

Economic and Fiscal Impact Analysis of Class I Railroads in 2017

Commissioned by
Association of American Railroads

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1.0 Executive Summary

The primary purpose of this study is to examine the economic impact of Class I railroads, a major transportation and economic contributor, on the U.S. economy. This report, commissioned by the Association of American Railroads (AAR), calculates the economic and fiscal impacts of operations and capital investments of Class I railroads in 2017. Beyond the economic and fiscal impacts, this report briefly outlines the widespread use and benefits of Class I railroads' transportation. In determining the national economic impacts of Class I railroads, three types of impacts are measured: direct, indirect, and induced impacts.

- The **direct** economic effects are generated as operations and capital investment create jobs, and workers are hired to support Class I railroads' operations.
- The **indirect** economic impacts occur as goods and services are purchased from other firms.
- In either case, the increases in employment generate an increase in household income as new job opportunities are created and income levels rise. This drives the **induced** economic impacts that result from households increasing their purchases at local businesses.

This report provides economic and fiscal impact estimates for 2017, the most recent year for which Class I railroads' spending data are available. Class I railroad spending data were collected from annual reports (Form R-1) submitted to the Surface Transportation Board.

1.1 Summary of Findings

The analysis found that Class I railroads have a wide footprint on the economy, impacting a variety of industries and occupations. The total impacts (including direct, indirect, and induced) are a result of industry spending on employee wages, as well as operating and capital expenses. In 2017, Class I railroads' capital expenditures for road work and equipment reached approximately \$13.0 billion, while maintenance expenditures were nearly \$11.9 billion, totaling over \$24.8 billion in capital and maintenance disbursements.¹ Meanwhile, total direct employment for Class I railroads exceeded 147,000 in 2017, with approximately \$12.8 billion in total 2017 expenses attributable directly to wages.² According to RESI's analysis, Class I railroads' operations and capital expenditures supported over 1.1 million jobs (0.8 percent of all U.S. workers), \$219.5 billion in output (1.1 percent of total U.S. output), and \$71.3 billion in wages (0.9 percent of total wages in the U.S.). These impacts are outlined in Figure 1 below.

¹ Totals do not sum exactly due to rounding.

² The \$12.8 billion in total wages is comprised of approximately \$11.1 billion in expensed wages and nearly \$1.8 billion in capitalized wages. Totals do not sum exactly due to rounding.

Figure 1: Class I Railroads’ Total Economic Impacts, 2017

| Impact Type | Total | Percent of U.S. Economy |
|--------------------|-------------------|--------------------------------|
| Jobs | 1,120,215 | 0.8% |
| Output | \$219,466,200,675 | 1.1% |
| Wages | \$71,294,711,756 | 0.9% |

Sources: IMPLAN, RESI, Bureau of Labor Statistics, Bureau of Economic Analysis

The impacts outlined above also support tax revenues at the federal, state, and local levels. Class I railroads’ operations and capital investment generated approximately \$25.9 billion in tax revenues in 2017, as summarized in Figure 2 below. State and local taxes in the analysis primarily include sales and property taxes, as well as dividends and other taxes (such as motor vehicle taxes). Federal taxes included excise taxes and custom duties. Personal income taxes, social insurance taxes, and corporate profits are included at the state and local level, as well as at the federal level.³

Figure 2: Class I Railroads’ Total Fiscal Impacts, 2017

| Tax Type | Total |
|-----------------|-------------------------|
| State and local | \$9,221,814,824 |
| Federal | \$16,709,831,017 |
| Total | \$25,931,645,841 |

Sources: IMPLAN, RESI

Figure 3 below highlights the top-five sectors that are most impacted by Class I railroads, as measured by total employment. The plurality of direct employment impacts resulting from Class I railroads’ activity fell within the Transportation and Warehousing sector with 54,894 direct employees and total employment impacts of 103,485 jobs in 2017. The greatest total employment impacts, however, fall under the Administrative and Support and Waste Management and Remediation Services sector with 186,622 employees.

Significant employment impacts were also seen in the Other Services sector, totaling 134,109 employees, which includes subsectors such as commercial and industrial machinery and equipment repair and maintenance. Other Services also comprised the second-highest direct employment impacts of 41,694 jobs. The Manufacturing sector had the third-highest total employment impacts, while the Retail Trade sector had the fifth-highest total employment impacts from Class I railroad activity in 2017.

For a detailed list of employment impacts by all industry sectors, please refer to Appendix B. Note that totals may not sum exactly due to rounding.

³ IMPLAN does not differentiate between state and local taxes.

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Figure 3: Major Class I Railroad Employment Impacts, 2017

