Economic Benefits of Housatonic Railroad Passenger Service

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0. Summary of findings

The Housatonic Railroad is considering a proposed extension of passenger rail service that would connect with the Metro North Railroad south and west of Danbury, Connecticut, and extend north through parts of Fairfield and Litchfield County, Connecticut and then onwards to Pittsfield, Massachusetts.

The proposed rail passenger service would provide important benefits to the region. These include:

- Increased total economic output in the region. The increase during the first decade of the project would total in excess of $625 million dollars additional goods and services produced and sold in the region.
- This increase in economic activity in the region would bring an average of 610 new jobs to the region (with a maximum of 733 jobs during the initial construction and upgrade of the railroad)
- The increase in economic activity in the region would provide Connecticut and Massachusetts state governments, and local governments in the region with nearly $29.5 million in additional tax revenues during the first decade of the project
- During the first decade the affected region would provide the federal government with an additional $55 million in tax revenues
- The value of residential properties located relatively close to (within a few miles of) the passenger stations for the railroad would increase modestly, generating at least $310 million in additional wealth for property owners, and possibly as much as $619 million. Because these impacts will be spread along the entire region, these changes are not expected to generate significant changes in broad land use patterns (although there may be some changes very near the stations)
- The availability of passenger rail service and anticipated levels of demand will reduce automobile traffic on local and regional roadways, saving nearly $1.4 million during the first decade of the project.
- The availability of passenger rail service and anticipated levels of demand will reduce fatal automobile accidents, saving the lives of an expected 8 persons during the first decade of the project and reducing associated costs of fatal accidents by $7.2 million during the first decade of the project.
- Passenger rail service has much lower impact on the climate than private automobile travel. The availability of passenger rail service, along with the expected levels of utilization of the service, would reduce global warming and result in a reduction of global mean temperature of 2.2×10^{-7} degrees Celsius.

All of these benefits are calculated using the best available data and making use of methods of analysis that are accepted and explained in the body of the report. While the study does not undertake a complete evaluation of the costs of the project, the benefits would seem to be significant and relatively large when compared with the general range of cost estimates for the project. In that sense the analysis contained here might serve to inform public discussion of the project and help to identify areas and incentives for public-private collaboration.

Naturally, there are important benefits that are difficult to quantify and as a result are excluded from the analysis reported here. Perhaps the most important is to promote the continued transformation of the local economy from one that is stagnant or even declining towards one that is stable or growing in a sustainable fashion. Such a prospect seems entirely possible should events proceed to make the proposed rail service a reality.

1. Introduction

The Housatonic Railroad began operations in 1836. In 1892 the railroad was purchased by the New York, New Haven & Hartford Railroad. That railroad ceased passenger operations in 1971, along with most of the private passenger rail operators in the US. In 1983 a freight operation from Canaan to New Milford, Connecticut began again using the old name of Housatonic Railroad, and these operations expanded north to Pittsfield, Massachusetts in 1991 and south to Danbury, Connecticut in 1992, including an east-west line that runs from Beacon, New York to Derby, Connecticut. Today the railroad operates 161 miles of rail lines devoted to freight transportation.

In 2010 the Railroad management commissioned a study from Market Street Research in Northampton, Massachusetts. This study sought to evaluate the potential for developing a passenger rail service that would connect from existing Metro North Railroad services connecting Grand Central Station in New York City along lines extending both to Brewster, New York (on Metro North's Harlem line) and to Danbury (an extension of Metro North's New Haven line). The proposed service would run north of Danbury, Connecticut along existing Housatonic Railroad tracks through Canaan and continue to provide service to popular destinations in Berkshire County, Massachusetts as far north as Pittsfield.

The Market Street Research study, completed in August 2010, provided estimates of projected ridership of the proposed service based on online surveys of residents in New York City, Berkshire County and northwest Connecticut. The vast majority of respondents were from New York City, and only respondents who had traveled to Berkshire County or northwest Connecticut were counted in the analysis. By considering only New York City (rather than the broader New York metro area) residents, and restricting attention only to those who had actually traveled to the region served by the proposed passenger rail service during the past year, the study provides a conservative estimate of the potential ridership that could be attracted to the proposed passenger rail service. In addition to those passengers that might be attracted from amongst the survey population, some passengers would almost surely be attracted from the broader region – particularly from Westchester County through which the connecting Metro North lines run. In addition, there would seem to be considerable potential to develop passenger demand for travel to the region amongst those in New York who have not been traveling to the region on an annual basis (and who would therefore have been excluded from the survey population).

While the Market Street analysis does not estimate the projected passenger demand at specific fare levels, it does evaluate general interest in train travel to the region and specifically considers interest in rail travel whose cost levels are within given percentages of the cost of currently used modes of transportation (generally private automobile). The analysis also provides information on the expected means of travel within the destination region during a visit. Overall, the results of this analysis are encouraging. There is strong interest in and broad acceptance of rail transportation as a travel mode between the region (which we might call the "Housatonic Corridor") and New York City. Combining those trips with a northbound origin (mostly coming from New York City) and a southbound origin (commuters from Connecticut communities and some travel demand from both Berkshire County and northwestern Connecticut to New York), the study concludes that annual one-way ticket demand for the system would range between 1.59 million and 2.41 million per year, with summer traffic being the seasonal peak (about 60% greater than winter traffic).

While this report does not undertake a specific evaluation of these estimates, the estimates of potential ridership are quite plausible. To understand why, remember that the demand for rail transportation will come from a variety of sources, including local business, family travel, long distance commuting to New York, and travel to visit the region's

travel destinations (ranked among the world's best). Consider the following "back of the envelope" calculations. Tourist travel to the region is estimated to be approximately 2.5 million visitor days to Berkshire County and over 1 million visitor days to northwest Connecticut. Based on analysis of travel to Berkshire County cultural destinations, approximately 37% of these visitors come from New York City. This suggests about 1.3 million visitor days from New York which could generate 2.6 million one way journeys by all travel modes combined. According to the Market Street survey research, about 57% of northbound survey-respondents own automobiles, so that 43% of those currently traveling to the region must either rent a car, come by bus, or some combination of rail, bus and taxi. This provides a potential of 1.12 million one-way journeys from New York City to the region from existing tourists who do not own automobiles. Combining these with commuters from the southern portion of the service area, and travel for other purposes suggests that the Market Street estimates are certainly plausible.

