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The Section 45G Tax Credit and the Economic Contribution of the Short Line Railroad Industry

July 2018

Prepared for:

American Short Line and Regional Railroad Association

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Executive Summary

Industry Overview

The US short line and regional railroad industry ("short line industry") consists of the nation's smallest freight railroads by revenue, defined according to the US Surface Transportation Board as Class II or III railroads with freight revenue of less than $475.75 million in 2016. There are an estimated 603 short line railroads as of 2016. The average short line railroad employs fewer than 30 people and operates less than 79 route miles. Combined, short lines operate 47,500 route miles, or 29 percent of the nation's rail network, extending the reach of the rail network to rural communities, farmers, manufacturers, and other industries.[1] Short lines together with the seven Class I railroads (those with freight revenue of at least $475.75 million) constitute the US freight railroad industry.

Economic Contribution of the Industry

PwC estimates the short line industry directly provided 17,100 jobs in the United States in 2016, paying labor income of $1.1 billion, and adding $2.2 billion to the nation's GDP (see **Table E-1**). The short line industry's economic impact goes beyond its own employees and direct payroll and value added. Including the indirect effects resulting from suppliers to the industry and induced effects resulting from expenditures of labor income, the industry supported 61,070 jobs in 2016. Operational spending by the industry supported 33,730 indirect and induced jobs in 2016, while capital spending by the industry of $755 million supported 10,240 jobs. This indicates that each job in the short line industry supports an average of 2.6 additional indirect and induced jobs across the rest of the US economy (combined jobs to direct jobs multiplier of 3.6). Combined labor income amounted to $3.8 billion (labor income multiplier of 3.3) and value added amounted to $6.5 billion (value added multiplier of 2.9).

Table E-1. Direct, Indirect, and Induced Economic Impacts of the US Short Line Industry, 2016

Item	Direct Impacts	Indirect and Induced Impacts		Combined Impacts
		Operational Impacts	Capital Investment Impacts	
Employment*	17,100	33,730	10,240	61,070
Labor Income ($ millions)**	$1,129	$2,035	$616	$3,780
Value Added ($ millions)	$2,228	$3,373	$948	$6,549

Source: PwC calculations using the IMPLAN modeling system (2016 database).
Note: Details may not add to totals due to rounding.
* Employment is defined as the number of payroll and self-employed jobs, including part-time jobs.
** Labor income is defined as wages and salaries and benefits as well as proprietors' income.

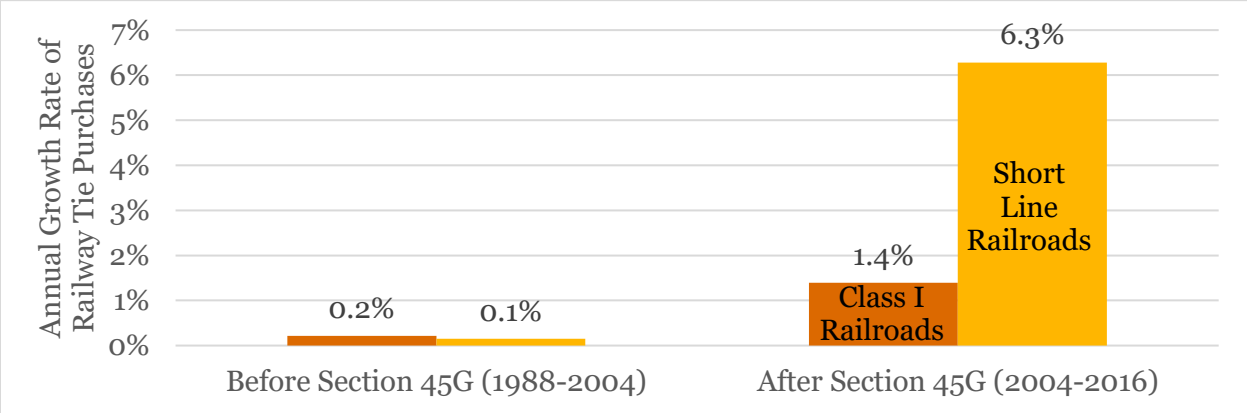
[1] American Short Line and Regional Railroad Association (ASLRRA), "Short Line and Regional Railroad Facts and Figures," 2017; Association of American Railroads (AAR) to ASLRRA, February 17, 2017, 2015 Short Line Railroad Industry Estimates.

In addition to the direct, indirect, and induced economic impacts, the short line industry impacts the US economy to the degree that other industries rely on the short line industry for transportation services. The three customer sectors most reliant on the short line industry are (1) mining, (2) manufacturing, and (3) agriculture. In total across the US economy, 0.51 percent of business inputs rely on transportation services provided by the short line industry, amounting to 478,820 jobs, $26.1 billion in labor income, and $56.2 billion in value added.

The Section 45G Tax Credit

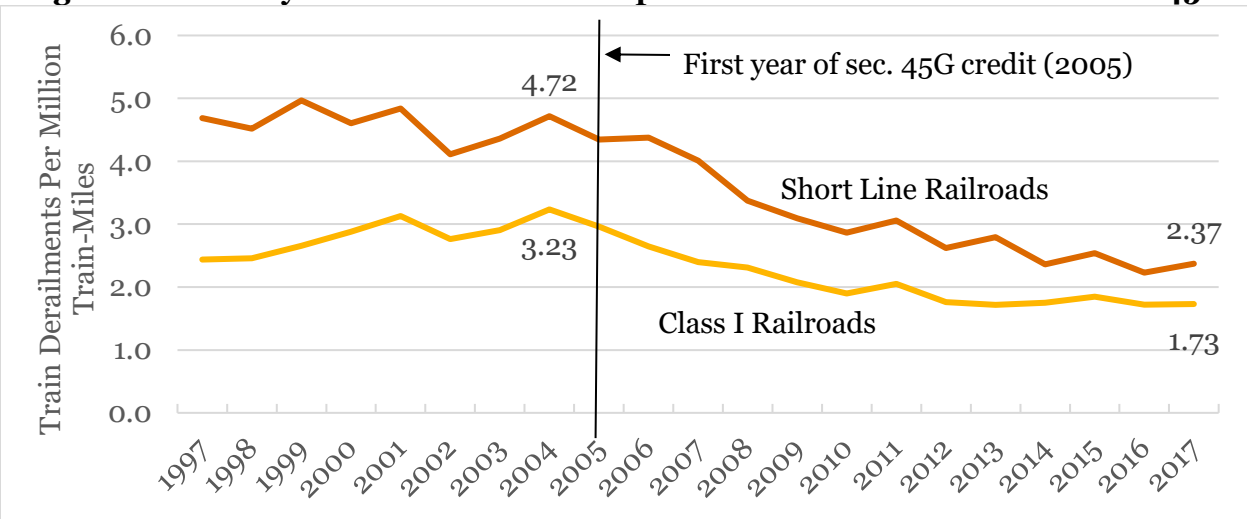
Since its enactment in 2004, the railroad track maintenance tax credit (Internal Revenue Code section 45G) has provided an important financial incentive to maintain and improve short line infrastructure. The result has been a marked increase in industry investment, as evidenced, for example, by industry purchases of railway ties, which have grown at an annual rate of 6.3 percent since enactment of the credit, compared to 0.1 percent before the credit (see **Figure E-1**). In addition, safety on short line railroads has improved since enactment of the credit. For example, train derailments on short line railroads have declined by 50 percent, from a rate of 4.72 per million train miles in 2004 to 2.37 in 2017 (see **Figure E-2**).

