAMKO has become a preferred employer with more than 700 employees in the four-state area, producing about $400 million in payroll and capital spending in the four state area in the past six years. TAMKO’s salaries, wages and benefits are at the top of the scale for the region and the average gross annual income for TAMKO production hourly employees in Missouri is more than $65,000.²

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¹ See Rodengren, Jeffrey L., TAMKO Building Products: A Constancy of Purpose, Ft. Lauderdale, FL: WriteStuff, LLC. This book provides a complete and thorough history of the E. L Craig family, the origination of the TAMKO Building Products company, and its operational development.

TAMKO is one of the largest employers in the Joplin area. Table 1 presents the ten largest employers in Joplin in 2017. It appears that the City of Joplin estimated employment; Table 1 estimates TAMKO employment in 2017 is 1,000 employees while TAMKO reports its April 2018 employment level at 848. According to the city’s Comprehensive Annual Financial Report, TAMKO was the sixth largest employer; the larger employers are two hospitals, the Joplin Public Schools, and two private industries.\(^3\) Even with TAMKO employment corrected, TAMKO would be the 8\(^{th}\) largest employer in Joplin. According to the Joplin, MO Comprehensive Annual Financial Report, TAMKO accounts for 1.17 percent of the city’s payroll employment. Compared with 2008, TAMKO is a more important contributor to the Joplin employment scene. In 2008, TAMKO ranked as the 9\(^{th}\) largest employer, accounting for 0.77 percent of payroll employment.

Table 1

<table>
<thead>
<tr>
<th>Employer</th>
<th>rank</th>
<th># of 2017 employees</th>
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<tbody>
<tr>
<td>Freeman Hospital</td>
<td>1</td>
<td>2,866</td>
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<tr>
<td>Mercy Hospital</td>
<td>2</td>
<td>1,310</td>
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<tr>
<td>Joplin R-VIII School District</td>
<td>3</td>
<td>1,200</td>
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<tr>
<td>Tri-State Motor Transit</td>
<td>4</td>
<td>1,135</td>
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<tr>
<td>Eagle Picher</td>
<td>5</td>
<td>1,015</td>
</tr>
<tr>
<td>TAMKO Building Products</td>
<td>6</td>
<td>1,000</td>
</tr>
<tr>
<td>Downstream Casino</td>
<td>7</td>
<td>923</td>
</tr>
<tr>
<td>Wal-Mart</td>
<td>8</td>
<td>900</td>
</tr>
<tr>
<td>Empire District Electric</td>
<td>9</td>
<td>784</td>
</tr>
<tr>
<td>Missouri Southern State University</td>
<td>10</td>
<td>620</td>
</tr>
</tbody>
</table>

Source: Comprehensive Annual Financial Report, Joplin Missouri, 2017

The purpose of this study is to quantify the economic impact of TAMKO. We characterize the impact by looking at TAMKO and its contribution to the Joplin, MO metropolitan area. According to the U.S. Census Bureau, the Joplin, MO Metropolitan Statistical

\(^3\) The ranking is determined by an estimated number of employees. Of course, the city may have overestimated Joplin employment for the other employers.
Area (Joplin MSA) consists of Jasper and Newton counties. In addition, we present evidence on how important TAMKO is to the State of Missouri economy.

In this study, Section 2 will focus on characterizing the economic impact historically. Both employment and GDP are used to describe how important TAMKO is to the Joplin MSA and State of Missouri economies. In order to quantify the economic impact in value terms, Section 3 projects future paths for the economies; one path is the baseline and assumes that TAMKO operates in the aggregate economy and the other path considers the aggregate economy as if TAMKO does not produce goods and services in the aggregate economy. Specifically, we considered the contribution that TAMKO has made to Joplin MSA’s in terms of total employment and personal income during the period 2010 through the beginning of 2018. Thus, we can characterize the contribution that TAMKO has made in the past to the local and state economy. Section 4 provides a brief summary of the results.

2. Economic Impact: What has happened?

2.1 Industry Background

We begin our assessment of TAMKO by characterizing the industry in which it operates. In the United States, businesses are categorized as operating within an industry. The North American Industrial Classification System (NAICS) is the classification system adopted in this country. Because TAMKO’s primary good is the production of roofing materials, it would fall under category named “Asphalt shingle and coating materials manufacturing.” Table 2 reports data from the 2016 Economic Census for the NAICS code 324122.

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A Metropolitan Statistical Area, or MSA, is defined by the United Census Bureau as a geographical region with a relatively high population density at its core and close economic ties throughout the area. In practical terms, the MSA is a region dominated by a particular central city. Close economic ties are captured by commercial operations of businesses emanating from the central city such as branch operations. In addition, the MSA extends to consider the area from which workers travel to the central city.
The 2016 observations give one a sense of several key characteristics about the roofing materials production industry. Roofing material producers sell more than $9.7 billion worth of goods in a year. In the 2012 Census of Manufacturers, there were 133 different firms operating in this industry and the average company operated 1.67 production locations. We get some idea of just capital intensive and material intensive the industry is. Production labor costs account for about 5.8 percent of the shipment value in this industry (divide production workers annual wages by Production shipment value; that is $475.6/9767). Materials account for 52.2 percent of the value of products shipped ($5,098/9,767) and value added is about 48 percent ($4,689/9,767).