For these potential passengers to choose to use the service stations must be constructed or upgraded, track improvements must be made so that travel speeds can be acceptably rapid, and local transport infrastructure – whether in the form of available rental cars, privately operated vans or public transport systems – must be developed. Part of the incentive to undertake these developments and investments will be the economic and environmental benefits that can be derived from the proposed passenger service. It is the goal of this report to provide estimates of these benefits.

In preparing the analysis we have not sought to refine or test the estimated levels of passenger demand or how demand levels affect viability of the service. We have worked with cost and expenditure estimates that have been provided by the Housatonic Railroad, and used these figures to provide estimates of the impact on local employment and output, tourism and other impacts that can be expected if the project moves ahead. The result is a detailed and reasonably complete measure of the benefits associated with the proposed passenger service.

2. Approach and methods of analysis

The analysis presented in this report focuses on five different types of impact on the local economy that can be expected from a major transportation investment such as the proposed service from the Housatonic Railroad. These are first, the stimulus to the local economy that comes from the production of the transportation service itself. Second, the change in federal, state and local tax collections that can be expected to result from the change in the local economy. Third, the impacts on tourism and tourist travel to the region, with consequent impacts on local output, employment and public resources. Fourth, the impact on the values of residential property and levels of house construction that can be attributed to the improved transportation infrastructure. Finally the shared environmental benefits that can be expected to result from the proposed passenger service. In this section we provide a brief overview of the methods used to evaluate each of these impacts on the local economy.

a. Inter-industry models to measure changes in output and employment

Our analysis of the changes in output and employment is undertaken in the context of an extensive inter-industry model of the economy of the region. These models have been widely used in economic analysis and planning at the local, state and national levels for decades. In addition to the capital improvement and operating cost data provided to us by the railroad, our models make use of data that are collected periodically by the US Department of Commerce's Bureau of Economic Analysis for their system of Regional Economic Accounts and County Business Pattern reports. These data record, at the county level, the pattern of purchases and sales between firms in each industrial sector and organizations in other economic sectors, as well as between each sector and households or firms and organizations that are outside of the local area. Finally, we make use of data on employment in each sector at the zip-code level that are collected by the

Bureau of Labor Statistics. These data are used both to make inferences about the employment impacts resulting from changes in output levels in each sector as well as to disaggregate the county-level BEA data down to the more local zip code level. These data and the other values used to parameterize the model have been obtained from the Minnesota Implan Group, who provide imputations for geographic areas smaller than counties and package the data in a format convenient for computer use with their software.

We have constructed customized models for several economic regions in preparing this report. The geographic extent of the regions is discussed in the following section. The economic models present the local economy as consisting of 440 different sectors in the local region, ranging from vegetable farms to scientific research and development. Firms and organizations in each of these sectors sell to and purchase from each other. We also model local households who supply some factors of production such as labor to local producers, and use their income to purchase goods and services from both local producers and from firms and organizations outside of the region. The firms and organizations in each sector of the local economy will purchase some inputs from outside of the region in addition to local purchases, and these "imports" will tend to limit the expansion of the local economy in response to any stimulus.

Once the model is complete, we can evaluate the impact of a change in the economy by introducing a change in the total activity level of one or more of the sectors. Thus to represent operations of the passenger rail service we increase the output level of the sector (Transit and ground passenger transportation) in which that industrial activity is categorized. This increase in local output is called the "direct impact" of the project. We then use the model to compute the pattern of increased purchases of goods and services from local suppliers (such as office supplies or electricity) and the resulting increases in their activity levels. These changes are called "indirect impacts". Many of these changes will result in increased levels of local household earnings, and local households will spend this income on many different goods and services. These changes are called the "induced impacts". The model calculates the final result after all of the rounds of buying and selling have completed and combines them to obtain the total impact as well as amounts for each type of impact.

Finally, employment data are used to provide estimates of the change in total employment that can be expected to result from the changes in output levels in each sector. In appendix tables we present estimates of the impacts on output and employment disaggregated for each of the affected sectors. About 317 of the 440 sectors are estimated to experience some impact on output resulting from the passenger service. A somewhat smaller number of sectors can be expected to experience a measurable change in employment levels.

b. Impact on public sector revenues

The County Business Pattern data do not contain complete information on payments to the public sector, but data from the Annual Survey of Government Employment do contain information at the county level about public sector employment. In addition, the Census of Employment and Wages contains information on employment and the relative size of the public sector in local areas. These data are used, along with the regional accounts data from the County Business Patterns, to estimate the flows of direct and indirect taxes paid by businesses and households to federal, state and local governments. These estimates are proportional to the levels of activity (in the case of firms and organizations in the individual economic sectors) and to income and consumption (in the case of households). Essentially, then, public sector revenue impacts are derived using similar data and in the context of the inter-industry model used to estimate output and employment effects.

After estimating the changes in output and employment that can be expected from the proposed passenger railroad, we use the estimated tax payment factors to obtain projections of the change in federal and combined state and local tax revenues collected.

While in and of themselves such payments may not constitute a "benefit" of the proposed passenger rail service, the change in public sector revenues provides important information about how the general economic benefits of the proposal are distributed amongst the various segments of the economy. The analysis also provides an important variable for policy analysis. If the public sector wants to consider accommodating or facilitating the proposed passenger rail service, it seems natural that decision makers will want to know what additional revenues might be available to the public sector should the project go forward.

c. Impact on tourism

As noted above, the region that would be served by the proposed passenger rail service is well-known as a travel destination. In a 2009 survey of over 400 of travel experts, the *National Geographic Traveler* ranked the Berkshires among the top 15 travel destinations in the world (of 133 places covered in the survey)[2]. Based on analysis of hotel tax receipts, the Berkshire Visitors Bureau estimates that approximately 2.5 million visitor-days are spent in the county each year. Assuming that employment and output in the hospitality sector are similar in northwestern Connecticut to the values observed in Berkshire County, we estimate approximately 1.04 million visitor days in the Connecticut portion of the proposed rail service area. Tourism is an important sector for the region, and the impact of the railroad passenger service on the tourism sector should be considered as a source of economic benefit for the region.