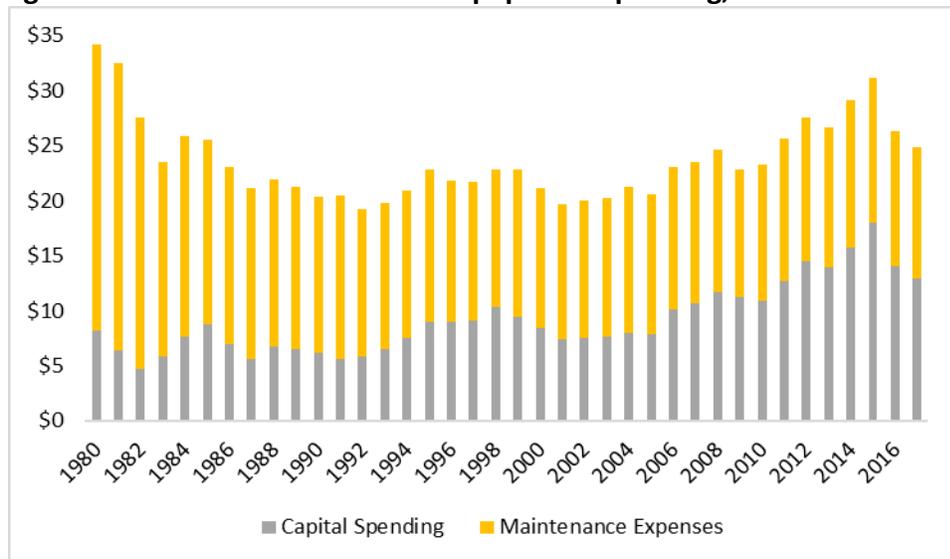
| Industry | Direct | Indirect | Induced | Total |
|--|----------------|----------------|----------------|------------------|
| Administrative and Support and Waste Management and Remediation Services | 24,725 | 130,233 | 31,665 | 186,622 |
| Other Services | 41,694 | 46,450 | 45,964 | 134,109 |
| Manufacturing | 17,947 | 62,679 | 23,755 | 104,380 |
| Transportation and Warehousing | 54,894 | 31,930 | 16,661 | 103,485 |
| Retail Trade | 0 | 14,882 | 67,075 | 81,958 |
| Other Industries | 8,276 | 188,538 | 312,845 | 509,660 |
| Total, All Industries | 147,537 | 474,713 | 497,965 | 1,120,215 |

Sources: IMPLAN, RESI

1.2 Spending Activity

U.S. freight railroads spent over \$660 billion in maintenance and capital expenditures between 1980 and 2017, averaging 40 cents per revenue dollar.⁴ In 2015, railroad capital and maintenance expenditures exceeded \$30 billion, while in 2017 there was approximately \$24.8 billion in spending on capital and maintenance.⁵ Class I railroads' total spending on infrastructure and equipment remained fairly consistent at roughly \$20-\$22 billion per year between 1983 and 2011.⁶ Between 2011 and 2017, spending on infrastructure and equipment has increased to an average of nearly \$28 billion per year.

Figure 4: Total Infrastructure and Equipment Spending, Billions of 2017 Dollars



Sources: Association of American Railroads, RESI

⁴ Association of American Railroads, "Overview of America's Freight Railroads," 4, accessed August 30, 2018, <https://www.aar.org/wp-content/uploads/2018/05/AAR-Overview-Americas-Freight-Railroads.pdf>.

⁵ Data provided by Association of American Railroads.

⁶ Spending reported in 2017 dollars.

2.0 Introduction

The primary purpose of this study is to examine the economic impact of Class I railroads, a major transportation and economic contributor, on the U.S. economy in 2017. This report, commissioned by the Association of American Railroads (AAR), calculates the economic and fiscal impacts of operations and capital investments of Class I railroads. Beyond the economic and fiscal impacts, this report briefly outlines the widespread use and benefits of Class I railroads' transportation.

The U.S. freight railroad industry network encompasses close to 140,000 miles and is shared by several types of railroads: Class I railroads, Short Line and Regional railroads (including Switching and Terminal railroads), and Passenger railroads.^{7,8,9} Class I railroads account for the majority of the industry's mileage and revenue. U.S. freight railroads spent over \$660 billion in maintenance and capital expenditures between 1980 and 2017, averaging 40 cents per revenue dollar.¹⁰ Recently in 2015, railroad capital and maintenance expenditures exceeded \$30 billion, while in 2017 there was approximately \$24.8 billion in spending on capital and maintenance.¹¹ The products that railroads move include components that are vital to a number of important industries; in turn, these industries support a number of jobs and significant economic activity. Due to Class I railroads' substantial contributions to the U.S. economy, it is important to determine a comprehensive measure of the economic and fiscal impacts of current operations and capital investments.

3.0 The Railroad Industry

In the U.S., freight railway infrastructure is comprised of nearly 140,000 miles of track, which is operated by nearly 600 freight railroads and shared with passenger railroads.¹² Defined by the Surface Transportation Board as railways with individual operating revenues of at least \$463.9 million, Class I railroads are the largest railway carriers and account for the majority of the rail infrastructure (about 93,000 miles) in the U.S.^{13,14,15} There are seven major Class I railroads currently operating in the U.S.:

⁷ Association of American Railroads, "Overview of America's Freight Railroads," 1.

⁸ "Railroad 101: Types of Railroads," Association of American Railroads, accessed August 30, 2018, <https://www.aar.org/railroad-101/>.

⁹ The 140,000 miles refers to route-miles, which are the aggregate length of railroad right-of-way (excluding yard tracks, sidings, and spurs) over which rail service is conducted. It does not reflect the fact that a mile of right-of-way might include two, three, or more parallel tracks.

¹⁰ Association of American Railroads, "Overview of America's Freight Railroads," 4.

¹¹ Data provided by Association of American Railroads.

¹² Association of American Railroads, "Railroad Facts 2017 Edition," 3, report provided by Association of American Railroads.

¹³ Association of American Railroads, "Railroad Ten-Year Trends," 8, report provided by Association of American Railroads.

¹⁴ Association of American Railroads, "Railroad Facts 2017 Edition," 47.

¹⁵ Operating revenue figures are represented in 2017 dollars.