The roofing industry is broader than just asphalt shingle manufacturing. The Fredonia Group published its forecasts for the United States’ Roofing Industry, including Asphalt shingles, Metal Roofing, Bituminous Roofing, Wood Shingles and Shakes, Tile Roofing and Plastic Roofing. Based on forecasts for new construction and reroofing needs for the existing housing stock, The Fredonia Group predicts that roofing sales will be equal to 267.9 million squares, totaling sales valued at $19.9 billion.

TAMKO has a reputation for quality with two products in the top ten of “Best Shingles.” According to Research Roofing, the TAMKO Heritage Woodgate shingle is the third best shingle on the market while the TAMKO Heritage Vintage shingle is rated 10th best shingle.

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Table 2

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<table>
<thead>
<tr>
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<tbody>
<tr>
<td>Number of Employees</td>
<td>8,987</td>
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<tr>
<td>Annual Payroll</td>
<td>$673.6 million</td>
</tr>
<tr>
<td>Production Workers (avg over year)</td>
<td>6,850</td>
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<tr>
<td>Production Workers Annual Hours</td>
<td>14.6 million</td>
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<tr>
<td>Production Workers Annual Wages</td>
<td>$475.6 million</td>
</tr>
<tr>
<td>Production Shipment Value</td>
<td>$9.767 billion</td>
</tr>
<tr>
<td>Cost of materials</td>
<td>$5.098 billion</td>
</tr>
<tr>
<td>Value Added</td>
<td>$4.689 billion</td>
</tr>
</tbody>
</table>

Source: 2016 Economic Census, U.S. Census Bureau; See https://factfinder.census.gov/

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2.2 A Brief overview

TAMKO’s history reads like a story of dedicated innovation on both the production and management fronts. Any company lasting for three generations, and still going, has to be willing to experiment with new technologies. It is the sensible application of these technologies, tested by market forces, that are the mark of a successful operation. When viewed against all the competing forces—both within the industry and outside the industry—it is remarkable that a company survives for that long.

With $108,000, three partners purchased Lehrack Asphalt Roofs Inc in Joplin, MO in March 1944. The business name was changed to TAMKO in March 1945, and the first order was for 90,000 rolls of 3-foot chicken wire enclosed with saturated felt. The order was for the WWII effort in the European Theater and filled by mid-1945. Over time, partners were bought out. In 1947, two partners instigated the practice of vertical integration as TAMKO built a paper plant on High Street in Joplin to produce felt for its shingles. By 1949, E. L. Craig was the lone partner remaining in the business.

TAMKO continued to expand. By 1958, TAMKO was producing 80 million pounds of roofing products. In 1961, the company paid $33,000 for 11,000 square feet of warehouse space, bringing total storage capacity to 80,000 square feet. Employment in the Joplin plants reached 150 strong in 1961 with payroll topping $1 million. In 1968, the Rangeline plant was processing 864,000 square feet of roofing. Between 1963 and 1975, the roofing industry increased by 174 percent. During the same period, TAMKO increased sales by 349 percent.

In 1969, TAMKO expanded manufacturing capabilities across state lines, purchasing a roofing manufacturing plant in Phillipsburg, KS. In the early 1970s, a second paper mill was built on Rangeline, doubling the production capacity with 45,000 additional square feet of production and 35,000 additional square feet of storage. Production reached 70 tons of dry roofing felt per day.

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7 The overview presented here is not meant to be a comprehensive corporate history. See Rodengren for a more complete overview. Our goal here is to highlight what the authors believed were quantitatively important parts of the corporate history.
Expansion continued in Missouri during the 1980s and 1990s. TAMKO added 56,250 square feet to its Rangeline facility to produce fiberglass mat. The product innovation required an additional 25 employees and cost $475,000 to build. TAMKO then purchased Dura-Board, entering the production of composite railing systems, decking products and composite shingles to its product line. Initially, TAMKO retrofitted a 52,000 square foot facility to produce EverGrain composite decking materials in Lamar, MO. Eventually, a facility that became known as the Lamar North plant was built, adding 167,000 square foot of production capability for the EverGrain and Envision decking product lines.

Overall, TAMKO has a rich tradition of innovation. TAMKO holds 23 patents. In its commercial product line, Awaplan, was introduced into the United States by TAMKO. The production process includes polyester mat saturated with asphalt and coated with fire-resistant SBS-modified asphalt. TAMKO has consistently embraced management innovations to maintain excellent relationships with employees and customers, relying principally on Dr. W. Edwards Deming’s 14-point management strategies. TAMKO implemented vertical integration into its production process at an early stage of the company’s development. In addition, it has embraced automated methods to maximize the productivity of its office workers and administrators. Combined these approaches have produced a long-lived company that continues to develop itself.

2.3 State and Local economies overview

The Joplin MSA is presented in Figure 1 with the two counties—Jasper and Newton—shaded red in the map of the State of Missouri. The map indicates the two primary geographic units that will be examined in this study. In particular, we quantify the impact that TAMKO has on the State of Missouri economy and the impact that TAMKO has on the Joplin MSA economy.