There is very little available research on the sensitivity of tourist travel to changes in travel costs. One such study has been completed using data from the Berkshire region[3]. This study indicates that the "elasticity" of cultural tourism with respect to travel costs is between -0.15 and -0.35. We use an average value of -0.20, which implies that doubling the cost of transportation will result in a 20% drop in tourist travel to the region.

We estimate the change in travel costs that would take place if the passenger service exists at the fare structure currently anticipated, compared to the costs of motor vehicle travel obtained from the AAA[4] and adapted to reflect the more plausible cost of gasoline of $4 per gallon rather than the $2.88 per gallon used in the AAA guide. The resulting change in travel costs and the sensitivity of tourist travel to these costs provides an estimate of the change in the number of tourists traveling to the region.

When these additional tourists come to the region, the economic impact they generate depends on how much is spent on average during the trip. We use survey data collected on visitors to the region in 2008 as part of a study of the economic impact of visitors to the Boston Symphony Orchestra's Tanglewood Music Center[5]. The estimated per visitor expenditures are multiplied times the change in number of visitors to determine the direct impacts of the associated increase in tourism. The inter-industry model for the region is then used to determine the full impacts on output, employment and public sector revenues as discussed above.

[2] See ranking online at http://traveler.nationalgeographic.com/2009/11/destinations-rated/intro-text

[3] *Demand for Museum Experience, Regional Development and Spatial Competition* by Stephen Sheppard and Nathaniel Walton, presented at the 2009 meetings of the Regional Science Association.

[4] *AAA Your Driving Costs, 2011 edition* downloaded from http://www.sne.aaa.com/sne/public_affairs/media/docs/DrivingCosts.pdf

[5] *Boston Symphony Orchestra Economic And Community Impacts: Boston, The Berkshires, and Massachusetts* available online at http://www.bso.org/images/pressreleases/BSO_Economic_Impact_Report_2008.pdf

d. Impact on house values and residential construction

Given the observation about the importance of the region as a travel destination, it is not surprising that some portions of the proposed service area show large concentrations of second homes. It is possible that provision of passenger rail service to the region might increase the attractiveness of the region for purchase of vacation homes by persons who normally reside in the New York area. This could have the result of increasing the price of residential property in the region, increasing the construction of homes, or both.

In addition to the increased demand for second homes in the region, there could be an increase in the general demand for residential property in the region by households who work in the New York metropolitan area and must commute. This would be of particular relevance for the southern portion of the service area in Fairfield County or the southernmost portions of Litchfield County, Connecticut. The impact of transit provision on house values has been widely documented in scores – perhaps hundreds – of studies set in urban areas around the world[6]. The impact on property values estimated from these studies is generally concentrated on properties that are near the stations, and ranges from 1% to 2% at the low end, to 30% or larger, increase in property values. Whether this would be observed in a small-town or rural setting is unclear.

We use two methods for evaluation of these impacts. First, we compare the impacts on property values and the rate of new property construction in the region near a recent commuter rail extension project that opened in 2000 extending Metro North service to Wassaic, New York. For this we use data from the American Community Survey (ACS) recently released for the area. Second, we use ACS data for residential properties within 5 miles of a set of possible stations for the proposed passenger rail service, and apply results from recently published studies of the impacts of transit improvements on property values to these properties.

e. Environmental benefits

Arguably some of the most important benefits of the proposed passenger rail extension are environmental in nature, although many such benefits will not be concentrated only on the regions being served by the proposed service. They will instead be enjoyed more broadly by firms and households living in the wider region or even by the global community. While it is very difficult to provide precise economic estimates of the value of these benefits, we provide some comments on the real nature of benefits deriving from increased efficiency and reduced carbon emissions from rail transport as compared with automobile transportation.

One environmental benefit that may be available to some residents of the region is the reduction in road congestion associated with inducing some travelers to switch from private automobile to rail transit. In some studies of the benefits of transit improvements the reduction in congestion is the largest single source of benefits (in monetary terms). While existing congestion levels on transport networks in the proposed service region suggest that reducing congestion even further will provide only modest additional benefits, we use similar studies to provide some general estimates of how large these might be.

[6] Three recently published examples are:

i. Atkinson-Palombo, Carol, 'Comparing the Capitalisation Benefits of Light-Rail Transit and Overlay Zoning for Single-Family Houses and Condos by Neighbourhood Type in Metropolitan Phoenix, Arizona', *Urban Studies*, October 2010, v. 47, iss. 11, pp. 2409-26

ii. Dube, Jean, et al., 'Economic Impact of a Supply Change in Mass Transit in Urban Areas: A Canadian Example', *Transportation Research: Part A: Policy and Practice*, January 2011, v. 45, iss. 1, pp. 46-62

iii. Hess, Daniel Baldwin and Almeida, Tangerine Maria, 'Impact of Proximity to Light Rail Rapid Transit on Station-Area Property Values in Buffalo, New York', *Urban Studies*, May 2007, v. 44, iss. 5-6, pp. 1041-68

3. Defining the region for analysis

In order to construct a model that is appropriate for evaluating the economic impact of the proposed passenger rail service, we must identify a region for which the data are available to determine and represent the relationships between the firms, individuals and organizations in each sector of the economy. As noted in the preceding section, we make use of data collected regularly by the Bureau of Economic Analysis and the Bureau of Labor Statistics that provide the employment in each of hundreds of sectors in the economy as well as the levels of trade between each sector. These data are regularly made available at the county level, and can be further broken down to the smaller zip code geography.

This breakdown of data to smaller geographies is useful in analysis of the potential impacts of the proposed Housatonic Railroad because the region most directly affected includes all of Berkshire County in Massachusetts and Litchfield County in Connecticut, but only that portion of Fairfield County that extends from Danbury north to the Fairfield County line. The portions of Fairfield County south of Danbury are already reasonably well-served by rail via the Metro-North line to New Haven.

Figure 1 to the right shows the region with the Massachusetts portion shaded lavender and the Connecticut portion shaded blue. The black line running through the region shows the path of the Housatonic Railroad proposed passenger service running through the region.