- BNSF Railway Co.,
- CSX Transportation,
- Grand Trunk Corporation (Canadian National’s U.S. operations),
- Kansas City Southern Railway Co.,
- Norfolk Southern,
- Soo Line Corporation (Canadian Pacific’s U.S. operations), and
- Union Pacific Railroad Co.^{16,17}

These seven Class I railroads had combined operating revenues of \$70 billion in 2017 and account for approximately 90 percent of U.S. railroad employees, 94 percent of freight revenue, and 69 percent of freight rail mileage.^{18,19} Class I railroads also account for the majority of rail infrastructure spending.²⁰

There are other types of freight railroads that connect customers to the expansive Class I rail network. Short Line (Class III) and Regional (Class II) railroads comprise 31 percent of freight rail mileage and employ about 10 percent of all U.S. railroad employees.²¹ Commonly found in ports and industrial areas, Switching and Terminal railroads enable the transfer of freight between different railroads through switching and terminal services.²² While not a freight carrier, Passenger railroads commonly utilize infrastructure owned by freight railroads—about 70 percent of the miles that AMTRAK covers are owned by freight railroads.²³

3.1 Cargo

According to the most-recent data available from the Organisation for Economic Co-operation and Development (OECD), the U.S. is a world leader in freight rail with 2,448,480 million tonne-kilometers, behind only Russia with 2,493,428 million tonne-kilometers. On average, 5 million tons of goods are delivered using Class I railroads each day.²⁴ Coal transportation, which historically has been the most important commodity for U.S. railroads, was responsible for 32.2 percent of tonnage, 15.6 percent of carloads, and 14.8 percent of revenue for all U.S. Class I railroads in 2017.²⁵ Comparatively, Chemicals transportation was responsible for 10.8 percent

¹⁶ Canadian National Railway and Canadian Pacific Railway both have trackage in the United States and also constitute Class I railroads, but the majority of their infrastructure is in Canada.

¹⁷ Association of American Railroads, “Railroad Facts 2017 Edition,” 4.

¹⁸ Association of American Railroads, “Overview of America’s Freight Railroads,” 1.

¹⁹ “140,000-Mile Private Rail Network Delivers for America’s Economy,” Freight Rail Works, accessed August 30, 2018, <http://archive.freightrailworks.org/network/class-ii-and-class-iii/>.

²⁰ American Society of Civil Engineers, “2017 Infrastructure Report Card: Rail,” 3, accessed September 22, 2018, <https://www.infrastructurereportcard.org/wp-content/uploads/2017/01/Rail-Final.pdf>.

²¹ “140,000-Mile Private Rail Network Delivers for America’s Economy,” Freight Rail Works.

²² “Railroad 101: Types of Railroads,” Association of American Railroads.

²³ *Ibid.*

²⁴ *Ibid.*

²⁵ Association of American Railroads, “Railroads and Coal,” 1 and 6, accessed August 29, 2018, <https://www.aar.org/wp-content/uploads/2018/05/AAR-Railroads-Coal.pdf>.

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of tonnage, 7.4 percent of carloads, and 14.8 percent of revenue for all U.S. Class I railroads in 2017.²⁶

In 2015, the top 10 commodities by weight were bulk products; these products encompassed 26.8 percent of the total value of goods transported and 67.3 percent of total tons of goods transported.²⁷ Meanwhile, the top 10 commodities by value included numerous finished goods and comprised 57.3 percent of the total value of goods transported and approximately 35.9 percent of total tons of goods transported.²⁸ A summary of these products is provided in Figure 5 below.

Figure 5: Top Commodities for All Modes of Transportation, by Weight or Value in 2015²⁹

| Weight | Millions of Tons | Value | Billions of 2015 Dollars |
|----------------------------|------------------|--------------------------------------|--------------------------|
| Natural gas, coke, asphalt | 2,647 | Electronics | \$1,725 |
| Gravel | 1,820 | Motorized vehicles | \$1,513 |
| Gasoline | 1,156 | Mixed freight | \$1,503 |
| Cereal grains | 1,099 | Machinery | \$1,184 |
| Nonmetal mineral products | 1,073 | Gasoline | \$1,092 |
| Fuel oils | 1,039 | Natural gas, coke, asphalt | \$945 |
| Coal | 1,001 | Pharmaceuticals | \$931 |
| Crude petroleum | 912 | Fuel oils | \$862 |
| Other foodstuffs | 704 | Miscellaneous manufacturing products | \$816 |
| Waste/scrap | 653 | Other foodstuffs | \$732 |
| Top 10 Total | 12,104 | Top 10 Total | \$11,303 |

Sources: U.S. Department of Transportation (USDOT), Bureau of Transportation Statistics

As detailed above, natural gas, coke, and asphalt were the most-transported commodities by weight (classified as a single commodity), while electronics were the most transported commodity by value.³⁰ The top five commodities by value (electronics, motorized vehicles, mixed freight, machinery, and gasoline) accounted for over one-third of the total value of all

²⁶ Association of American Railroads, "Railroads and Chemicals," 2, accessed August 29, 2018, <https://www.aar.org/wp-content/uploads/2018/05/AAR-Railroads-Chemicals.pdf>.

²⁷ U.S. Department of Transportation, Bureau of Transportation Statistics, "Freight Facts and Figures 2017," 16, accessed August 29, 2018, https://www.bts.gov/sites/bts.dot.gov/files/docs/FFF_2017_Full_June2018revision.pdf.

²⁸ Ibid.

²⁹ Monetary figures were inflated from 2012 values using the Bureau of Labor Statistics CPI Inflation Calculator. Totals may not sum exactly due to rounding.