Figure E-1. Railway Tie Purchases have Increased since Enactment of Section 45G



Source: Railway Tie Association.

Figure E-2. Safety on Short Lines has Improved since Enactment of Section 45G



Source: Federal Railroad Administration.
Note: Class I data exclude Amtrak.

Standard cost of capital analysis indicates the section 45G credit provides strong incentives to invest in short line infrastructure.[2] For instance, for a corporate taxpayer making a break-even, or marginal, investment in short line track maintenance that is below the section 45G per mile cap, relative to current law in which the section 45G credit is expired, extending the section 45G credit reduces the user cost of capital by 63 percent. Empirical estimates of the responsiveness of investment to changes in the user cost of capital indicate that such a reduction in the user cost of capital is associated with a 47.3 percent increase in investment (see **Table E-2**).[3]

The same type of analysis indicates that for short line infrastructure investors the section 45G credit is a much more powerful incentive at the margin than the two main investment incentives provided in the Tax Cuts and Jobs Act (TCJA), i.e., the lower corporate tax rate and full expensing for equipment. Relative to 2017 law, the combination of the TCJA's two main incentives reduces the user cost of capital by 1.2 percent, which is associated with a 0.9 percent increase in investment.[4]

Table E-2. Impact of Section 45G Tax Credit and the Tax Cuts and Jobs Act (TCJA) on Cost of Capital and Investment for a Short Line Infrastructure Project

Tax Change	Change in Cost of Capital	Change in Investment
Section 45G Tax Credit	-63.0%	47.3%
TCJA (reduced corporate tax rate and expensing)	-1.2%	0.9%

[2] The user cost of capital is the real before-tax rate of return that a marginal (i.e., break-even) investment must earn to recover the cost of investment, pay taxes on business income, and pay an expected after-tax rate of return to investors that covers their opportunity cost.

[3] Kevin A. Hassett and R. Glenn Hubbard, "Tax Policy and Business Investment," in Handbook of Public Economics, Vol. 3, edited by Alan J. Auerbach and Martin Feldstein, pp. 1293–1343, 2002.

[4] Expensing under TCJA has relatively little effect on short line investment incentives because short line investors previously were permitted to expense 75 percent of track maintenance expenditures under a safe harbor provided by IRS Revenue Procedure 2002-65.

The Section 45G Tax Credit and the Economic Contribution of the Short Line Railroad Industry

I. Overview of the Industry

Number of Railroads, Revenue, and Employment

The US short line and regional railroad industry ("short line industry") consists of the nation's smallest freight railroads by revenue, defined according to the US Surface Transportation Board as Class II or III railroads with freight revenue of less than $475.75 million in 2016. There are an estimated 603 short line railroads as of 2016. The average short line railroad employs fewer than 30 people and operates less than 79 route miles.[5]

Short lines together with the seven Class I railroads (those with freight revenue of at least $475.75 million) constitute the US freight railroad industry. While short line railroads far outnumber Class I railroads, the vast majority of total railroad industry revenue is earned by Class 1 railroads (see **Figure 1**). Based on annual surveys by the Association of American Railroads (AAR), we estimate that total revenue earned by the short line industry was $3.76 billion in 2016 – an average of $6.24 million per railroad.[6] We estimate that total employment in the short line industry was 17,100 in 2016 – an average of 28 employees per railroad.[7]

[5] American Short Line and Regional Railroad Association (ASLRRA), "Short Line and Regional Railroad Facts and Figures," 2017; Association of American Railroads (AAR) to ASLRRA, February 17, 2017, 2015 Short Line Railroad Industry Estimates.

[6] Association of American Railroads, "Railroad Facts 2017 Edition," 2017. We used the AAR's last published estimate of revenue earned by the short line industry in 2012 and projected it forward using the AAR's estimated percent change in revenue for the Class I railroad industry. The revenues of Class I and short line railroads are highly correlated since they carry similar types of commodities. Short line industry revenues dropped approximately 8 percent in both 2015 and 2016, based on the revenue declines reported by Class I railroads, which are primarily attributable to declines in coal shipments. To the extent coal shipments on short line railroads have rebounded since 2016, short line industry revenue may have rebounded as well.

[7] Association of American Railroads, "Railroad Facts 2017 Edition," 2017. We used the AAR's last published estimate of employment in the short line industry in 2012 and projected it forward using the AAR's estimated percent change in employment for the overall railroad industry. This reflects an estimated drop in short line employment of approximately 9 percent in 2016, based on estimated employment declines for the entire railroad industry, which are primarily attributable to declines in coal shipments. Industry employment may have rebounded since 2016 to the extent coal shipments have rebounded.

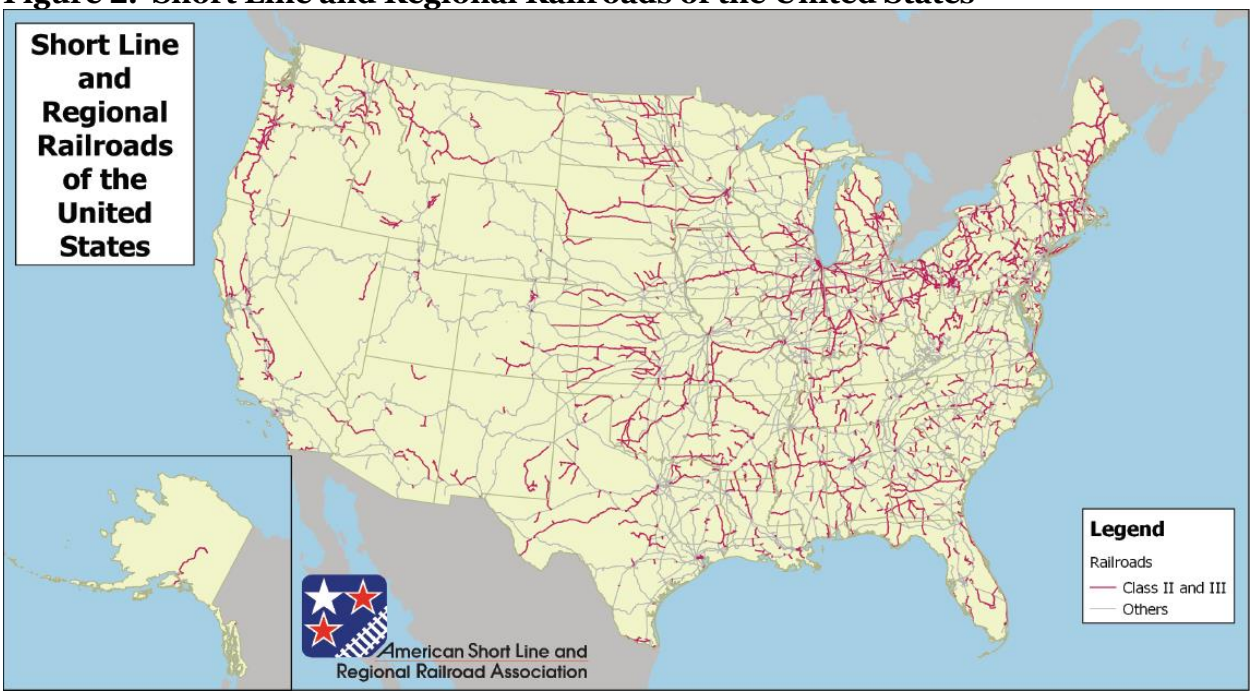
Figure 1. Comparison of Short Line and Class I Railroads

Source: ASLRRA, AAR, and PwC calculations using the IMPLAN modeling system (2016 database).