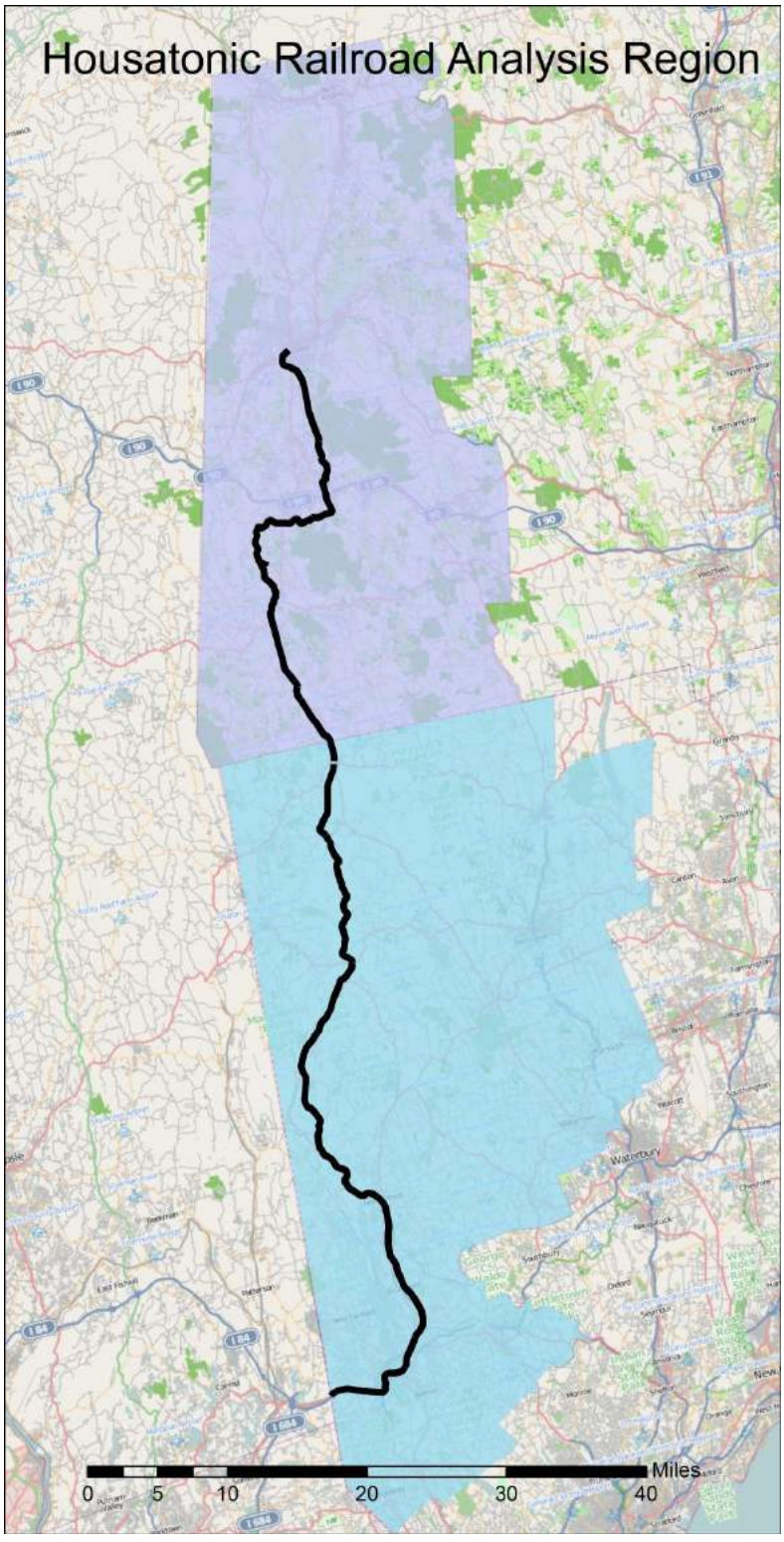

Figure 1: region affected by proposed passenger service

We extend the region of analysis northwards to include all of Berkshire County. While many of the most popular travel destinations in the County are located in the southern half (such as Tanglewood, Jacob's Pillow, and the Mahaiwe Theatre, the portion of the county that is north of the proposed Pittsfield Terminus includes MASS MoCA, the Clark Art Institute, Williamstown Theatre Festival, the Massachusetts College of Liberal Arts and Williams College. Together these destinations account for 28 to 30 percent of the county's 2.5 million annual visitors. Earlier

research on the visits of persons who came to Berkshire County primarily to attend a concert at Tanglewood indicated that a large share of these persons also visited one of the destinations north of Pittsfield, suggesting that many travelers to the area regard the northern area as an intrinsic part of the destination.

a. Importance of regional definition

Definition of the region of primary impact is important because it affects the structure of the economic model. If the defined region is too small or narrowly defined then the model will fail to capture the full extent of the impact of the project. If the region is defined too broadly then the model fails to represent the local economic impacts and fails to provide the local communities and policy makers with a reasonable projection of how they can expect their local economy to be affected.

The defined region of analysis strikes an appropriate balance of capturing the impacts and representing the local economy. Because of the interest to policy makers we subdivide the region to provide estimates of the impact on total output, employment and public sector revenues for the Massachusetts portion, Connecticut portion and the entire region. To do this we have actually constructed three different economic models: separate models for the Massachusetts and Connecticut portions of the service area, plus a third for the combined region.

b. Economic overview of the region

The combined region presents us with an area having population of just over a half million persons, and nearly 200 thousand households. The total labor force is approximately 310 thousand, with 281.6 thousand persons currently employed. Statistics for the individual state portions and other relevant information about the regional economy is presented below in table 1.

	Connecticut portion	Massachusetts portion	Total
Population	376,034	129,288	505,322
Households	144,012	54,862	198,874
Total employment	203,798	77,877	281,675
Gross regional product (2009$)	$19.2 billion	$5.4 billion	$24.6 billion
Average household income (2009$)	$158,871	$100,605	$142,798
Estimated tourist visitor-days	1,044,256	2,500,000	3,544,256
Sector with most employment	Real estate establishments	Restaurants and bars	Real estate establishments
Sector with greatest labor income (2009$)	State/local govt, non-education	Private hospitals	Offices of physicians and dentists
Sector with greatest output (2009$)	Owner-occupied housing (imputed)	Paper mills	Owner-occupied housing (imputed)

Table 1: Structure of the economy in the region of analysis

In brief, the data suggest that the region that would be served by the proposed passenger rail service is one having a population of just over half a million persons. Total employment is over 280 thousand, with a current labor force exceeding 300 thousand (about 9 percent of this group is unemployed as of early 2011). The regional economy produces output of nearly $25 billion (in 2009 dollars), with somewhat more than three quarters of this taking place in the Connecticut portion of the region. The smaller Massachusetts portion of the region is dominated by light industry and service-related employment, particularly those sectors that are related to the relatively large volume of tourism in the area. It is perhaps worth noting that the Massachusetts sector with the largest total output, Paper Mills, was once the dominant employer in the subregion as well. The sector has been in decline and continues to face intense competitive pressure and experience plant closures. The Connecticut portion is dominated by employment in sectors that characterize suburban development, such as real estate and health care. Although the overall economy in the Connecticut portion is much larger and it is closer to major population centers, its tourism sector is less well-developed and the amounts of travel are less than half of what we observe in the Massachusetts portion of the region. This might suggest considerable potential for expansion and development of the Connecticut region as a travel destination, but we provide no specific estimates in this regard.