³⁰ U.S. Department of Transportation, Bureau of Transportation Statistics, "Freight Facts and Figures 2017."

transported commodities.³¹ Four commodities—gasoline; fuel oils; foodstuffs; and natural gas, coke, and asphalt—were in the top 10 commodities transported by both weight and value.³² While trucks carried the largest share of goods that were traveling under 750 miles, rail was the leading mode of transportation for shipping goods in the 750- to 2,000-mile distance range.³³

3.2 Regulation Changes and Infrastructure Investment

The Staggers Rail Act of 1980 was enacted as a partial economic deregulation of the freight rail industry to increase the productivity and efficiency of rail systems and to provide freedom to price services at market value.³⁴ The Staggers Rail Act has had several effects. Railroad costs were reduced through the elimination of unprofitable rail lines, the application of technological advancements, and a reorganization of the rail network (designed to improve efficiency).³⁵ Since deregulation in 1980, rail track miles have decreased by approximately 41 percent, and traffic density (measured by millions of ton-miles per mile of track) has increased from 3.4 to 9.9.³⁶ While flat prior to the Staggers Rail Act, rail productivity has increased 172 percent since the regulation change.³⁷ By 2017, rail rates charged to customers had decreased by 46 percent, according to average inflation-adjusted rail rates as measured by revenue per ton-mile; this decrease indicates vast savings for rail customers as the current shipping rate allows for the transport of close to two times the amount of product as it did prior to 1980.³⁸

In recent years, the railroad industry has spent significant amounts on capital improvements and maintenance to continue ensuring a safe, productive, and reliable environment. Railroad infrastructure and equipment spending totaled approximately \$660 billion between 1980 and 2017.³⁹ As railroad spending increased, train accident rates have decreased—since 2000, train accident rate have decreased by approximately 41 percent.⁴⁰ Additionally, the employee injury rate in the rail industry is lower than many industries, including construction, trucking, mining, airlines, agriculture, and manufacturing.⁴¹ To improve safety and efficiency, the railroad

³¹ U.S. Department of Transportation, Bureau of Transportation Statistics, “Freight Facts and Figures 2017.”

³² Ibid.

³³ Ibid.

³⁴ U.S. Department of Transportation, “National Rail Plan Progress Report,” 15, accessed September 15, 2018, <https://www.fra.dot.gov/eLib/Details/L02696>.

³⁵ Clifford Winston, “The Success of the Staggers Rail Act of 1980,” AEI-Brookings Joint Center for Regulatory Studies (October 2005): 5-5, accessed September 20, 2018, <http://www.brookings.edu/research/papers/2005/10/railact-winston>.

³⁶ Association of American Railroads, “Railroad Facts 2017 Edition,” 43-47.

³⁷ “High-speed Railroading,” *The Economist*, July 22, 2010, accessed August 31, 2018, <https://www.economist.com/briefing/2010/07/22/high-speed-railroading>.

³⁸ Association of American Railroads, “Putting Technology to Work: How Freight Rail Delivers the 21st Century,” 9, accessed August 31, 2018, <https://www.aar.org/wp-content/uploads/2018/05/RailxTech-AAR-White-Paper-Final-Web.pdf>.

³⁹ Association of American Railroads, “Overview of America’s Freight Railroads,” 4.

⁴⁰ Ibid, 5.

⁴¹ Ibid.

industry consistently implements new technologies, such as defect detectors (for both rail cars as well as tracks) and sophisticated data performance collection systems.⁴²

The long-term outlook for the environmental sustainability of freight rail transport is highly encouraging. The reduced environmental impact, greater fuel efficiency, and low costs over long distances favor freight rail in the future.⁴³ The speed in which freight trains have improved efficiency is unparalleled. Over a three-decade period, the efficiency of freight trains has more than doubled; comparatively, miles per gallon for tractor trailers have increased from 5.6 to 6.5 between 1973 and 2014.^{44,45} America's freight infrastructure has been called "one of the unsung transport successes of the past 30 years."⁴⁶

3.3 Rail Transportation and the Economy

Since the beginning of rail operations in the 1830s, railroads have been positively impacting the U.S. economy. The expansion of railroads in the U.S. allowed for a broad variety of goods to be moved across significant distances in a much shorter period of time, presenting opportunities for economic growth.⁴⁷ Increased interstate trade through rail allowed individuals to access previously difficult-to-obtain products, and also increased product demand as markets expanded.⁴⁸ Rail transportation also increased the ease of travel for both business and leisure purposes, which enabled growth and provided opportunities for increased communications and partnerships.⁴⁹ As new settlements were developed at railway depots across the U.S., the increased local goods and services that were made available for travelers' needs also benefitted towns' residents as well.⁵⁰ Still today, the rail industry continues to be a powerful driver of the U.S. economy through operations and capital investment and providing efficient transportation for the industries it serves.

⁴² Lisa Terry, "Railroad Operations: Where Safety and Innovation Converge," *Inbound Logistics*, October 2013, accessed August 31, 2018, <http://www.inboundlogistics.com/cms/article/railroad-operations-where-safety-and-innovation-converge/>.

⁴³ Elizabeth Dovell, "U.S. Rail Infrastructure," Council on Foreign Relations, March 7, 2012, accessed September 25, 2018, <https://www.cfr.org/backgrounder/us-rail-infrastructure>.

⁴⁴ Brian Palmer, "Let's Make an Effort to Move More Freight by Rail and Less by Road," *The Washington Post*, March 3, 2014, accessed August 31, 2018, https://www.washingtonpost.com/national/health-science/lets-make-an-effort-to-move-more-freight-by-rail-and-less-by-road-trains-are-more-efficient/2014/03/03/d1947278-9d90-11e3-9ba6-800d1192d08b_story.html?noredirect=on&utm_term=.c54944b4fea8.

⁴⁵ Brooks Jackson, "Fuel Efficient Freight Trains," FactCheck.org, July 1, 2008, accessed August 31, 2018, <https://www.factcheck.org/2008/07/fuel-efficient-freight-trains/>.

⁴⁶ "High-speed Railroading," *The Economist*.