Rail Network and Relationship to Class I's

Short lines operate a total of 47,500 route miles, or 29 percent of the nation's rail network, extending the reach of the rail network to rural communities, farmers, manufacturers, and other industries (see **Figure 2**). In five states (Alaska, Maine, New Hampshire, Rhode Island, and Vermont), short lines provide the only freight rail service.[8]

Figure 2. Short Line and Regional Railroads of the United States

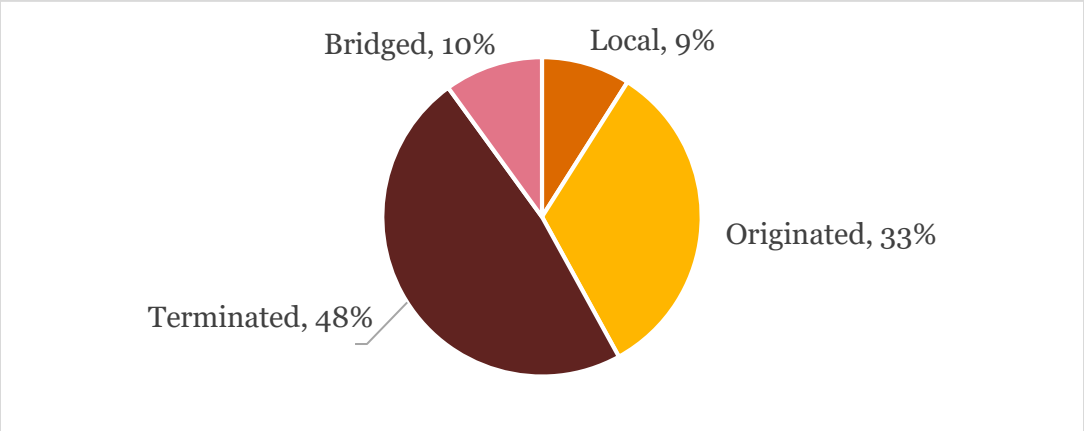


The vast majority of traffic on short lines (81 percent) either originates or terminates on short lines as part of a longer journey on Class I railroads or other modes of traffic (see **Figure 3**). A smaller share of traffic (10 percent) is transferred (bridged) from one Class I railroad to another

[8] Ibid. AAR estimates that total miles of track owned by short line railroads exceeds 47,500, including multiple main tracks, passing tracks, sidings, crossovers, turn-outs and switching tracks.

via short line, and the remainder (9 percent) is local traffic that is moved entirely by short line railroads. The average length of haul for short line railroads is 37.5 miles.[9]

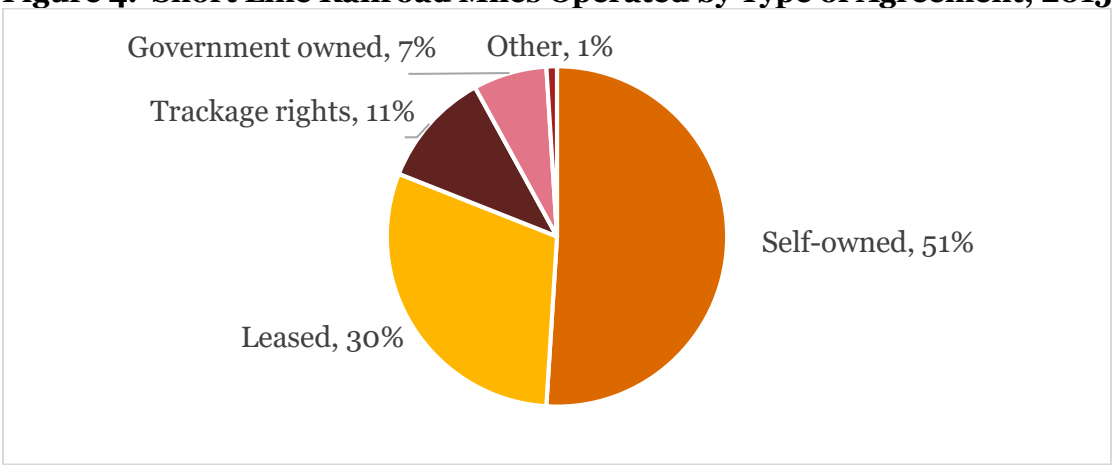
Figure 3. Carloads Moved on Short Line Railroads by Traffic Type, 2015



Source: 2016 ASLRRA Data Survey.

Short line railroads provide service under many types of agreements (see **Figure 4**). The majority (51 percent) of short line track miles are wholly-owned by short line railroads, while the remainder are either leased from Class I railroads and other entities (31 percent), owned by the government (7 percent), or made available via trackage rights or other interchange agreements (12 percent).

Figure 4. Short Line Railroad Miles Operated by Type of Agreement, 2015



Source: 2016 ASLRRA Data Survey.

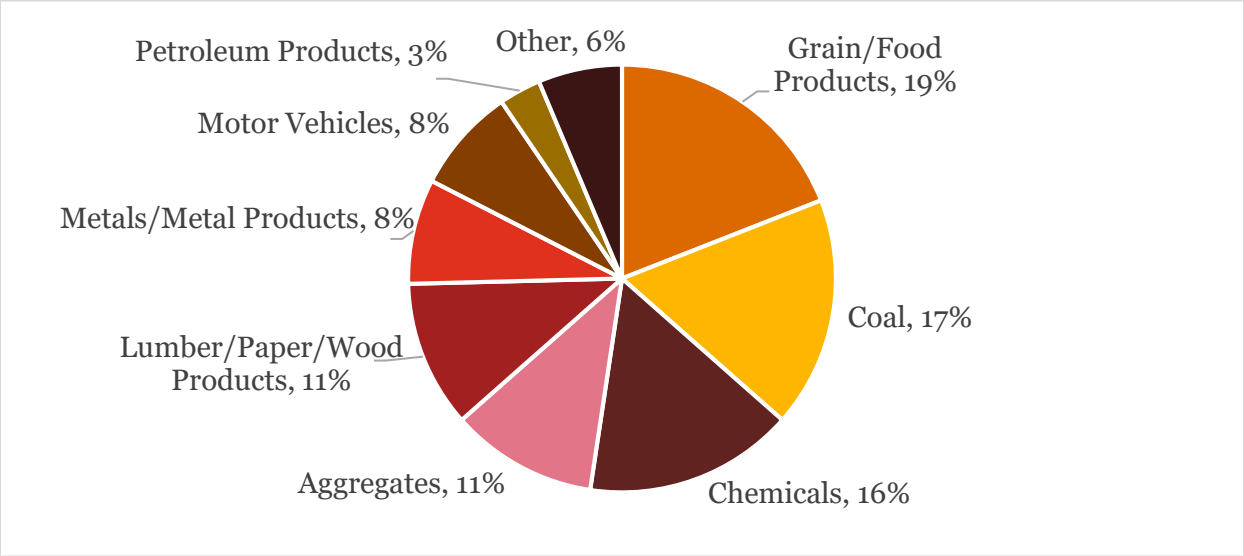
Commodities

Short line railroads move many types of commodities, and are typically more efficient than trucks for moving extremely heavy or bulky goods. Coal has historically been a major commodity shipped by rail, but as US coal production has declined precipitously in recent years so have shipments by rail, forcing short line railroads to diversify more into other