In each separate analysis, we consider the following question: suppose that TAMKO ceases operating facilities in (i) Joplin and (ii) the State of Missouri. The hypothetical example is forward looking in the sense that TAMKO and its value-added to the economies are projections made “as-if” TAMKO is excluded from the economy in the specific geographic area. For example, in the case of the economic impact on the State of Missouri, we consider the Missouri economy as if TAMKO continues to operate over the next twenty-five years. We refer to this
projection as the baseline or control economy. Then, we construct a projection as if TAMKO
does not add any value to the Missouri economy. We refer to this case as the treatment projection
since the Missouri economy is treated as if TAMKO did not exist. By comparing the control
economy with the treatment economy over time, we can quantify how

**Figure 1**

Map of Joplin MSA and State of Missouri

[Map image]

Important TAMKO is to the Missouri economy. This is how we construct a measure of
TAMKO’s economic impact.

Figure 2 presents employment data for Jasper and Newton counties for the period 1969
through 2016. Jasper is the larger county in terms of employment with payroll employment
between three and four times greater than levels reported for Newton County. Over the 47-year
period, payroll increased at a 1.41 percent average annual rate in Jasper County while
employment increased at a 2.33 percent average annual rate in Newton County. Overall, the
Joplin MSA recorded payroll employment increasing at a 1.63 percent average annual rate. Since
the end of the Great Recession in 2009, employment growth in both counties has been flat.
The employment picture in Joplin compared with the rest of the state has been a tale of two histories. Over the entire sample, Joplin has reported faster employment growth while the State of Missouri has reported slightly better employment growth during the current business-cycle expansion. Between 1969 and 2016, Missouri reported that payroll employment increased at a 1.13 percent average annual rate; nearly 50 basis points lower than the growth rate reported in the Joplin MSA. Since the end of the Great Recession in 2009, employment growth in Joplin was slower than for the State of Missouri. Statewide employment increased at a 0.5 percent average annual rate between 2009 and 2016 while payroll in the Joplin MSA was flat during the same time period.

**Figure 2**

Payroll Employment for

Jasper and Newton Counties, 1969-2016

![Graph showing payroll employment for Jasper and Newton Counties, 1969-2016](image)

Source: Bureau of Labor Statistics

In addition, we compare volatility in employment growth for the Joplin MSA and Missouri. Though Joplin MSA reported slightly faster employment growth over the 47 years between 1969 and 2016, we also observe that the standard deviation of the annual growth rate has been slightly higher when compared with the standard deviation in Missouri employment.
growth. The range of growth rates is a measure of volatility in overall employment growth experience; in other words, how big have the swings in employment growth been? In Joplin MSA, over the past 47 years, employment growth has ranged from a decline of 4.6 percent (in 1975) to an increase of 6.5 percent (in 1973). Meanwhile, Missouri’s employment growth has ranged from negative 2.7 percent (in 2009) to positive 4.1 percent (in 1984). When looking at an overall measure of volatility, we turn to the standard deviation.

The standard deviation tells us something about the average amplitude over business cycles. For the Joplin MSA, the standard deviation is slightly higher with respect to the annual employment growth rate, coming in at 2.2 percentage points compared with Missouri’s standard deviation coming in at 1.5 percentage points.\(^8\) The implication is that while the Joplin MSA economy has reported faster growth over the past five decades, it also reports greater volatility in the year-over-year growth rates.

The broadest measure of economic activity is Gross Domestic Product (GDP) because it measures the value of all final goods and services produced in a specific geographic region in a year. We can compare real GDP data for Missouri and for the Joplin MSA over the period 2001 through 2016. Over this much shorter period, we see a similar pattern. Specifically, the inflation-adjusted market value of final goods and services—that real GDP—produced in the Joplin MSA increased at a 1.3 percent average annual rate while the Missouri economy increased at a 0.7 percent average annual rate between 2001 and 2016. In addition, real GDP growth exhibited more volatility. The standard deviation of Joplin MSA’s real GDP growth was 1.9 percentage points while the standard deviation of Missouri’s real GDP was 1.1 percentage points. Thus, Joplin’s economy grew faster, on average, than the Missouri economy and with greater volatility.

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\(^8\) Some people might hold the view that because the Missouri economy is bigger than the Joplin MSA economy, it will automatically smooth out shocks that affect economic conditions. This view is not necessarily true by mathematics. By construction the Missouri economy is more diversified than the Joplin MSA economy; every industry in the Joplin MSA economy is in the Missouri, but the converse is not true. With greater diversification, shocks to some Missouri industries, for example, will offset shocks to the Joplin MSA economy, thereby reducing the standard deviation in the growth rate of the Missouri economy relative to the standard deviation in the growth rate of the Joplin MSA economy. The evidence we present here is consistent with notion that diversification in Missouri does result in lower overall economic volatility.
2.4 TAMKO recent employment history

TAMKO is a large employer. In Missouri, TAMKO has had operations in as many as nine different locations across the state. Since its inception, TAMKO has reported that employment increased in its Missouri facilities at a 4.35 percent average annual rate. This is a remarkable average growth rate for a mature manufacturing company in the United States.\(^9\)