⁴⁷ Martin Kelly, "Effect of Railroads on the United States," ThoughtCo, September 7, 2018, accessed September 26, 2018, <https://www.thoughtco.com/effect-of-railroads-on-the-united-states-104724>.

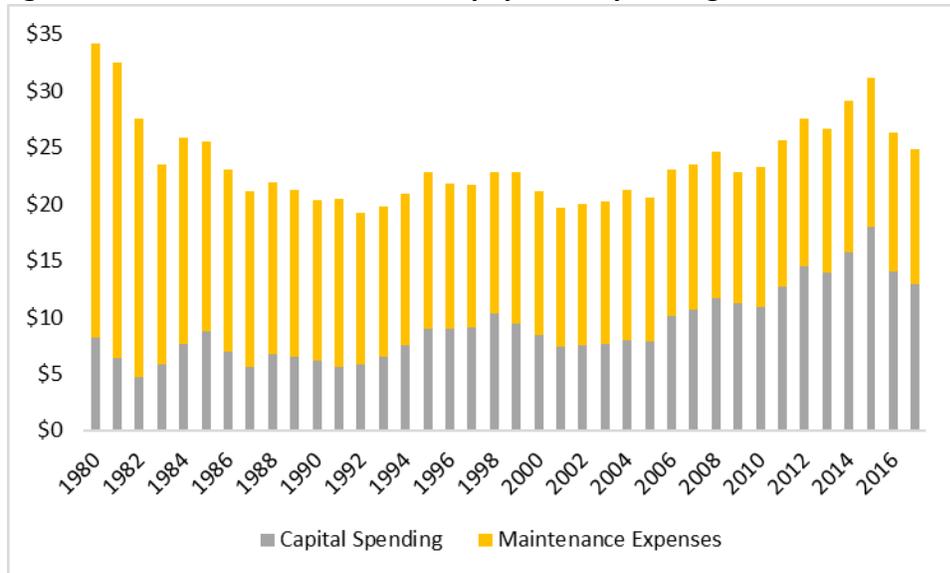
⁴⁸ Ibid.

⁴⁹ Courtney Endsley, "How the Transcontinental Railroad Changes America," GTG Technology Group, December 17, 2014, accessed August 31, 2018, <http://gtgtechnologygroup.com/transcontinental-railroad/>.

⁵⁰ Kelly, "Effect of Railroads on the United States."

U.S. freight railroads spent over \$660 billion in maintenance and capital expenditures between 1980 and 2017, averaging 40 cents per revenue dollar.⁵¹ Recently in 2015, railroad capital and maintenance expenditures exceeded \$30 billion, while in 2017 there was approximately \$24.8 billion in spending on capital and maintenance.⁵² Class I railroads’ total spending on infrastructure and equipment remained fairly consistent at roughly \$20-\$22 billion per year between 1983 and 2011.⁵³ Between 2011 and 2017, spending on infrastructure and equipment has increased to an average of nearly \$28 billion per year, as illustrated in Figure 6 below.

Figure 6: Total Infrastructure and Equipment Spending, Billions of 2017 Dollars



Sources: Association of American Railroads, RESI

4.0 Findings

To achieve the project objective, RESI completed a national economic (jobs, output, and wages) and fiscal (state, local, and federal tax revenues) impact analysis using IMPLAN.⁵⁴ RESI estimated the economic impacts of Class I railroads’ operations as well as capital investments for 2017, the most recent year for which all data are available. This analysis describes the impacts associated with operating Class I railroads and capital investment in rail infrastructure in terms of employment, output, and wages.

To determine the economic and fiscal impacts of nationwide Class I railroads’ operations, RESI used 2017 operations and capital investments data provided by AAR. AAR compiled Class I Railroad spending data from annual reports (Form R-1) submitted to the Surface

⁵¹ Association of American Railroads, “Overview of America’s Freight Railroads,” 4.

⁵² Data provided by Association of American Railroads.

⁵³ Spending reported in 2017 dollars.

⁵⁴ Please refer to Appendix A for a detailed description of IMPLAN.

Transportation Board. In 2017, Class I railroads' capital expenditures for road work and equipment reached approximately \$13.0 billion, while maintenance expenditures reached nearly \$11.9 billion, totaling over \$24.8 billion in capital and maintenance expenditures.⁵⁵ Locomotives represented the largest equipment expenditure in 2017 at nearly \$2.1 billion, while spending related to rail and other track material comprised the largest road work expenditure at approximately \$2.4 billion. Remaining equipment expenditures were primarily related to the purchase of ties (\$1.8 billion), signals and interlockers (\$1.4 billion), ballast (\$1.1 billion), as well as investments in technology and infrastructure. Meanwhile, total direct employment for Class I railroads exceeded 147,000 in 2017, with approximately \$12.8 billion in total 2017 operating expenses attributable directly to wages.⁵⁶ Engine and train crews comprised the largest portion of wages in 2017, at \$2.2 billion and nearly \$2.1 billion, respectively. Additionally, former Class I railroads' employees and their dependents received over \$7.6 billion in annual pension payments—generating increased household income for the recipients.

A summary of the total economic impacts of Class I railroads' operations can be found in Figure 7 below. Note that summed figures throughout the report may not add up exactly to totals due to rounding. Please refer to Appendix A for more information regarding the specific industry sectors analyzed using the IMPLAN model. For detailed impacts, please refer to Appendix B.

⁵⁵ Totals do not sum exactly due to rounding.

⁵⁶ The \$12.8 billion in total wages is comprised of approximately \$11.1 billion in expensed wages and nearly \$1.8 billion in capitalized wages. Totals do not sum exactly due to rounding.