[9] ASLRRA, "Short Line and Regional Railroad Facts and Figures," 2017.

commodities.[10] As of 2015, grain and food products comprise the largest share of identified carloads moved by short lines (19 percent), followed by coal (17 percent), chemicals (16 percent), aggregates (11 percent), and lumber, paper and wood products (11 percent).[11] Class I railroads have a broadly similar distribution of carloads by commodity as compared to short line railroads, but with a heavier concentration in coal.[12]

Figure 5. Short Line Carloads by Commodity (where identified), 2015



Source: 2016 ASLRRA Data Survey.
Note: The unidentified category (not shown) consists of trailers/containers with miscellaneous goods.

[10] US coal production dropped 38 percent from 2008 to 2016, but is estimated to have increased 6 percent in 2017, according to the U.S. Energy Information Administration, available at https://www.eia.gov/todayinenergy/detail.php?id=34992#; ASLRRA, "Short Line and Regional Railroad Facts and Figures," 2017.
[11] Unidentified commodities consist of trailers/containers with miscellaneous goods.
[12] AAR, "Railroad Ten-Year Trends, 2006-2015," 2017.

II. Economic Contributions

Direct, Indirect, and Induced Impacts

The economic activity of the short line industry can be measured using three separate metrics: employment, labor income, and value added, as defined below.

- **Employment**: The number of payroll and self-employed jobs (including part-time jobs), averaged over the year.
- **Labor income**: The wages, salaries and benefits paid to employees and proprietors' income for the self-employed.
- **Value added**: The total output of each sector less the associated value of intermediate inputs. The sum of the value added across all sectors in the economy is GDP.[13] An industry's value added represents its contribution to GDP.

The short line industry's economic impact goes beyond its own employees and direct payroll and value added. The industry uses goods and services supplied by other industries to produce its own services, generating upstream employment, payroll, and value added. The employees of the short line industry and its supply chain spend their wages and salaries on goods and services generating additional (induced) economic activity. The combined economic impact of the short line industry includes direct, supply chain (indirect), and induced impacts:

- ***Direct effects*** include activities directly attributable to short line companies, such as the employees and value added of short line companies.
- ***Indirect effects*** include activities of the upstream supply chain to short line companies, including contractors and other companies providing inputs to short line companies and their immediate suppliers.
- ***Induced effects*** reflect spending by employees of short line companies and their suppliers. Employees throughout the short line industry's supply chain receive incomes associated with the direct and indirect activities, a portion of which will be consumed. This consumption causes additional economic activity attributable to the short line industry.

To quantify these linkages, we rely on the IMPLAN model, an input-output (I-O) model based on federal government data (see Appendix). The indirect and induced effects are determined separately for purchases of operating inputs (operational impact) and plant and equipment (investment impact).

As presented in **Table 1**, below, we estimate the short line industry directly provided 17,100 jobs in the United States in 2016, paying labor income of $1.1 billion, and adding $2.2 billion to the nation's GDP.

Combined, including the indirect and induced effects, the industry supported 61,070 jobs in 2016. Operational spending by the industry supported 33,730 indirect and induced jobs in 2016, while capital spending by the industry of $755 million supported 10,240 jobs. This indicates that each job in the short line industry supports an average of 2.6 additional indirect

[13] Value added differs from gross output (or sales) because it excludes the value of intermediate goods that are embedded in the final sales of each industry. The value of intermediate inputs could be counted multiple times if output of one segment of the short line industry serves as an input for another segment.

and induced jobs across the rest of the US economy (combined jobs to direct jobs multiplier of 3.6).

Combined labor income amounted to $3.8 billion and value added to $6.5 billion. Labor income and value added multipliers for the industry are 3.3 and 2.9, respectively.

Table 1. Direct, Indirect, and Induced Economic Impacts of the US Short Line Industry, 2016

Item	Direct Impacts	Indirect and Induced Impacts		Combined Impacts
		Operational Impacts	Capital Investment Impacts	
Employment*	17,100	33,730	10,240	61,070
Labor Income ($ millions)**	$1,129	$2,035	$616	$3,780
Value Added ($ millions)	$2,228	$3,373	$948	$6,549

Source: PwC calculations using the IMPLAN modeling system (2016 database).
Note: Details may not add to totals due to rounding.
* Employment is defined as the number of payroll and self-employed jobs, including part-time jobs.
** Labor income is defined as wages and salaries and benefits as well as proprietors' income.

Customer Impacts

In addition to the direct, indirect, and induced economic impacts, the short line industry impacts the US economy to the degree that other industries rely on the short line industry for transportation services. To quantify the degree of customer reliance on the short line industry, we estimate two alternative measures – inbound reliance and outbound reliance – representing two perspectives on the goods that are transported by short line railroads. Inbound reliance refers to the degree to which sectors rely on the short line industry for transportation of business inputs. Outbound reliance refers to the degree to which certain commodities are transported by short line railroads. More specifically:

- ***Inbound reliance*** includes the portion of a sector's economic activity reliant on the short line industry as measured by the sector's expenditures on short line rail transportation as a share of the sector's expenditures on all transportation.
- ***Outbound reliance*** includes the portion of US-produced commodities transported by short line railroads (measured by a combination of volume and value) as a share of all modes of transportation.

We use the IMPLAN model to estimate inbound customer reliance for all sectors (see Appendix). As shown in **Table 2**, the three sectors with the greatest inbound reliance on the short line industry are (1) mining, (2) manufacturing (including iron and steel manufacturing), and (3) agriculture.

In the mining sector, 1.63 percent of business inputs rely on transportation services provided by the short industry, amounting to 9,500 jobs, $895 million in labor income, and $2.2 billion in value added. In manufacturing, 1.11 percent of business inputs rely on transportation services provided by the short line industry, amounting to 106,650 jobs, $8.2 billion in labor income, and $16.9 billion in value added. In agriculture, 0.85 percent of business inputs rely on

transportation services provided by the short line industry, amounting to 26,760 jobs, $1.2 billion in labor income, and $1.6 billion in value added. In total across the US economy, 0.51 percent of business inputs rely on transportation services provided by the short line industry, amounting to 478,820 jobs, $26.1 billion in labor income, and $56.2 billion in value added.