Figure 3 provides end-of-year total employment at the Missouri locations operated by TAMKO since 2010.\(^{10}\) (For 2018, April data are the last observations available at the time this

![Figure 3](attachment:image.png)

**Figure 3**

TAMKO Employment at Missouri Operations, 2010-April 2018

Source: TAMKO Building Products

\(^9\) In a recent report by the Bureau of Labor Statistics, only 1.3 percent of firms *ten years and older* met the criteria for a high-growth rate firm. In this report, they consider a high-growth firm to be one in which employment increases at a 20 percent average annual rate for three years. TAMKO has increased at a 4 percent average annual rate for 75 years. The data are not set up to compare apples to apples. See [https://www.bls.gov/opub/mlr/2013/article/clayton.htm](https://www.bls.gov/opub/mlr/2013/article/clayton.htm).

\(^{10}\) Note that TAMKO is reporting employment as full-time equivalent number of workers. The U.S. data reports payroll employment, which consists of both full-time and part-time workers.
From roughly 700 employees in 2010, TAMKO has increased to over 800 employees during this decade. In terms of employment growth since 2010, TAMKO has recorded faster employment than the rest of the State of Missouri. Between December 2010 and April 2018, TAMKO’s Missouri employment has increased at a 2.34 percent average annual rate. Over the same time period, total employment in Missouri increased from 2.68 million (December 2010) to 2.91 million (April 2018); in other words, employment in the state increased at 1.13 percent average annual rate over the 88-month period. Thus, TAMKO’s operations in Missouri have been outpacing growth in the rest of the state, at least when comparing employment.

If we narrow our comparison to the Joplin MSA, TAMKO’s contribution to overall employment is easier to see. Figure 4 plots TAMKO’s employment level across the operations within the Joplin MSA. From a December 2010 level of approximately 600 employees, the Joplin MSA locations have increased to nearly 800 employees as of April 2018. In terms of employment growth, TAMKO has been increasing at a much faster rate than the Joplin MSA. Indeed, over the last seven-plus years, TAMKO’s employment has been increasing at a 3.72 percent average annual rate compared with a meager 0.36 percent average annual rate of employment growth for the Joplin MSA as a whole. With faster employment growth, TAMKO’s share of employment in the Joplin MSA has been increasing. We define employment share as employment at TAMKO divided by total payroll employment in the Joplin MSA. In December 2010, TAMKO accounted for 0.77 percent of total payroll employment in the Joplin MSA, rising to 0.97 percent by April 2018. It is quite remarkable that a mature corporation—one that has operated for nearly 75 years—continues to be one of the fastest growing entities in a local economy the size of the Joplin MSA.

In order to provide some additional perspective on how important TAMKO is to the local economy, we construct a counterfactual series, comparing the actual history of employment in the Joplin MSA with what it would have been with no people employed by TAMKO. We construct the counterfactual employment series as follows: take the actual Joplin MSA employment level in each year and subtract the number of people employed by TAMKO in that year.
year. By constructing this counterfactual, it is as if we are comparing what the actual Joplin MSA economy was and what it would it would have been with TAMKO not operating. By doing this TAMKO-elimination each year, we can get a sense of the impact that TAMKO has had on employment growth over the past eight years. Note that we refer to the difference between the actual employment growth rate and the counterfactual employment growth rate as the TAMKO employment effect.

**Figure 4**

TAMKO Employment at Joplin MSA Operations, 2010-April 2018

![Graph showing TAMKO employment at Joplin MSA Operations from December 2010 to April 2018.](image)

Source TAMKO Building Products

Between December 2010 and April 2018, Joplin MSA reported employment increasing at a 0.36 percent average annual rate. Figure 5 plots the TAMKO employment effect for each year between 2010 through April 2018. As Figure 5 shows, the TAMKO employment effect is typically between 50 and 100 basis points a year. In 2018, the small increase in Joplin MSA employment—it rose by 200 employees—is swamped by reducing employment by nearly 800 people if TAMKO ceased operating. Because this occurs over just four months of 2018, the
TAMKO employment effect is compounded over the year, resulting in an annualized three-percentage-point reduction in employment growth.

Figure 5

Annual TAMKO Employment Effect on

Joplin MSA Employment Growth, 2011-April 2018

Source: Authors’ calculations

Next, we measure the TAMKO employment effect by looking at average differences in the growth rates over the 2011-April 2018 period. On average, Joplin MSA employment increased at a 0.36 percent annual rate. We construct a counterfactual series of the average annual impact that TAMKO would have had on the annual employment growth rate each year. We find that by reducing Joplin MSA employment by the number of people employed by TAMKO each year would have resulted in MSA employment decreasing at a 0.72 percent average annual rate. Thus, by constructing the TAMKO employment effect, we find that TAMKO can account for a 1.08 percentage-point decline in the average annual employment growth rate in the Joplin MSA.