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Figure 7: Class I Railroads' Total Economic Impacts, 2017

| Impact Type | Direct | Indirect | Induced | Total |
|-------------|------------------|------------------|------------------|-------------------|
| Jobs | 147,537 | 474,713 | 497,965 | 1,120,215 |
| Output | \$42,939,815,807 | \$93,218,009,562 | \$83,308,375,306 | \$219,466,200,675 |
| Wages | \$13,672,737,963 | \$31,443,759,858 | \$26,178,213,936 | \$71,294,711,756 |

Sources: IMPLAN, RESI

According to RESI's analysis, Class I railroads' operations and capital investment supported over 1.1 million jobs (0.8 percent of all U.S. workers), \$219.5 billion in output (1.1 percent of total U.S. output), and \$71.3 billion in wages (0.9 percent of total U.S. wages).

Figure 8 below highlights the five sectors most impacted by Class I railroads, as measured by total employment. For a full list of all industry sector employment impacts, please refer to Appendix B. Please note that totals may not sum exactly due to rounding.

Figure 8: Major Class I Railroad Employment Impacts, 2017

| Industry | Direct | Indirect | Induced | Total |
|--|----------------|----------------|----------------|------------------|
| Administrative and Support and Waste Management and Remediation Services | 24,725 | 130,233 | 31,665 | 186,622 |
| Other Services | 41,694 | 46,450 | 45,964 | 134,109 |
| Manufacturing | 17,947 | 62,679 | 23,755 | 104,380 |
| Transportation and Warehousing | 54,894 | 31,930 | 16,661 | 103,485 |
| Retail Trade | 0 | 14,882 | 67,075 | 81,958 |
| Other Industries | 8,276 | 188,538 | 312,845 | 509,660 |
| Total, All Industries | 147,537 | 474,713 | 497,965 | 1,120,215 |

Sources: IMPLAN, RESI

The plurality of direct employment impacts resulting from Class I railroads' activity fall within the Transportation and Warehousing sector with 54,894 direct employees and total employment impacts of 103,485 jobs in 2017. This includes subsectors for various forms of transportation; couriers and messengers; and warehousing and storage.

The greatest total employment impacts, however, fall under the Administrative and Support and Waste Management and Remediation Services sector with 186,622 employees. The Administrative and Support and Waste Management and Remediation Services sector includes subsectors such as office administrative services, facilities support services, and waste management and remediation services.

Significant employment impacts were also seen in the Other Services sector, totaling 134,109 employees, which includes subsectors such as commercial and industrial machinery and equipment repair and maintenance. Other Services also comprised the second-highest direct

employment impacts of 41,694 jobs. The Manufacturing sector had the third-highest total employment impacts, and encompasses subsectors such as food product manufacturing and motor vehicle body manufacturing. The Retail Trade sector had the fifth-highest total employment impacts from Class I railroad activity in 2017 and includes subsectors such as motor vehicle and parts dealers; furniture and home furnishings; and electronics and appliance stores.

Fiscal impacts were calculated at two levels: state and local, and federal. Figure 9 below provides a summary of these impacts generated at both levels.

Figure 9: Total Fiscal Impacts

| Tax Type | Direct | Indirect | Induced | Total |
|-----------------|------------------------|------------------------|-------------------------|-------------------------|
| State and local | \$2,523,685,020 | \$2,325,700,000 | \$4,372,429,804 | \$9,221,814,824 |
| Federal | \$5,931,816,691 | \$4,340,269,324 | \$6,437,745,002 | \$16,709,831,017 |
| Total | \$8,455,501,711 | \$6,665,969,324 | \$10,810,174,806 | \$25,931,645,841 |

Sources: IMPLAN, RESI

Fiscal impacts were largely produced at the federal level with over \$16.7 billion in total impacts, while state and local impacts were also substantial at more than \$9.2 billion. In total, Class I railroads’ operations resulted in combined tax impacts of over \$25.9 billion in 2017. State and local taxes in the analysis primarily include sales and property taxes, as well as dividends and other taxes (such as motor vehicle taxes). Meanwhile, federal taxes include excise taxes and custom duties. Personal income taxes, social insurance taxes, and corporate profits are included at the state and local level, as well as at the federal level.⁵⁷

5.0 Conclusion

Since its expansion in the 1800s, rail transportation has been significantly impacting economic activity in the U.S. In addition to the numerous jobs created during the construction of the U.S. railroad network, rail transportation has enabled economic growth throughout the country as cross-country shipping and travel became possible. In present day, Class I railroads continue to infuse significant capital into the economy and support a number of occupations. According to RESI’s current analysis, Class I railroads’ operations and capital investment supported over 1.1 million jobs, \$219.5 billion in output, and \$71.3 billion in wages, while also creating a total of \$25.9 billion in total tax revenues in 2017.

⁵⁷ IMPLAN does not differentiate between state and local taxes.

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Appendix A—Methodology

A.1 IMPLAN Model Overview

To quantify the economic and fiscal impacts of Class I railroads' operation and investment in the U.S., RESI used the IMPLAN input/output model. This model has the ability to enumerate the economic and fiscal impact of each dollar earned and spent by the following: employees of the development, other supporting vendors (business services, retail, etc.), each dollar spent by these vendors on other firms, and each dollar spent by the households of the development's employees, other vendors' employees, and other businesses' economic impacts that result from households increasing their purchases at local businesses.

Economists measure three types of economic impacts: direct, indirect, and induced impacts. The direct economic effects are generated as the event creates jobs and hires workers to support the event's activities. The indirect economic impacts occur as vendors purchase goods and services from other firms. In either case, the increases in employment generate an increase in household income, as new job opportunities are created and income levels rise. This drives the induced economic impacts that result from households increasing their purchases at local businesses.