Table 2. Inbound Customer Reliance on the US Short Line Industry, 2016

Sector	Short Line Share of Trans-portation Cost	Reliant Employ-ment*	Reliant Labor Income ($millions)**	Reliant Value Added ($millions)
Agriculture	0.85%	26,760	$1,192	$1,638
Mining	1.63%	9,500	$895	$2,249
Utilities	0.60%	3,400	$479	$1,581
Construction	0.40%	41,890	$2,330	$3,179
Manufacturing	1.11%	106,650	$8,238	$16,874
Wholesale and retail trade	0.02%	5,710	$270	$466
Transportation and warehousing	0.20%	11,950	$768	$1,050
Information	0.09%	5,410	$529	$1,607
Finance, insurance, real estate, rental and leasing	0.20%	64,980	$2,276	$16,866
Services	0.17%	195,090	$8,403	$9,932
Other	0.07%	7,470	$682	$736
Total	**0.51%**	**478,820**	**$26,062**	**$56,177**

Source: PwC calculations using the IMPLAN modeling system (2016 database).
Note: Details may not add to totals due to rounding.
* Employment is defined as the number of payroll and self-employed jobs, including part time jobs.
** Labor income is defined as wages and salaries and benefits as well as proprietors' income.

To estimate the outbound customer reliance on the short line industry, we use data published by the US Bureau of Transportation Statistics and US Census Bureau for 2012 and the AAR for 2016 indicating the share (by volume and value) of US-produced commodities that are shipped by rail. To determine the short line industry share, we then allocate the rail industry share between the short line industry and Class I railroads by revenue.[14]

Table 3 and **Table 4** show the results of this analysis for select commodities. As shown in **Table 3**, products reliant on rail transportation include: (1) coal, with 67.5 percent of the volume of all US-produced coal shipped by rail in 2016; (2) chemicals, with 26.2 percent of the volume of all US-produced chemicals shipped by rail in 2012; and (3) grain, with 22.9 percent of the volume of all US-produced grain shipped by rail in 2016. Across all US-produced commodities, in 2012, 5.1 percent of the value and 16.8 percent of the volume was shipped by rail.[15]

[14] While the revenue (and train miles) associated with rail transportation of many commodities may be largely attributable to Class I railroads, short line railroads often provide the first or last mile of service, or a bridge between Class I railroads (see Figure 3). In this sense, commodities shipped by rail are more dependent on short lines than indicated by the short line revenue share.
[15] The most recent Economic Census data published by the US Census Bureau is for 2012.

Table 3. Outbound Customer Reliance on the US Railroad Industry

Commodity Shipped by Rail	Year	Value of Shipments by Rail ($ millions)	Share of US production by value	Volume of Shipments (thousands of tons, unless otherwise noted)	Share of US production by volume
All commodities	2012	705,879	5.1%	1,897,921	16.8%
Coal	2012	29,028	63.2%	748,788	71.5%
Coal	2016	N/A	N/A	492,000	67.5%
Chemicals	2012	60,758	19.2%	90,087	26.2%
Grain	2016	N/A	N/A	5,300	22.9%

Source for 2012: US Bureau of Transportation Statistics and US Census Bureau, 2012 Economic Census, "Transportation - Commodity Flow Survey".
Source for 2016: AAR, "Railroad 10-Year Trends 2006-2015," June 2017.
Note: 2012 data includes a small portion that is transported by a combination of rail and other modes. Grain volume is in millions of bushels.

Based on the short line industry's share of freight rail revenue, 4.9 percent of all freight rail transportation costs were incurred on short-line rail transportation. Multiplying rail volume of each commodity by the short line industry's share of rail transportation costs provides an indication of the degree to which the short line industry is relied upon for transportation of these commodities: 3.3 percent of the volume of all US-produced coal in 2016, 1.3 percent of the volume of all US-produced chemicals in 2012, and 1.1 percent of the volume of all US-produced grain in 2016 (see **Table 4**).

Table 4. Outbound Customer Reliance on the US Short Line Industry

Commodity Shipped by Short Line Rail	Year	Value of Shipments by Short Line Rail ($ millions)	Share of US production by value	Volume of Shipments (thousands of tons, unless otherwise noted)	Share of US production by volume
All commodities	2012	34,306	0.2%	92,239	0.8%
Coal	2012	1,411	3.1%	36,391	3.5%
Coal	2016	N/A	N/A	23,911	3.3%
Chemicals	2012	2,953	0.9%	4,378	1.3%
Grain	2016	N/A	N/A	258	1.1%

Source for 2012: US Bureau of Transportation Statistics and US Census Bureau, 2012 Economic Census, "Transportation - Commodity Flow Survey"; PwC calculations.
Source for 2016: AAR, "Railroad 10-Year Trends 2006-2015," June 2017; PwC calculations.
Note: 2012 data includes a small portion that is transported by a combination of rail and other modes. Grain volume is in millions of bushels.

III. Section 45G Tax Credit

Since its enactment in 2004, the railroad track maintenance tax credit (IRC section 45G) has been an important factor for the industry, providing incentives to taxpayers to maintain and improve short line infrastructure.

Legislative History and Policy Rationale

The section 45G credit was initially introduced in October 2003 as a permanent tax credit by Sen. Gordon Smith (R-OR) in the Local Railroad Rehabilitation and Investment Act of 2003 (S. 1703). The bill was co-sponsored by Sen. Ron Wyden (D-OR) and 17 other Senators,[16] before being incorporated in a modified form in the Jumpstart Our Business Strength (JOBS) Act (S. 1637), passed by the Senate on May, 11, 2004. Following a House/Senate Conference, the legislation was included in the American Jobs Creation Act of 2004 (Public Law 108–357, enacted October 22, 2004), and effective for three years – taxable years beginning after December 31, 2004 and before January 1, 2008.

The provision has been extended six times, most recently by the Bipartisan Budget Act of 2018, which extended it retroactively through 2017. As indicated in **Table 5**, after the section 45G credit's initial enactment period of three years, the credit has been extended 10 additional years. Of those 10 years of extensions, approximately 5-1/2 years have represented periods the credit was extended retroactively; only 4-1/2 years represent periods the credit was extended prospectively. As a result, taxpayers have not always been able to count on the availability of the section 45G credit when making investment plans.

The original rationale for the provision upon introduction of S. 1703 by Sen. Smith and co-sponsors was threefold.[17] First, the bill's sponsors noted the critical role played by short lines in the nation's infrastructure, particularly in connecting farmers and small businesses in rural America to the larger rail network and providing an alternative to increasing truck traffic on local roads. Second, the bill's sponsors believed there was a need to create incentives for taxpayers to maintain short lines, many of which had been abandoned or poorly maintained as branch lines of Class I's before being spun-off to short line companies. Third, the bill's sponsors recognized the need for short lines to upgrade to accommodate the new Class I industry standard maximum car weight of 286,000 lbs. (up from 263,000 lbs.), which was estimated to require $7 billion in new investment. A number of studies at the time documented the large infrastructure needs of small railroads.[18]

[16] Co-sponsors of S. 1703 were Sen. Ron Wyden (D-OR), Sen. Sam Brownback (R-KS), Sen. Arlen Specter (R-PA), Sen. Conrad Burns (R-MT), Sen. Pat Roberts (R-KS), Sen. Richard Lugar (R-IN), Sen. Larry Craig (R-ID), Sen. Olympia Snowe (R-ME), Sen. Mark Pryor (D-AR), Sen. Thad Cochran (R-MS), Sen. Blanche Lincoln (D-AR), Sen. Evan Bayh (D-IN), Sen. Thomas Daschle (D-SD), Sen. Bill Nelson (D-FL), Sen. Charles Schumer (D-NY), Sen. Susan Collins (R-ME), Sen. Tim Johnson (D-SD), and Sen. Jim Talent (R-MO).