By looking backward, we develop two main characteristics of the state and local economy. First, the Joplin economy has been doing slightly better than the Missouri economy as a whole in
terms of employment growth and real GDP growth. Joplin did realize more modest employment since the end of the Great Recession compared with the State of Missouri economy, increasing at rate nearly one percentage point less than the Missouri economy as a whole. Second, TAMKO’s Missouri operations have been growing faster than the state’s employment and its Joplin MSA’s operations have been growing faster than the MSA’s employment. Indeed, TAMKO has had a quantitatively large impact on the Joplin MSA economy. More specifically, TAMKO, even as a mature corporation, continues to report strong employment growth compared with the Joplin MSA as a whole. In addition, if TAMKO had not operated over the past eight years, the Joplin MSA would have contracted in terms of employment instead of reporting slight growth.

3. **Economic Impact: Projecting forward**

In this section, we examine the effect that TAMKO has on the local economy and on the Missouri economy. In order to quantify TAMKO’s economic impact, we will ask two questions: (i) What is the projected value of the local (state) economy with TAMKO operating; and (ii) What is the projected future value of the local (state) economy if TAMKO did not operate in Missouri?

The projected path of the economy is for a twenty-five year period (a generation). We will use a model of the economy to compute the projected values. Then, with TAMKO not operating, we use the model, now with less economic production reduced by the value of TAMKO’s production, to project the TAMKO-less economy. If you like, you can think of the baseline projection (with TAMKO operating) as the control path and the treatment projection as the one in which TAMKO is removed from the economy. We interpret the economic impact of TAMKO as the difference between the baseline and the treatment projections. Put another way, we measure the economic impact as the economy untreated and treated.

3.1 **The Model economy: Joplin MSA**

We begin by describing the method we use to construct the baseline and treatment paths for the Joplin MSA economy. It is useful to start with a baseline view of the regional economy over time. The most preferred measure of the economy is real Gross Domestic Product (hereafter
GDP). To project the baseline forward, we need a measure of the current level of GDP and the average annual growth rate for the Joplin MSA.

Figure 6 presents the history of real GDP for the Joplin MSA. As a reminder, GDP is the market value of final goods and services produced in a region over a specified amount of time. So, we know the value of all goods and services produced in the Joplin MSA each year for the years 2001 through 2016 (last date available at the time of the report). Real GDP increased from $5.3 billion to more than $6.45 billion in the Joplin MSA. Over this period, Joplin MSA real GDP increased at a 1.31 percent average annual rate. The data on the Joplin MSA provides us with a measure of expected future economic growth.

**Figure 6**

*Plot of Joplin MSA real GDP, 2001-16*

Armed with the history of average economic growth, we proceed to project forward the baseline path for the Joplin MSA over the next twenty-five years. The projection is based on the simple assumption that real GDP in the Joplin MSA will continue to increase at the historical average rate.

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12 The key message of this data is the average economic growth over a period longer than a decade. However, the 2014 dip in economic activity is out of sync when compared with the national and state economies. One possible explanation is the end of rebuilding associated with 2011 Joplin tornado. After all the construction in 2011, 2012, and 2013, there is some anecdotal evidence indicating that the pace of construction activity did eventually slowdown and could account for the 2014 Joplin recession.
average rate for the next 25 years. Figure 7 plots the path for the Joplin MSA’s real GDP for the period 2018 through 2042. What Figure 7 shows is that if the Joplin MSA continues to grow at the 1.31 percent annual rate, then real GDP in 2042 will be nearly $9.1 billion. The baseline serves a basic function; if TAMKO were not operating as part of the Joplin MSA, we have to have a control against which the treatment can be compared.

**Figure 7**

**Baseline Path for Joplin MSA’s real GDP, 2018-42**

![Baseline Path for Joplin MSA’s real GDP, 2018-42](image)

Source: authors’ calculations

In order to assess the treatment, we need to quantify the economic impact that TAMKO has on the Joplin MSA economy. First, we focus on the facilities that TAMKO operates in the Joplin MSA. There are four: the High Street Plant, the Rangeline Plant, TAMKO Engineering Facility in Webb City, and TAMKO Corporate Headquarters. Second, we need a measure of the value of its contribution to the production of final goods and services in the Joplin MSA. TAMKO produces goods that are not sold to final consumers, rather its products are sold primarily to distributors and builders. Consequently, we use data on the factor payment side to get our measurement. Further, we need to separate out the expenses in terms of the cost of materials

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13 Conceptually, one can measure the value of final goods and service produced from the spending side. In this method, one uses the sales of the final-goods producer directly as the measurement of a corporation’s contribution to real GDP. For TAMKO, we take the factor payment approach, which is based on the equivalence between all factor payments and the value of final sales. The conceptual basis for this equivalence can be found in any principles of economics textbook. The gist of the equivalence is the following: the value of the final sales to
and the value added by TAMKO. Ultimately, it is the value added—the processing of the purchased materials by labor and capital operated by TAMKO—that constitutes TAMKO’s contribution to the Joplin MSA economy.