Consider the following example. A new firm opens in a region and directly employs 100 workers. The firm purchases supplies, both from outside the region as well as from local suppliers, which leads to increased business for local firms, thereby hypothetically creating jobs for another 100 workers. This is the indirect effect. The workers at the firm and at suppliers spend their income mostly in the local area, hypothetically creating jobs for another 50 workers. This is the induced effect. The direct, indirect, and induced effects add up to 250 jobs created from the original 100 jobs. Thus, in terms of employment, the total economic impact of the firm in our example is 250.⁵⁸

A.2 Input Assumptions

RESI determined economic impacts based on spending on operations and capital investments that the Association of American Railroads provided—AAR compiled Class I railroad spending data from annual reports (Form R-1) submitted to the Surface Transportation Board. RESI categorized the provided expenditure data by IMPLAN industry sectors. RESI's analysis includes the following modeling assumptions.

- Economic impact multipliers are developed from IMPLAN input/output software.
- IMPLAN data are based on the North American Industrial Classification System (NAICS).
- IMPLAN employment multipliers are adjusted for inflation using the Bureau of Labor Statistic's CPI-U.
- Impacts are based on 2017 IMPLAN data for the U.S., the most recent data available.
- Impacts are represented in 2017 dollars.

⁵⁸ Total economic impact is defined as the sum of direct, indirect, and induced effects.

- Employment impacts include both full- and part-time employees. IMPLAN does not differentiate between full- and part-time employment.

For the IMPLAN analysis, RESI categorized industry sectors based on the expenditure categories outlined in Section 4.0. The specific industry sectors that RESI analyzed can be found in Figure 10 below.

Figure 10: IMPLAN Industry Sectors

| Industry Code | Description |
|---------------|---|
| 58 | Construction of other new nonresidential structures |
| 134 | Sawmills |
| 145 | All other miscellaneous wood product manufacturing |
| 209 | Other concrete product manufacturing |
| 264 | Construction machinery manufacturing |
| 303 | Computer terminals and other computer peripheral equipment manufacturing |
| 306 | Other communications equipment manufacturing |
| 332 | Power, distribution, and specialty transformer manufacturing |
| 362 | Railroad rolling stock manufacturing |
| 395 | Wholesale trade |
| 402 | Retail--gasoline stores |
| 409 | Rail transportation |
| 430 | Data processing, hosting, and related services |
| 438 | Insurance agencies, brokerages, and related activities |
| 440 | Real estate |
| 447 | Legal services |
| 448 | Accounting, tax preparation, bookkeeping, and payroll services |
| 449 | Architectural, engineering, and related services |
| 456 | Scientific research and development services |
| 457 | Advertising, public relations, and related services |
| 460 | Marketing research and all other miscellaneous professional, scientific, and technical services |
| 462 | Office administrative services |
| 465 | Business support services |
| 467 | Investigation and security services |
| 468 | Services to buildings |
| 470 | Other support services |
| 507 | Commercial and industrial machinery and equipment repair and maintenance |
| 516 | Labor and civic organizations |
| 523 | Other state government enterprises |
| 526 | Other local government enterprises |

Source: IMPLAN

Appendix B—Detailed Economic Impacts

Figure 11: Detailed Jobs Impacts

| Industry | Direct | Indirect | Induced | Total |
|--|----------------|----------------|----------------|------------------|
| Agriculture | 0 | 10,521 | 9,561 | 20,083 |
| Mining | 0 | 5,322 | 2,080 | 7,402 |
| Utilities | 0 | 1,087 | 1,697 | 2,784 |
| Construction ⁵⁹ | -3,945 | 3,595 | 5,616 | 5,267 |
| Manufacturing | 17,947 | 62,679 | 23,755 | 104,380 |
| Wholesale Trade | 813 | 19,634 | 14,443 | 34,890 |
| Retail Trade | 0 | 14,882 | 67,075 | 81,958 |
| Transportation and Warehousing | 54,894 | 31,930 | 16,661 | 103,485 |
| Information | 1,272 | 8,716 | 8,467 | 18,455 |
| Finance and Insurance | 147 | 30,994 | 34,147 | 65,288 |
| Real Estate and Rental and Leasing | 0 | 23,910 | 24,830 | 48,740 |
| Professional, Scientific and Technical Services | 9,989 | 51,011 | 25,721 | 86,721 |
| Management of Companies and Enterprises | 0 | 8,147 | 5,534 | 13,681 |
| Administrative and Support and Waste Management and Remediation Services | 24,725 | 130,233 | 31,665 | 186,622 |
| Educational Services | 0 | 294 | 16,831 | 17,124 |
| Health Care and Social Services | 0 | 4 | 84,680 | 84,684 |
| Arts, Entertainment and Recreation | 0 | 5,417 | 14,884 | 20,301 |
| Accommodation and Food Services | 0 | 11,878 | 58,491 | 70,369 |
| Other Services | 41,694 | 46,450 | 45,964 | 134,109 |
| Government | 0 | 8,008 | 5,863 | 13,871 |
| Total | 147,537 | 474,713 | 497,965 | 1,120,215 |

Sources: IMPLAN, RESI

⁵⁹ The negative construction impacts indicate a larger component of work-in-progress compared to work completed.