[17] Congressional Record, available at https://www.congress.gov/congressional-record/2003/10/02/senate-section/article/S12377-1.

[18] American Association of State Highway and Transportation Officials, "Freight-Rail Bottom Line Report," 2002; Upper Great Plains Transportation Institute, North Dakota State University, "Small Railroads – Investment Needs, Financial Options, and Public Benefits," 2002; ZETA-TECH Associates, Inc., "An Estimation of the Investment in Track and Structures Needed to Handle 286,000 lb. Rail Cars," 2000.

Table 5. Legislative History of the Railroad Track Maintenance Credit

Legislation	Effective Dates: Taxable Years beginning after and before	Total Years Covered	Retroactive Period	Prospective Period
Bipartisan Budget Act of 2018 (Public Law 115-123, enacted February 9, 2018)	12/31/2016-1/1/2018	1 year	12 months	None
Protecting Americans from Tax Hikes Act of 2015 (Public Law 114-113, enacted December 18, 2015)	12/31/2014-1/1/2017	2 years	11.5 months	12.5 months
Tax Increase Prevention Act of 2014 (Public Law 113-295, enacted December 19, 2014)	12/31/2013-1/1/2015	1 year	11.5 months	0.5 months
American Taxpayer Relief Act of 2012 (Public Law 112–240, enacted January 2, 2013)	12/31/2011-1/1/2014	2 years	12 months	12 months
Tax Relief, Unemployment Insurance Reauthorization, and Job Creation Act of 2010 (Public Law 111–312, enacted December 17, 2010)	12/31/2009-1/1/2012	2 years	11.5 months	12.5 months
Emergency Economic Stabilization Act of 2008 (Public Law 110-343, enacted October 3, 2008)	12/31/2007-1/1/2010	2 years	9 months	15 months
American Jobs Creation Act of 2004 (Public Law 108–357, enacted October 22, 2004)	12/31/04-1/1/2008	3 years	None	36 months

Capital Needs of the Industry

A more recent capital needs assessment by the Federal Railroad Administration (FRA) in 2014 finds that while short lines have made substantial progress in upgrading track (e.g., 57 percent of route-miles could handle the heavier cars as of 2010, up from 39 percent in 2002) substantial capital needs remain.[19] Based on industry surveys and interviews with bankers and other experts, the FRA estimated that as of 2013 the short line industry required $5.3 billion in investment to meet capital needs over the next 5 years, mainly due to infrastructure needs of $4.2 billion. The FRA estimated that only 69 percent of these needs would be met with available funding, primarily cash flow (73 percent of funding), as it is difficult for short line companies to access private market financing, particularly infrastructure loans.

How the Credit Works

The section 45G credit is a business tax credit allowed for 50 percent of qualified railroad track maintenance expenditures paid or incurred in a taxable year by an eligible taxpayer. Qualified railroad track maintenance expenditures are gross expenditures for maintaining railroad track

[19] Federal Railroad Administration, "Summary of Class II and Class III Railroad Capital Needs and Funding Sources," October 2014.

(including rail, ties, bridges, signals, crossings, tunnels, roadbed, etc.) owned or leased as of January 1, 2015 by a Class II or Class III railroad.

The credit is limited to the product of $3,500 times the number of miles of railroad track owned, leased, or assigned to the eligible taxpayer as of the close of its taxable year. The credit is assignable to any eligible taxpayer who makes qualified expenditures. An eligible taxpayer is (1) any Class II or Class III railroad and (2) any person that transports property using the rail facilities of a Class II or Class III railroad or that furnishes railroad-related property or services to such person.

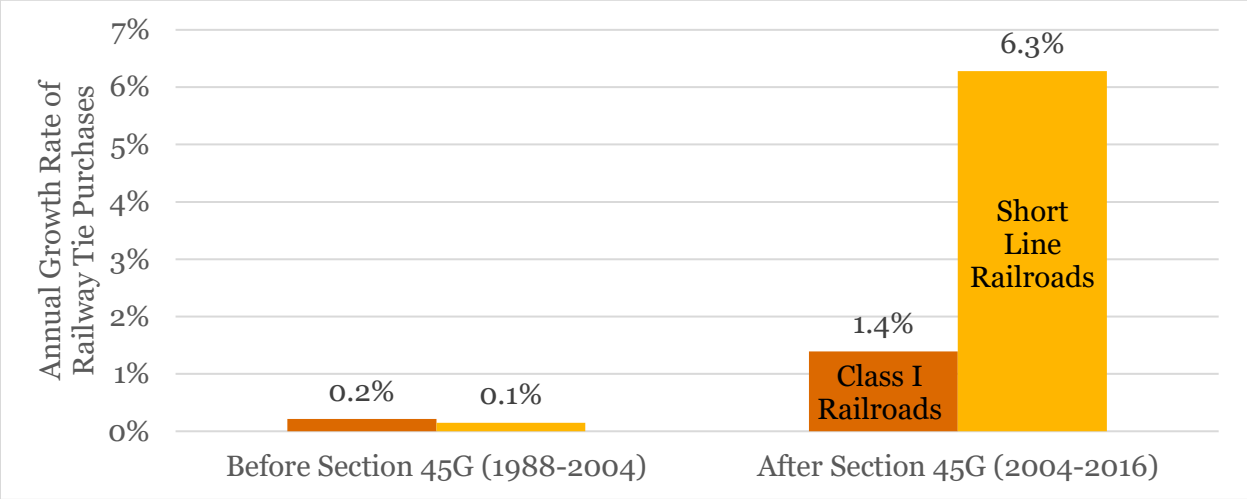
Effectiveness

The most recent IRS Statistics of Income (SOI) data indicate that $241 million in section 45G tax credits were tentatively claimed in 2013, $171 million of which was by C corporations and the remainder by individuals.[20] This indicates that the section 45G tax credit supported approximately $482 million of short line infrastructure investment in 2013, or roughly half the industry's estimated $1 billion of expenditures for capital and track maintenance in that year.[21]

A major portion of short line infrastructure expense is the purchase and installation of railway ties.[22] According to data provided by the Railway Tie Association (RTA), since enactment of the section 45G credit in 2004, railway tie purchases by the short line industry have grown at an annual rate of 6.3 percent over the period 2004-2016, compared to an annual rate of growth of 0.1 percent over the period 1988-2004 (see **Figure 6**). Purchases of ties by Class I railroads also increased, but by a much smaller amount, from an annual rate of 0.2 percent before the credit to 1.4 percent after the credit. After controlling through statistical analysis for various factors that normally predict railway tie purchases, RTA finds that approximately 1 million railway tie purchases annually by the short line industry are attributable to the section 45G tax credit – a 23 percent increase over the average of annual purchases for the period 1988-2016.[23] Given the $50 average cost of treated ties, this amounts to an annual increase in purchases of $50 million.[24]

[20] Due to limitations on general business tax credits, which include the section 45G credit, approximately one-third of tentative credits are claimed in a typical tax year.
[21] Surveys by the ASLRRA and AAR indicate that the short line industry's revenue in 2013 was approximately $4.2 billion, and expenditures for capital and maintenance of way are approximately 24 percent of revenue. See, ASLRRA, "Short Line and Regional Railroad Facts and Figures," 2017.
[22] Based on data provided by the Railway Tie Association on the number of ties purchased by the short line industry and the average cost of treated ties (approximately $50), the short line industry spent approximately $366 million on treated ties in 2013, and $404 million in 2016. Installation costs incurred by the industry are in addition to these expenditures.
[23] Fred Norrell, "An Inquiry into the Effect of Tax Credits on Crosstie Purchases," Railway Tie Association, March 28, 2018.
[24] Data provided by the Railway Tie Association. Excludes the cost of installation.