For the four plants that TAMKO operates in the Joplin MSA, we define “valued-added expenses” as total expenses less the cost of materials used in production. For the period 2018 through April 2018, TAMKO’s value-added expenses, on average, were $185.42 million. In addition, value-added expenses increased at a 0.33 percent average annual rate. The treatment we consider is as follows: suppose TAMKO stopped operating in the Joplin MSA. We project forward the loss to Joplin MSA GDP by subtracting the value-added by TAMKO’s four plants as follows:

\[ GDP^{TR}_{2018} = GDP_{2018} - VA_{2018} \]

which is shorthand notation for the treatment value of GDP, here denoted \( GDP^{TR}_{2018} \), is equal to the projected actual value of GDP, denoted by \( GDP_{2018} \) (with TAMKO operating) less the expected value of TAMKO’s contribution to GDP, denoted by \( VA_{2018} \). For all subsequent years, we project that TAMKO’s value added increases by 0.33 percent. Formally, \( VA_t = 1.033^t VA_{t-1} \), where \( t = 2019, 2022, ..., 2042 \) and \( VA_{2018} = VA_{2018} \) is given.

Figure 8 plots the dollar amount of lost GDP, or Differential, in the Joplin MSA if TAMKO did not operate there. Because value-added expenses are increasing over time, the Differential is increasing over time. Between 2018 and 2042, the annual impact on the Joplin MSA economy increases from over $185 million to over $201 million. And this is a conservative estimate based on the annual average value added over the last eight years. If we had used the actual 2018 value-added expenses, the Differential would have increased to more than $226 million by 2042. Depending on what value of value added you choose, TAMKO is responsible for between 2.8 percent (average value added over the 2010-18 period) or 3.1 percent (2018 actual value added) of the Joplin MSA GDP.

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14 Note that the value January through April 2018 was computed as an annualized value.
The summary of the economic impact is measured by the discounted sum of the TAMKO’s value-added—that is, the Differential—over the period 2018 to 2042. For a given Differential in year $t$, denoted here by $D_t$, the discounted sum is calculated as

$$\sum_{t=2018}^{2042} \rho^{t-2018} D_t$$

where $\rho$ is the discount factor. We assume that the average market real return is a weighted sum of the risk free rate and the return on equities. For our purposes let $\rho = 1/1.04$.\(^{15}\) By taking our approach, we look at the economic impact as part of movie rather than a snapshot. Indeed, the movie is comprised of economies that adjust to companies entering and exiting over time. In our

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\(^{15}\) This is a common discount factor used in macroeconomic models. See, for example, Ireland, Peter, 1994. “Supply-side economics and endogenous growth,” *Journal of Monetary Economics*, June, 33(3), 559-71.
case, the treatment is a particular form of an exit that occurs in one time period and has ramifications for the entire generation.

After following the process laid out, we compute the discounted sum of lost GDP for the Joplin MSA. Table 3 reports the discounted sum of value-added expenses for two different starting values; the row heading “5-year Sample Mean” takes the initial projection value as the sample mean for TAMKO while the row heading “2018” takes the initial projection value as the annualized 2018 value. Based on our projections, the discounted sum of value-added by TAMKO is $3.186 billion for the Joplin MSA economy. Note that the impact’s value is roughly half the size of one year’s worth of final goods and services produced within the Joplin MSA. If we initialize our projection using the 2018 level of value-added expenses, the economic impact by TAMKO is $3.591 billion on the Joplin MSA economy.

**Table 3**

<table>
<thead>
<tr>
<th>Initial Value</th>
<th>Discounted Sum (bil of $)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5-year Sample Mean</td>
<td>$3.186</td>
</tr>
<tr>
<td>2018</td>
<td>$3.591</td>
</tr>
</tbody>
</table>

To put the economic impact into more concrete terms, we compute the dollar value into a measurement called employee-years. An employee-year is dollar value added by TAMKO divided by the median annual salary for a worker in the United States. In other words, the result corresponds to the number of annual salaries that could be paid for an average worker with the value added by TAMKO. In 2016, the Social Security Administration reported that the median annual salary was $30,533.16 (Note that the national median annual salary is only about 40 percent of the median salary that TAMKO pays its employees.17) So, divide $3.186 billion by $30,533, yielding 104,365.8 employee-years. With the projection’s initial value set equal to the 2018 value-added expense, the impact is 117,611.7 employee-years. Thus, the economic impact

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17 TAMKO Building Products reports that the median salary for Missouri workers is $73,280, which means the median annual salary in the United States is just below 42 percent of the median annual salary for TAMKO employees.
by TAMKO on the Joplin MSA over the next generation is capable of paying the median annual salary for more than 100,000 workers.

### 3.2 Fiscal impacts for the Joplin MSA governments

Based on the projections of the economic impact on the aggregate Joplin MSA economy, we can extend our analysis to see how TAMKO would affect revenues in Newton and Jasper counties. Counties have multiple funds into which revenues are deposited. Here, our focus is on the collections by each county into the General Revenue Fund. Figure 9 shows the amount collected by each county for the period 2012 through 2016.