While some data (like population or gross regional product) can be summed over each subregion to obtain the total for the combined region, this is not true for estimating the economic impacts. The economic impacts are estimated in the context of separate models of local economic activity. When we estimate impacts for the Massachusetts or Connecticut regions, these are based on models specifically designed for those subregions.

The result is that the sum of output impacts in the subregions is generally less than the output impact estimated for the entire region as a whole. This is because when (for example) a Berkshire County firm makes a purchase from another firm located in Danbury, the Danbury firm expands to fill the order and this boosts the combined regional economy. From the perspective of the Berkshire economy alone, however, this purchase has “exited” the region and as a result generates no further expansion. The employment impacts of the larger region can be either smaller or larger than the sum of the impacts estimated for subregions, depending on the particular patterns of labor productivity observed in the area.

We now turn to presentation and discussion of the economic benefits associated with the proposed rail service.

4. Economic benefits

The provision of the proposed rail service to the region identified and discussed in the preceding section will require an extensive period of capital improvements in the track, street level crossings, stations and platforms for passengers, and rolling stock. Housatonic Railroad estimates that once the decision to proceed has been made and the project is begun there will have to be a *construction and capital improvements phase* of three years before passenger services can commence. This is then followed by an ongoing *operations phase* during which passenger services will be provided to the entire route. The nature of the investment and improvements is such that it is not particularly advantageous to begin service on a section of the track before the entire route is ready for operations.

We therefore provide estimates of the annual economic benefits derived during these two phases. First the annual benefits of the *construction and capital improvements phase* (there will be three years during which such benefits are realized). Second the annual benefits of the *operations phase*. These benefits could, in principle, be received every year in perpetuity as long as the track and stations are maintained, and the depreciated rolling stock and other portions of the system are replaced as necessary.

a. During construction and capital improvements

Housatonic railroad estimates that the construction and capital improvements can be completed at a total cost of $200 million spent over a three year period. Working with their cost estimates we first apportioned the $200 million over the three years. The annual spending on capital improvements was then divided between the two sub-regions and between four sectors of the local economy:

i. Maintenance, repair and construction of non-residential structures
ii. Construction of new non-residential structures
iii. Railroad rolling stock manufacturing
iv. Advertising and related

Expenditure amounts in each of these industrial sectors were split between the Connecticut and Massachusetts regions in proportion to track miles in each subregion (in the case of the first and largest category of maintenance and repair of structures), the number of possible stations in each subregion (in the case of the second category of construction of new structures), all to Connecticut (in the case of rolling stock manufacturing, based on the presence of existing industrial capacity in this sector only in the Connecticut portion of the region) or split evenly between the subregions (in the case of advertising and related, which is by far the smallest expenditure). The results are presented in Table 2 below.

Area	Direct	Indirect/Induced	Total per year
	Additional Output ($)		
Connecticut region	45,463,523	20,109,637	65,573,160
Massachusetts region	21,203,143	11,326,416	32,529,559
Combined region	**66,666,667**	**34,153,602**	**100,820,268**
	Additional Employment (jobs)		
Connecticut region	310	135	445
Massachusetts region	192	95	287
Combined region	**494**	**239**	**733**

Table 2: Annual economic impacts during the *construction phase*

As noted above, the figures provided for impacts in the *combined region* are NOT the sum of impacts in the individual subregions. The combined region estimates are derived from a model specifically designed for the combined region that reflects the interaction within the entire area, including the interaction between the Massachusetts and Connecticut portions of the area and the employment of the most efficient producers in the entire region. As a result, the impact on total economic output in the combined region is generally larger than the sum of output in the subregions, and the impact on total employment is somewhat less.

Table 2 underscores the very significant economic impact and benefits to the region during the construction and capital improvements phase of the project. Total output in the region would rise by over $100 million dollars. About 733 new

jobs would be created in the region. With current (as of May 2011) unemployment rates in the region of about 9%, these new jobs would be expected to decrease the regional unemployment rate to approximately 8.76%, and increase the gross regional product by approximately 0.4%. For a single investment project these are significant and important benefits.

In addition to the sectors identified above where direct impacts are taking place, there are significant employment impacts for the combined region in Architectural engineering and related services (24 jobs), Food services and drinking place (nearly 17 jobs), Real estate establishments (nearly 14 jobs), Retail stores for food and beverages and Offices of physicians and dentists (with over 9 jobs each).

b. During operations

Analysis of the benefits of the operations phase begins with Housatonic staff estimates of the operating costs of providing passenger service. These cost estimates were assigned to the *Transit and Ground Passenger Transportation* sector, which includes all economic activities that can be described as "Commuter rail systems", "Commuter transit systems, mixed mode", "Light rail systems", "Monorail transit systems", "Rail transportation, commuter", "Street railway systems, commuter", "Suburban commuter rail systems", "Tramway systems, commuter", etc., and thus constitutes the most representative economic sector for the proposed passenger rail service.

Division of the increase in output in this sector between subregions was done in proportion to the expected revenues received. At this stage these estimates of revenues are more reliable at the level of the entire region than they are at the level of the subregion, so that the separate impacts for the Massachusetts and Connecticut subregions should probably be viewed with some caution. The estimated annual benefits for the entire region, however, are presented with greater confidence. Table 3 below provides the actual figures.