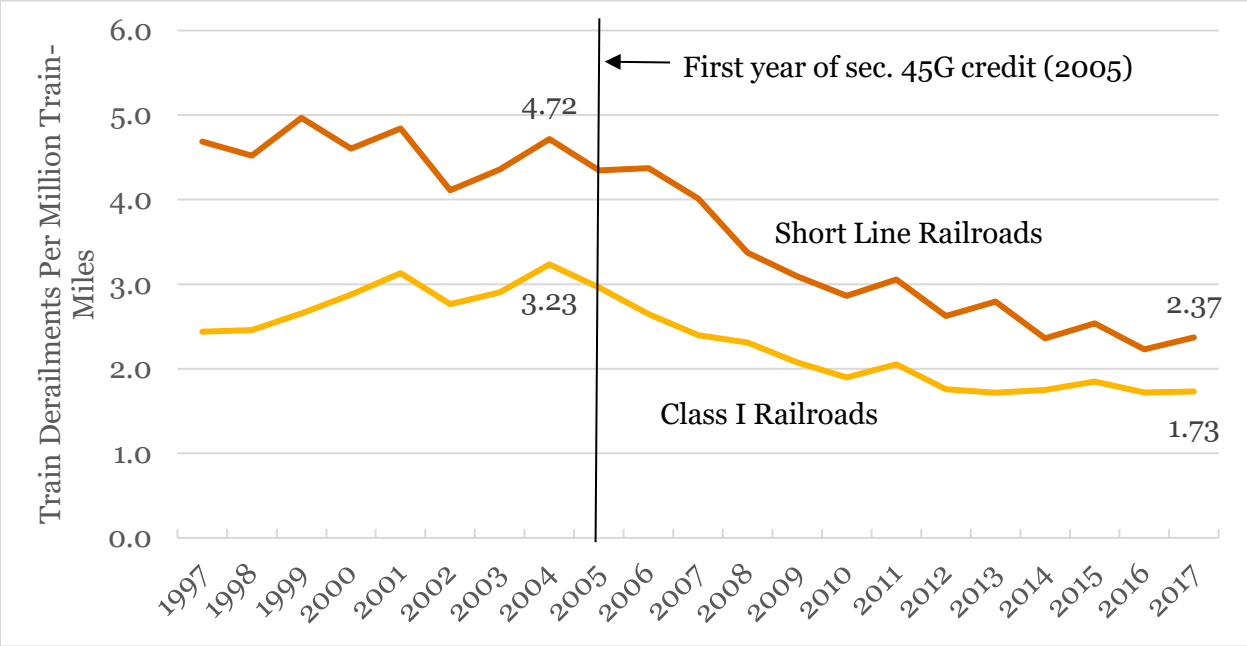
Figure 6. Railway Tie Purchases have Increased since Enactment of Section 45G



Source: Railway Tie Association.

One indicator of the quality of short line infrastructure investment is the industry's improved safety record. Since enactment of the 45G credit in 2004, train derailments on short line rails have declined by 50 percent, from a rate of 4.72 per million train miles in 2004 to 2.37 in 2017 (see **Figure 7**). Short line railroad safety performance is now approaching that of the longer haul Class I railroads and has improved at a faster rate than Class I railroads over the period the 45G credit has been in existence.

Figure 7. Safety on Short Lines has Improved since Enactment of Section 45G



Source: Federal Railroad Administration.
Note: Class I data exclude Amtrak.

Investment Incentives

Standard cost of capital analysis also indicates the section 45G credit provides strong incentives to invest in short line infrastructure.[25] For instance, consider the case of a break-even, or marginal, investment in short line track maintenance that is below the section 45G per mile cap (i.e., an investment of less than $7,000 per track mile), such that the credit has maximum effect on investment incentives (i.e., the credit is fully utilized, either directly or through assignment to another taxpayer).[26] In this case, the section 45G credit reduces the user cost of capital by 63 percent.[27] Empirical estimates of the responsiveness of investment to changes in the user cost of capital indicate that such a reduction in the user cost of capital is associated with a 47.3 percent increase in investment (see **Table 6**).[28]

The same type of analysis indicates that for short line infrastructure investors the section 45G credit is a much more powerful incentive at the margin than the two major incentives contained in the Tax Cuts and Jobs Act (TCJA), namely:

1. The lower federal corporate income tax rate (21 percent in 2018, down from 35 percent in 2017).
2. 100-percent expensing for equipment in 2018 (up from 50-percent expensing, a.k.a. bonus depreciation, in 2017).

For instance, for a corporate taxpayer making a marginal investment in short line track maintenance, relative to 2017 law, the combination of the TCJA's lower corporate tax rate and expensing for equipment reduces the user cost of capital by 1.2 percent, which is associated with a 0.9 percent increase in investment. Expensing has relatively little effect on short line investment incentives because short line investors previously were permitted to expense 75 percent of track maintenance expenditures under a safe harbor provided by IRS Revenue Procedure 2002-65.

Table 6. Impact of Section 45G Tax Credit and the Tax Cuts and Jobs Act (TCJA) on Cost of Capital and Investment for a Short Line Infrastructure Project

Tax Change	Change in Cost of Capital	Change in Investment
Section 45G Tax Credit	-63.0%	47.3%
TCJA (reduced corporate tax rate and expensing)	-1.2%	0.9%

[25] The user cost of capital is the real before-tax rate of return that a marginal (i.e., break-even) investment must earn to recover the cost of investment, pay taxes on business income, and pay an expected after-tax rate of return to investors that covers their opportunity cost. Further details on the calculations are provided in the appendix.

[26] There is zero effect on marginal incentives for taxpayers above the section 45G cap. It is not known what percentage of taxpayers have expenditures in excess of the cap.

[27] The section 45G credit may reduce the user cost of capital at the time an investment is made by a lesser amount under certain circumstances, including (1) for investments of more than $7,000 per track mile, (2) investments made in periods in which the credit was not yet extended (even if extended retroactively), and (3) investments by taxpayers who have difficulties in utilizing or assigning the credit.

[28] We used a consensus of empirical estimates of the elasticity of investment with respect to the cost of capital (-0.75), which is for all business investment, not just railroad infrastructure investment. See, Kevin A. Hassett and R. Glenn Hubbard, "Tax Policy and Business Investment," in Handbook of Public Economics, Vol. 3, edited by Alan J. Auerbach and Martin Feldstein, pp. 1293–1343, 2002.