![Figure 9](image)

**Figure 9**

**Collections into General Fund**

**Revenue Account by County, 2012-2016**

Source: various issues of Comprehensive Annual Financial Review, Jasper and Newton Counties

Jasper is the larger of the two counties, collecting roughly double the amount collected in Newton County. Together, it is the sum of the General Fund Revenues collected by each county government that constitutes the relevant base for the Joplin MSA. Let nominal GDP in the Joplin MSA be the tax base upon which General Revenue Funds are applied. Over the five-year period, General Fund Revenues collected in the Joplin MSA are between 0.33 percent and 0.36 percent
of nominal GDP. On average, county government comprising the Joplin MSA collect 0.34 percent of nominal GDP each year.

It is straightforward to calculate the impact that TAMKO ceasing operations in the Joplin MSA would have on the county governments. With the 5-year Sample mean as the initial value, our projections indicate that over a generation, Joplin MSA county governments would lose 
\[3.186 \text{ billion} \times 0.0034 = 10.85 \text{ million}\] in General Fund revenues. Alternatively, with the 2018 level of value-added expenses, the Joplin MSA county government would realize revenue losses equal to \[3.591 \text{ billion} \times 0.0034 = 12.21 \text{ million}\]. Thus, we see that TAMKO alone has a substantial impact on the revenues collected at the county level in the Joplin MSA. By taking the average of the revenue loss associated with TAMKO over the twenty-five year period, our calculations indicate that the counties in the Joplin MSA would realize roughly a two percent loss in collections into the General Revenue Fund.

### 3.3 The Model Economy: The State of Missouri

In this part of the report, we compute the economic impact that TAMKO has on the State of Missouri Economy. In addition to the four plants operating in the Joplin MSA, TAMKO had three facilities in Lamar, MO, a warehouse in Kansas City MO, and a warehouse in St. Louis, MO. The Lamar South facility and the Kansas City, MO warehouse are no longer operating facilities for TAMKO.

We start with the history of the Missouri economy. Figure 10 presents real GDP for the State of Missouri for the period 1997 through 2017. At the state level, we see that real GDP increased from \$217 billion in 1997 to more than \$263 billion in 2017. Over this period, the Missouri economy recorded that real GDP increased at a 0.96 percent average annual rate. Recall that the growth rate of real GDP in the Joplin MSA was 1.31 percent over the 2001-2016 period. If we compare real GDP for the State of Missouri economy to real GDP in the Joplin MSA over the 2001-16 period, we see an even bigger gap in the growth rates. Between 2001 and 2016, real GDP in the State of Missouri increased at a 0.73 percent average annual growth rate. With the

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18 The fact that the Missouri economy has been recording slow growth has been documented several times. See Haslag, Joseph H. and Michael Podgursky, (2012), “Slip Sliding Away: The Weak Relative Growth of the Missouri Economy,” St. Louis, MO: ShowMe Institute.
state data, we get a sense of how large the Joplin MSA is to the aggregate state economy. Because the Joplin economy has reported a higher average annual growth rate than the Missouri economy, we see that Joplin’s share of the Missouri economy has risen from 2.3 percent to nearly 2.5 percent between 2001 and 2016.

Figure 10

Plot of State of Missouri real GDP, 1997-2017

Source: Bureau of Economic Analysis

Armed with the history of the Missouri economy, we proceed with the experiment in which TAMKO stops all operations within the boundaries of the State of Missouri. We consider all the plants and warehouses operating within the boundaries of the State of Missouri, including the four plants that TAMKO operates in the Joplin MSA. For the Missouri facilities, annualized value-added expense is $239.49 million for the period January 2018 through April 2018. In addition, value-added expenses increased at a 0.25 percent average annual rate.

The control setting would be the baseline path for the Missouri economy as if TAMKO continues to operate all its facilities. The treatment path is based on the notion that TAMKO no longer operates in Missouri. The baseline and treatment paths are projected forward and the economic impact is the difference between the two paths. At the state level, we assume that

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19 One reason for using the 2018 measurement of value-added expenses is that this year already takes the expenses out for the two discontinued facilities: the Kansas City Warehouse and the Lamar South.
TAMKO’s value-added expenses increase at 0.25 annual rate. Formally, $VA_t^M = 1.033^t VA_{t-1}^M$, where $t = 2019, 2022, ..., 2042$ and the superscript “M” identifies the value-added expenses at all of TAMKO’s Missouri operations. Figure 11 plots the baseline path projected for the State of Missouri economy. The projections put the Missouri economy on a path that begins around $264 billion and by 2042 stands at nearly $334 billion.

**Figure 11**

**Baseline Path for State of Missouri’s real GDP, 2018-42**

Figure 12 plots Missouri’s lost GDP, or Differential. As we did in our analysis of the Joplin MSA, the Differential is defined as the difference between the baseline projection and the treatment projection, given that the treatment is the exclusion of TAMKO’s value-added expenses in Missouri. The authors’ calculations indicate that the Differential is increasing over time. Between 2018 and 2042, the annual impact on the Missouri economy increases from over $202 million to nearly $216 million. And this is a conservative estimate based on the annual average value added over the last eight years. If we had used the actual 2017 value-added expenses, the Differential would have increased to more than $245.7 million by 2042.
The statewide economic impact is the discounted sum of the value-added expenses by TAMKO. Table 4 reports the discounted sum of value-added expenses for two different starting values; the 5-year Sample Mean and the 2018 level of value-added expenses. Starting with the 5-year Sample Mean,

Table 4

Discounted Sum of Value-Added Expenses: State Economy

<table>
<thead>
<tr>
<th>Initial Value</th>
<th>Discounted Sum (bil of $)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5-year Sample Mean</td>
<td>$3.461</td>
</tr>
<tr>
<td>2018</td>
<td>$3.936</td>
</tr>
</tbody>
</table>

TAMKO’s economic impact on the State of Missouri is $3.461 billion while starting the projection with the 2018 value measures the economic impact at $3.936 billion.