Economic and Fiscal Impact Analysis of Class I Railroads in 2017
RESI of Towson University

Figure 12: Detailed Output Impacts

| Industry | Direct | Indirect | Induced | Total |
|--|-------------------------|-------------------------|-------------------------|--------------------------|
| Agriculture | \$0 | \$874,864,996 | \$1,130,439,204 | \$2,005,304,199 |
| Mining | \$0 | \$1,591,626,777 | \$642,356,923 | \$2,233,983,701 |
| Utilities | \$0 | \$1,263,982,503 | \$1,987,477,511 | \$3,251,460,014 |
| Construction ⁶⁰ | -\$574,446,591 | \$655,924,653 | \$909,866,054 | \$991,344,116 |
| Manufacturing | \$11,006,480,655 | \$29,232,301,048 | \$12,968,278,447 | \$53,207,060,149 |
| Wholesale Trade | \$209,369,795 | \$4,954,499,705 | \$3,610,487,756 | \$8,774,357,255 |
| Retail Trade | \$0 | \$1,116,950,983 | \$5,891,222,729 | \$7,008,173,712 |
| Transportation and Warehousing | \$22,021,147,869 | \$8,418,508,379 | \$2,745,230,699 | \$33,184,886,947 |
| Information | \$392,615,743 | \$3,692,971,501 | \$4,647,224,682 | \$8,732,811,926 |
| Finance and Insurance | \$29,601,542 | \$6,891,213,717 | \$9,072,902,171 | \$15,993,717,430 |
| Real Estate and Rental and Leasing | \$0 | \$6,178,026,545 | \$12,308,342,864 | \$18,486,369,409 |
| Professional, Scientific and Technical Services | \$1,160,014,455 | \$7,510,775,176 | \$3,732,929,815 | \$12,403,719,447 |
| Management of Companies and Enterprises | \$0 | \$2,077,568,481 | \$1,403,630,170 | \$3,481,198,650 |
| Administrative and Support and Waste Management and Remediation Services | \$2,172,539,588 | \$8,578,504,146 | \$2,352,628,437 | \$13,103,672,171 |
| Educational Services | \$0 | \$15,701,232 | \$1,125,285,220 | \$1,140,986,451 |
| Health Care and Social Services | \$0 | \$401,543 | \$9,062,004,185 | \$9,062,405,728 |
| Arts, Entertainment and Recreation | \$0 | \$421,989,072 | \$1,302,638,834 | \$1,724,627,906 |
| Accommodation and Food Services | \$0 | \$851,905,771 | \$4,073,347,248 | \$4,925,253,019 |
| Other Services | \$6,522,492,750 | \$6,832,373,116 | \$2,899,424,228 | \$16,254,290,093 |
| Government | \$0 | \$2,057,920,220 | \$1,442,658,131 | \$3,500,578,350 |
| Total | \$42,939,815,807 | \$93,218,009,562 | \$83,308,375,306 | \$219,466,200,675 |

Sources: IMPLAN, RESI

⁶⁰ The negative construction impacts indicate a larger component of work-in-progress compared to work completed.

Economic and Fiscal Impact Analysis of Class I Railroads in 2017
RESI of Towson University

Figure 13: Detailed Wage Impacts

| Industry | Direct⁶¹ | Indirect | Induced | Total |
|--|----------------------------|-------------------------|-------------------------|-------------------------|
| Agriculture | \$0 | \$481,116,753 | \$326,245,841 | \$807,362,594 |
| Mining | \$0 | \$642,758,567 | \$242,245,405 | \$885,003,972 |
| Utilities | \$0 | \$171,127,517 | \$261,928,105 | \$433,055,622 |
| Construction ⁶² | -\$244,159,792 | \$223,764,107 | \$338,760,190 | \$318,364,505 |
| Manufacturing | \$1,554,740,855 | \$4,912,638,180 | \$1,807,286,248 | \$8,274,665,283 |
| Wholesale Trade | \$72,440,748 | \$1,714,228,484 | \$1,249,208,057 | \$3,035,877,290 |
| Retail Trade | \$0 | \$561,602,990 | \$2,342,941,025 | \$2,904,544,015 |
| Transportation and Warehousing | \$6,729,576,356 | \$2,821,325,611 | \$1,007,211,256 | \$10,558,113,223 |
| Information | \$144,465,292 | \$1,066,523,645 | \$984,063,732 | \$2,195,052,668 |
| Finance and Insurance | \$10,234,781 | \$2,644,331,548 | \$2,732,989,449 | \$5,387,555,779 |
| Real Estate and Rental and Leasing | \$0 | \$892,649,285 | \$739,114,874 | \$1,631,764,159 |
| Professional, Scientific and Technical Services | \$704,445,789 | \$4,353,914,155 | \$2,064,413,382 | \$7,122,773,326 |
| Management of Companies and Enterprises | \$0 | \$1,033,474,349 | \$698,227,659 | \$1,731,702,008 |
| Administrative and Support and Waste Management and Remediation Services | \$1,583,123,001 | \$5,402,692,840 | \$1,216,529,317 | \$8,202,345,158 |
| Educational Services | \$0 | \$9,476,024 | \$704,356,583 | \$713,832,607 |
| Health Care and Social Services | \$0 | \$222,872 | \$5,167,813,927 | \$5,168,036,799 |
| Arts, Entertainment and Recreation | \$0 | \$165,156,824 | \$457,094,661 | \$622,251,485 |
| Accommodation and Food Services | \$0 | \$319,610,909 | \$1,518,070,969 | \$1,837,681,878 |
| Other Services | \$3,117,870,932 | \$3,295,870,850 | \$1,793,078,111 | \$8,206,819,892 |
| Government | \$0 | \$731,274,348 | \$526,635,146 | \$1,257,909,494 |
| Total | \$13,672,737,963 | \$31,443,759,858 | \$26,178,213,936 | \$71,294,711,756 |

Sources: IMPLAN, RESI

⁶¹ IMPLAN Online reports wage impacts as labor income (employee compensation and proprietor income); therefore, direct wage impacts slightly vary from direct employee compensation inputs.

⁶² The negative construction impacts indicate a larger component of work-in-progress compared to work completed.

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