Current Legislation

The section 45G credit expired on December 31, 2017. Bills have been introduced in both the House and Senate to extend the credit on a permanent basis. The House bill (H.R. 721 - Building Rail Access for Customers and the Economy Act) was introduced on January 30, 2017 by Rep. Lynn Jenkins (R-KS) and originally co-sponsored by Rep. Earl Blumenauer (D-OR), Rep. Rodney Davis (R-IL), and Rep. Daniel Lipinski (D-IL). As of June 29, 2018, the House bill had 261 co-sponsors. The Senate bill (S. 407) was introduced on February 16, 2017 by Sen. Mike Crapo (R-ID) and originally co-sponsored by Sen. Debbie Stabenow (D-MI), Sen. James Inhofe (R-OK), Sen. Ron Wyden (D-OR), Sen. Jerry Moran (R-KS), Sen. Charles Schumer (D-NY), Sen. Roger Wicker (R-MS), Sen. Robert Casey (D-PA), Sen. Pat Roberts (R-KS), Sen. Richard Blumenthal (D-CT), Sen. Johnny Isakson (R-GA), Sen. Dean Heller (R-NV), and Sen. John Thune (R-SD). As of June 29, 2018, the Senate bill had 56 co-sponsors.

Appendix: Methodology

Economic Impact Modeling

We used estimated short line industry revenues and the IMPLAN model to calculate the economic impacts of the US short line industry.[29] IMPLAN is a modeling system developed for estimating economic impacts and is similar to the Regional Input-Output Modeling System developed by the US Department of Commerce. The model is primarily based on government data sources.

IMPLAN is built around an "input-output" table that relates the purchases that each industry has made from other industries to the value of the output of each industry. To meet the demand for goods and services from an industry, purchases are made in other industries according to the patterns recorded in the input-output table. These purchases in turn spark still more purchases by the industry's suppliers, and so on. Additionally, employees and business owners make personal purchases out of the additional income that is generated by this process, further increasing demand that ripples through the economy. Multipliers describe these iterations.

Economic multipliers are often used to measure the overall change in production that would result from a marginal increase in a particular industry. For example, a value added multiplier converts a $1 million increase in output of the short line industry into the total change in value added throughout the supply chain. Because some suppliers of US short line companies might use short line rail service, a marginal change in the short line industry could lead to an additional change in short line activity attributable to the services it provides its suppliers throughout the economy.

While this impact is appropriate to include when modeling a marginal change, when evaluating the overall impact of the industry these indirect, own-industry impacts should be excluded to prevent double-counting. Therefore, we have adjusted the IMPLAN model results to exclude any indirect or induced effects taking place within the short line industry.

Economic impacts are reported at 2016 levels.

Inbound Customer Reliance

To illustrate our methodology for estimating inbound customer reliance, **Table A-1** provides a detailed calculation for the iron and steel manufacturing industry (a subset of the manufacturing industry shown in **Table 2**). The iron and steel manufacturing industry had 90,940 employees in 2016. Each job in this sector can be viewed as reliant on transportation services of coal and other inputs purchased by iron and steel manufacturers. These manufacturers spent $8.4 billion on transportation services of inputs (shipments in the final stage of transport), of which $5.0 billion was for rail transportation. Based on the short line industry's share of the entire rail industry's revenue (4.9 percent), we estimate that iron and steel manufacturers spent $241 million on short line transportation in 2016, or 2.9 percent of the transportation costs of iron and steel manufacturers. As such, we estimate that 2.9 percent of iron and steel manufacturing employment relies on transportation services provided by the short line industry, amounting to 2,620 jobs.

[29] IMPLAN is a product of IMPLAN Group, Inc.

Table A-1. Methodology for Estimating Inbound Customer Reliance on the US Short Line Industry, Iron and Steel Manufacturing Industry as Customer, 2016

Employment*	Total Transportation Cost ($millions)	Railroad Cost ($millions)	Short Line Cost ($millions)	Short Line Share of Transportation Cost	Jobs Reliant on the Short Line Industry
90,940	$8,371	$4,963	$241	2.9%	2,620

Source: PwC calculations using the IMPLAN modeling system (2016 database).
Note: Details may not add to totals due to rounding.
* Employment is defined as the number of payroll and self-employed jobs, including part time jobs.

Cost of Capital Analysis

The user cost of capital is the real before-tax rate of return that a marginal investment must earn to recover the cost of investment, pay taxes on business income, and pay an expected after-tax rate of return to investors that covers their opportunity cost. We calculated the user cost of capital for a marginal, equity-financed investment in short line infrastructure by a corporate investor, following the standard methodology used, for example, by the US Treasury Department and the European Commission.[30] We accounted for the US corporate tax rate (inclusive of the average state corporate income tax), bonus depreciation for equipment, and the section 45G tax credit, assuming that the taxpayer is not subject to the section 45G per mile cap.[31] We excluded all other taxes, such as shareholder taxes and property taxes.

Data for US corporate income tax rates come from the OECD database.[32] The US combined statutory tax rate for 2017, assuming an average state corporate income tax rate of 6.01 percent, is calculated to be 37.58 percent. Under 2018 law, we held the average state corporate income tax rate constant at its 2017 value, and compute the US combined statutory tax rate to be 25.75 percent.

Following IRS Revenue Procedure 2002-65, we assumed that 75 percent of the infrastructure investment is expensed (under both 2017 and 2018 law). The remaining 25 percent we assumed is railroad track with a 7-year MACRS recovery period (double declining balance with a switch to straight line); we account for the half-year convention for the year placed in service as well as 50 percent bonus depreciation in 2017 and expensing in 2018.

We assumed a real interest rate of 5 percent and inflation of 2 percent.

[30] See, for example, US Treasury Department, "Effective Tax Rate Model," July 2014, available at https://www.treasury.gov/resource-center/tax-policy/tax-analysis/Documents/New-Investment-Rates-Methodology.pdf; James B. Mackie III, "Unfinished Business of the 1986 Tax Reform," *National Tax Journal*, June 2002; Christoph Spengel, Frank Schmidt, Jost Heckemeyer, and Katharina Nicolay, "Effective Tax Levels using the Devereux/Griffith Methodology: Final Report 2016," Project for the EU Commission TAXUD/2013/CC/120, Centre for Economic Research (ZEW), October 2016, available at http://www.zew.de/en/publikationen/effective-tax-levels-using-the-devereuxgriffith-methodology-final-report-2016/?cHash=cd1beff16840b2d302fd63720247e358.
[31] Because a majority of the section 45G credits are claimed by C corporations, we modeled the corporate income tax rather than the individual income tax that applies to pass-through business entity income.
[32] The OECD database is available at http://www.oecd.org/tax/tax-policy/tax-database.htm.

Based on these parameters we computed the percentage change in the cost of capital under the assumed change in tax law.[33] Lastly, we translated the estimated change in the user cost of capital into an estimated change in investment using a consensus of empirical estimates of the elasticity of investment with respect to the cost of capital (-0.75).[34] This elasticity implies that a 10 percent reduction in the cost of capital will increase investment by 7.5 percent.

[33] The percentage change in the cost of capital reported in Section III is independent of the asset's economic depreciation rate.

[34] Kevin A. Hassett and R. Glenn Hubbard, "Tax Policy and Business Investment," in Handbook of Public Economics, Vol. 3, edited by Alan J. Auerbach and Martin Feldstein, pp. 1293–1343, 2002.