Area	Direct	Indirect/Induced	Total per year
	Additional Output ($)		
Connecticut region	5,053,180	2,096,183	7,149,363
Massachusetts region	17,606,820	8,741,109	26,347,929
Combined region	**22,660,000**	**10,887,888**	**33,547,888**
	Additional Employment (jobs)		
Connecticut region	76	15	90
Massachusetts region	317	71	388
Combined region	**353**	**78**	**431**

Table 3: Annual economic impacts during the *operations phase*

Table 3 shows annual impacts for the region involving an increase in total economic output of $33.5 million dollars per annum. The operations of the passenger railroad can be expected to create 431 permanent jobs for the region.

These should be considered only part of the economic benefits of the operations of the rail service, because they don't include the impact on the economy of the additional tourists that may be attracted to the region by the availability of passenger rail transportation. We next present estimates of this impact.

c. Impacts on regional tourism

As mentioned in section 2, our analysis of the impacts of the proposed rail service makes use of estimates of the extent to which travel costs affects the attendance at cultural venues in Berkshire County. Estimates presented in the research paper cited above depend somewhat on the structure of the model being estimated, but a reasonable average value for this sensitivity is -0.20, which implies that a doubling of transportation costs (a 100% increase) leads to a 20% decrease in the number of tourists traveling to the region. These estimates are based on analysis of those coming to visit the Massachusetts Museum of Contemporary Art during the period from 2000 through 2007, taking into account the distance traveled, the prevailing prices of transportation and motor fuel, and other relevant factors (such as household income, admission price, proximity of other attractions, etc.).

If the passenger rail service is established, what will be the impact on the cost of traveling to the region? Since the fare structure for the service has not been finalized and the construction and capital improvements required for the service will take three years to complete, answering this question is necessarily somewhat speculative and cannot be done with the same precision as the analysis of the impacts on regional output and employment due to construction and operations presented above. Nevertheless, we attempt some answers.

From the Market Street Research survey, we note that 57% of regular travelers to the region own their own car and 43% do not. We calculate a weighted average cost of a weekend trip to the Berkshires using these percentages as weights to attach to the cost of travel by private automobile and the cost of travel by rented car. For automobile operating costs, we begin with AAA cost estimates[7], and adjust them to reflect the current price of gasoline of $4 per gallon[8]. This gives a total operating cost of $0.633 per mile. The distance from Grand Central Station to Pittsfield is 142 miles, and we use this distance as the basis of computing travel costs between New York and Pittsfield (for both automobiles and rail options). For visitors who travel from New York in a rented automobile for two night visit, we assume a required 3 day automobile rental at $65 per day. Such visitors must also cover the costs of their fuel, and we assume the same price of gasoline and average MPG as used in private automobile users, which suggests a cost of $0.1714 per mile.

We assume that local transportation will be necessary within the region to cover 50 miles of travel during the visit. For private automobile drivers, the cost is determined by the per mile operating cost of the vehicle. For visitors using rented cars there is no added rental cost but they must pay the added fuel costs per mile. For visitors coming by rail, they will need to find some way to travel locally. We assume that they rent a car locally at a cost of $45 (local rental costs are generally lower in Berkshire County than in New York City) and pay the same per mile fuel cost as other automobile users.

The current fare structure on most nearby Metro-North railroad routes from New York City is approximately $0.25 (twenty five cents) per mile, and consultation with Housatonic Railroad staff suggested that this may be a reasonable ballpark figure for the cost of service (if all prices and technologies at time of service provision are similar to those

[7] *Your Driving Costs, 2011 edition* downloaded from http://www.sne.aaa.com/sne/public_affairs/media/docs/DrivingCosts.pdf

[8] Since the recent history of gasoline prices is that they increase more rapidly than the general pattern of prices, it is reasonable to assume that when the rail service actually commences operation the real price of gasoline will be even higher than this.

prevailing in mid-2011). The round trip travel costs for visitors coming by rail include fares for two persons from New York to Pittsfield and return at $0.25 per mile.

Finally, we need to include an adjustment for the implicit cost associated with having to drive the automobile from New York to Pittsfield and return. This cost will apply to both visitors coming by private automobile and rented automobiles. Visitors who travel to the region by train have a generally less demanding and arguably more pleasant travel experience. They can sit and converse with their traveling companions, they can read or watch the landscape pass by, they can sleep or use their laptops to answer e-mail or work (if wi-fi connections are available on the train, as has been proposed). It seems logical to regard having to drive from New York to Pittsfield in an automobile as a less desirable experience. The question is what value will represent this cost?

Surveys and empirical studies of the value of travel time in private automobiles suggest that travelers would require an hourly compensation between 30% and 60% of their working hourly wage in order to accept an additional hour of travel. The Market Street Research survey suggests that the median annual earnings of travelers from New York City are about $80,000 per year, or $40 per hour. We assume an average required compensation of just over $16.50 per hour, which is 41.3% of the hourly earnings of the expected group of travelers, in the center of the expected range of implicit travel costs. We assume travel avoids the peak hour traffic so that the journey can be completed in 3.5 hours for a total driving time of 7 hours. We assume that the additional compensation is required only for the driver rather than for both travelers making the journey. Table 4 below presents the results of all of these calculations.

	Rail and rental	*Private automobile*	*Rented Automobile*
Round trip costs for travel	$142	$180	$244
Local transport	$54	$32	$9
Implicit cost (disutility) of driving	$0	$116	$116
Total	**$196**	**$327**	**$368**
Average	$196	$345	
Train percent cost reduction		**-43.23%**	

Table 4: Cost comparisons for two persons traveling for 2 nights / 3 days from New York to Pittsfield

The calculations suggest that this hypothetical couple coming for a typical long weekend visit to the region could save somewhat more than 43% of travel costs by taking the proposed rail service from New York and renting a small car for their local transport needs. Combining this figure with our estimates for transport cost sensitivity of travel to the region suggests that the rail service would result in an 8.65% increase in tourist traffic to the region.

We noted above that the Berkshire Visitors Bureau estimates about 2.5 million visitor days per annum to Berkshire County. Comparing this total to the employment and the dollar value of output in the hospitality sector in Berkshire County, we have the basis for estimating the annual number of visitors to the Connecticut portion of the region. Assuming the hotels, bed and breakfast establishments and inns in Connecticut use the same “technology” and charge similar price to their Massachusetts counterparts leads to an estimate of 1.044 million visitors to the Connecticut portion of our analysis region. We therefore estimate that the presence of the proposed passenger rail service will increase local tourism by 33,410 visitor-days in the Connecticut region and 79,985 new visitor-days in the Massachusetts region, for a total increase of 113,394 new visitor days per year.