As we did with the economic impact measurement in the Joplin MSA, we transform the dollar value into employee-years. With the 2016 median annual salary equal to $30,533, divide $3.461 billion by $30,533, yielding 113,341.2 employee-years. In other words, TAMKO’s
statewide economic impact over the next generation is capable of paying the median annual salary for more than 110,000 workers. Alternatively, with the projection initialized with the 2018 value-added expense, TAMKO’s economic impact is capable of paying the annual median salary for 128,895.9 employees.

3.4 Fiscal impacts for the State of Missouri government

The purpose of this analysis is to project TAMKO’s economic impact in terms of the effect on future State of Missouri Revenues. Here, the measure of state revenues is Net General Revenue.

Note that Net General Revenue measures the total dollar value of collections by the State of Missouri from activities—primarily individual income, corporate income, and sales—within state boundaries. Figure 13 plots the values of Missouri Net General Revenue collections for the years 2012 through 2016. As with the Joplin MSA, we take nominal GDP as the measure of the tax base to which Net General Revenues are applied. For the State of Missouri, Net General Revenue is 2.9 percent of statewide nominal GDP. Thus, to measure the fiscal impact that

Figure 13

State of Missouri, Net General Revenue Collections 2012-2016

Source: State of Missouri, Office of Administration
TAMKO has on the State of Missouri, we compute the product of the economic impact and the average fraction of Net General Revenue to nominal GDP. Table 5 reports the discounted sum of Net General Revenues collected by the State of Missouri under two alternative starting values for economic impact projections. The findings are quantitatively large. If we use the sample mean as the starting value for the projection, the State of Missouri loses nearly $100 million in lost revenues after discounting over the 25-year period given that TAMKO does not operate in Missouri. If we initialize the projected economic impact using the 2018 annualized value-added expense, the discounted sum of lost state revenues is more than $113 million if TAMKO does not operate in Missouri.

<table>
<thead>
<tr>
<th>Initial Value</th>
<th>Impact on Net GR</th>
</tr>
</thead>
<tbody>
<tr>
<td>5-year Sample Mean</td>
<td>$99.91 million</td>
</tr>
<tr>
<td>2018</td>
<td>$113.62 million</td>
</tr>
</tbody>
</table>

4. **Summary**

In this study, we measure the economic impact that TAMKO Building Products has on two economies. One is the impact on the Joplin MSA economy and the other is the impact on the State of Missouri economy. TAMKO is a mature, dynamic company. Despite operating for nearly 75 years of operation, it is not coasting. Rather, it is progressing by seeking to introduce new production technologies, new administrative and management approaches, and new product lines to serve their customers.

TAMKO is a large entity in the Joplin, MO economy. It is among the top ten employers in Joplin, employing more than one percent of the payroll workers in the Joplin city limits and nearly one percent of the payroll workers in the two-county Joplin metropolitan statistical area. In addition to being identified as a large and mature manufacturing employer, there are three facts that are important to summarize. First, the Joplin MSA has recorded faster employment growth and real GDP growth than the State of Missouri. Second, employment growth during the
current economic recovery—that is, between 2009 and 2016—the Joplin MSA economy has been reporting slower growth compared with the State of Missouri. Third, TAMKO has reported faster employment than the Joplin MSA. Indeed, for a nearly 75-year-old company, TAMKO has shown average annual employment greater than 4 percent. By age profile, the expected outcome is for a manufacturing company to be on a lower trajectory.

It is not terribly surprising that TAMKO has a large economic impact. For the four facilities operating in the Joplin MSA, we measure the value of lost production to be equal to be $3.4 billion based on recent value-added expenses. For the median annual salary, this impact amounts to more than 117,000 employee-years that could be paid because TAMKO is producing over the next generation. Without TAMKO, the tax base shrinks for the two counties in the Joplin MSA. Our projections indicate that Newton and Jasper would suffer lost collections in the General Revenue Fund by more than $12 million over the next twenty-five years.

For the facilities operating in Missouri, the economic impact is nearly $4 billion over the next twenty-five years. The impact on Net General Revenue collected by the State of Missouri is quantitatively important; our projections indicate that the State of Missouri would no longer collect more than $113 million in revenues if TAMKO did not operate in Missouri.

Overall, TAMKO is a large employer and its value-added to Missouri’s GDP is sizable. This obvious fact is now further supported by evidence of the economic impact at both the local and statewide level. At its current level of value-added, TAMKO Building Products, Inc. adds tremendous value to the Joplin MSA economy. Further, with its presence across the State of Missouri, it is a quantitatively important to the state economy.