To evaluate the local economic impact of this increase in local tourism, we make use of survey data collected in 2008 as part of analysis of the economic impacts of the Tanglewood Music Center. Persons who attended a concert at

Tanglewood during 2007 were asked to report the amounts they spent within Berkshire County during the day they attended the concert. This survey provided average daily expenditures per visitor, and we have used the Consumer Price Index to update these to approximate 2011 prices and obtain:

Food	$22.70
Retail	$6.37
Additional local transport	$3.15
Local gasoline purchase	$1.06
Childcare	$0.16
Lodging	$39.10
Total	**$72.54**

We use these amounts to determine the additional direct expenditures to add to the local economy in the appropriate economic sectors. Most of the respondents to this survey had traveled to the region by automobile, but the reported expenditure amounts for local transportation are less than those used in the analysis summarized in Table 4. The local transportation figures from the survey are per person rather than total for the group, so they should be compared to amounts of $4.50 (for travel by rented automobile) or $16 (for travel by private automobile). The survey of Tanglewood patrons stressed that responses should cover only those expenditures made within Berkshire County. Many of the normal operating costs for an automobile (tires, maintenance, insurance, etc.) would not typically be made by such visitors during a trip to Berkshire County, and this explains why the survey values are lower than the values used to estimate relative transportation cost savings.

We use these survey values, multiplied by the estimated number of new visitors to the region or subregion to determine amounts to add to the six sectors associated with the six expenditure categories. Table 5 below presents our estimates of the impact on the local economy.

Area	New visitors	Direct	Indirect/Induced	Total per year
		Additional Output ($)		
Connecticut region	33,410	2,423,543	1,109,420	3,532,964
Massachusetts region	79,985	5,802,081	3,047,364	8,849,445
Combined region	**113,394**	**8,225,624**	**4,314,110**	**12,539,734**
		Additional Employment (jobs)		
Connecticut region	33,410	27	8	34
Massachusetts region	79,985	72	25	97
Combined region	**113,394**	**95**	**31**	**126**

Table 5: Annual economic impacts from additional tourism during the *operations phase*

Comparing these results with those presented in Table 3, we see that the additional tourism that will be attracted to the region by the proposed passenger rail service will increase the economic impacts by 30 to 50 percent compared with the direct, indirect and induced impacts of the operation of the rail service alone.

Tables A1 and A2 in the appendix present – in columns 5 through 7 – the change in total output and employment in each sector of the economy that is expected to occur during the *operations phase.* These impacts include both the rail operations themselves and also the impacts of increased tourism summarized in Table 5 above.

The analysis in those tables show that after including the impacts of tourism, the combined region can expect to experience significant increases in output and employment, with total output rising in excess of $46 million per year and total employment increasing by more than 557 jobs for as long as the operations of the proposed passenger rail service continue. Naturally many of these are in the "Transit" sector (354 permanent new jobs) but there are also important employment gains expected in the "Food Services" sector (49 new jobs), "Hotels" (almost 36 new jobs), the combined retailing sectors (more than 25 new jobs) and in "Real estate establishments" (more than 7 new jobs).

These new employment opportunities help to provide the job experience and incomes that can sustain communities in the region and support continued economic development. They also come at a very welcome time. In mid-2011, the unemployment rate for the region stands at approximately 9%. The jobs that would be sustained in the long run because of operation of the proposed passenger rail service would reduce this rate to 8.82% and help to put the region on the path to recovery.

d. Public sector revenues

Tables 2, 3 and 5 summarize the overall changes in employment and output that can be expected to result if the proposed passenger rail project moves forward. We now provide estimates of the impact of the project on federal, state, and local tax revenues. These impacts occur because of the changes in the levels of economic activity described above. Naturally, the expected change in revenue depends on the structure of both the local economy and also on state, local and federal tax law. Given the required time for construction and capital improvements and the time period required for the local economy to adjust and reflect the changes described above, there is ample time for the tax laws to be changed and even for the local structure of the economy to change in response. Therefore these estimates, like those concerning the changes in tourism and associated economic impacts, should be regarded as having a wider margin of error than the basic forecasts of changes in output and employment associated with construction and operation of the rail service itself.

Impacts on state and local tax revenues

Table 6 below presents the estimated impact on state and local tax revenues. The table presents estimates of total taxes collected in the subregions in each state and from the combined region covering both states. Estimates are provided for collections during the construction phase, during the operations phase and from the increase in tourism. We also present totals for taxes collected "from households" and "from business".

The "household" taxes include taxes collected directly from households and also the taxes based on employee compensation, since all or part of the latter sum will be reflected in and hence borne by the household workers themselves. The "business" taxes include all indirect business taxes, taxes on proprietor's income, and all taxes on corporations. These breakdowns are not intended as a formal analysis of tax incidence but instead as broad conceptual groupings to give some idea of tax collections from broad segments of the economy.

It is perhaps most accurate to simply focus on the totals collected. Table 5 shows us that if the proposed passenger rail project moves ahead, state and local governments can expect to collect nearly $3.7 million per year extra during the three year construction phase. During the operations phase they can expect to collect about $2.6 million every year from both the expansion of the local economy attributable to both the operation of the rail service itself and the increase in local tourism that can be expected to occur as a result. These are important additional resources that would

be available to the state and local governments at a time when revenues are tight, and could potentially provide the resources to finance public-private partnerships in support of the passenger rail service or the upgrades required for it.

Area	From households	From business	Total per year
		During construction	
Connecticut region	763,949	1,536,770	2,300,719
Massachusetts region	391,170	841,219	1,232,389
Combined region	**1,217,547**	**2,464,487**	**3,682,034**
		During operation	
Connecticut region	103,566	241,190	344,756
Massachusetts region	355,398	918,946	1,274,344
Combined region	**485,268**	**1,140,713**	**1,625,981**
		From additional tourism	
Connecticut region	38,755	252,344	291,099
Massachusetts region	90,543	608,443	698,985
Combined region	**137,434**	**866,106**	**1,003,540**

Table 6: Changes in annual tax revenues received by state and local governments

Impacts on federal taxes

We have undertaken a similar analysis of the impact on revenue collection by the federal government. Since there is no assumption that these revenues will be made available to the local governments in the region or to the states, we cannot necessarily call these benefits to the local economy. They do, however, represent additional resources available at the national level and could be used to improve some group's welfare, so it is reasonable to talk about them in assessing the expected benefits of the proposed rail project. They are also of potential importance in policy decisions, since these extra resources could, in principle, be used to justify support from the federal government through one of its agencies for the proposed rail project.

Table 7 presents a breakdown of the extra revenues collected similar to that used in the preceding table. As before we group direct taxes on households together with taxes on employee compensation under the heading "From households" and group indirect business taxes, taxes on corporations and taxes on proprietors' income under the heading "From business" with the final column presenting the total. We provide breakdowns for each phase of the project and for each region and sub-region.

Table 7 shows that total federal government revenues collections can be expected to increase by over $7.8 million per year during the first three years of the project, and by almost $3.5 million per year during the period of sustained operations of the rail passenger service.

Area	From households	From business	Total per year
		During construction	
Connecticut region	4,424,966	650,223	5,075,189
Massachusetts region	1,890,162	472,120	2,362,282
Combined region	**6,788,748**	**1,069,326**	**7,858,074**
		During operation	
Connecticut region	692,301	66,443	758,744
Massachusetts region	2,006,274	306,382	2,312,656
Combined region	**3,114,483**	**325,745**	**3,440,228**
		From additional tourism	
Connecticut region	247,900	54,692	302,592
Massachusetts region	492,865	174,206	667,071
Combined region	**855,560**	**196,512**	**1,052,073**

Table 7: Changes in annual tax revenues received by the federal government

Combining the results presented in Tables 6 and 7 we see that total tax revenues at all government levels in both states combined can be expected to increase by $11.5 million per year during the construction phase, and then to return to a sustained increase of over $7.1 million per year during the operations phase including the impact of increased tourism.

e. Impacts on housing markets

The region through which the proposed passenger rail service passes and would serve is one of at least five important holiday home markets in the wider region. These five regions are identified below in figure 2 by areas where nearly half or more of the local housing stock is identified as a second residence owned by a person whose primary residence is elsewhere. The regions colored red or orange are generally associated with familiar vacation areas, so it is not surprising that in these areas more than 50% of the housing stock is comprised of second homes. Figure 2 clearly shows that the proposed passenger rail service provides a direct connection from the New York commuter rail system (Metro-North lines to New Haven, CT and Wassaic, NY) to the important second home market of the Berkshires. It is possible that the availability of passenger rail service to the region could augment demand for housing in the region by persons in

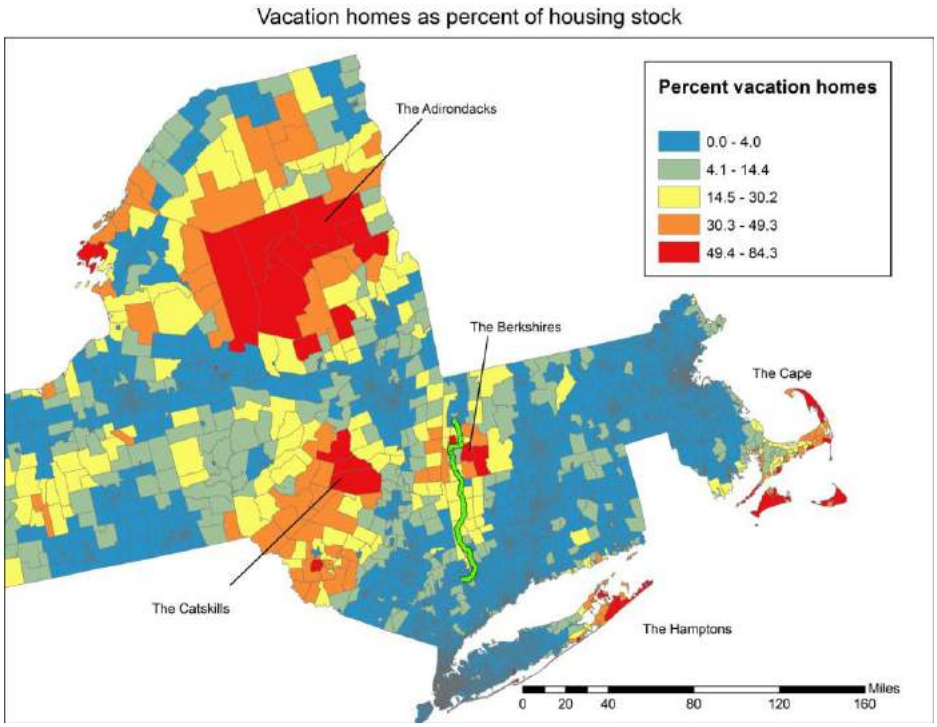

Figure 2: significant holiday home clusters in the wider region

the New York metropolitan region who seek to own a second home in the Berkshires. This increased demand could manifest itself as either an increase in the price of existing units or an increase in the number of units built, or both.

Assessing the expected impact on local housing markets is difficult. The price of housing depends on many factors in addition to the ease of access from New York City, and the extent to which new building can take place to accommodate the demand (and limit the extent of price increases) depends on the availability of local infrastructure, the extent of local zoning and land use regulation, and other environmental restrictions that may limit the ability of land owners to develop their property.

One approach for assessing the potential for significant price impacts or new building occurring due to the extension of passenger rail service to the region is to find another area that is similar in most respects and has had passenger rail service extended to it in the recent past. We could then see if there were important differences between the proposed service region and the comparison region in terms of recent construction or house prices.

One possible comparison region is located in eastern New York very near the southern portion of the proposed Housatonic Rail route. In 2000 the Metro-North railroad opened its new station and line extension to Wassaic, New York. Drawing upon recently released data from the American Community Survey, we identified the census tracts through which the proposed rail service would run (from west of Danbury, north through Connecticut and Massachusetts, to Pittsfield, MA). We compare this area to the census tracts through which the Metro-North line from Southeast, NY north to the Wassaic station located between Wassaic and Amenia, NY. The two regions and the associated paths of the railroad are shown in figure 3, with the Metro-North region shaded lavender and the proposed Housatonic Railroad region shaded light blue.

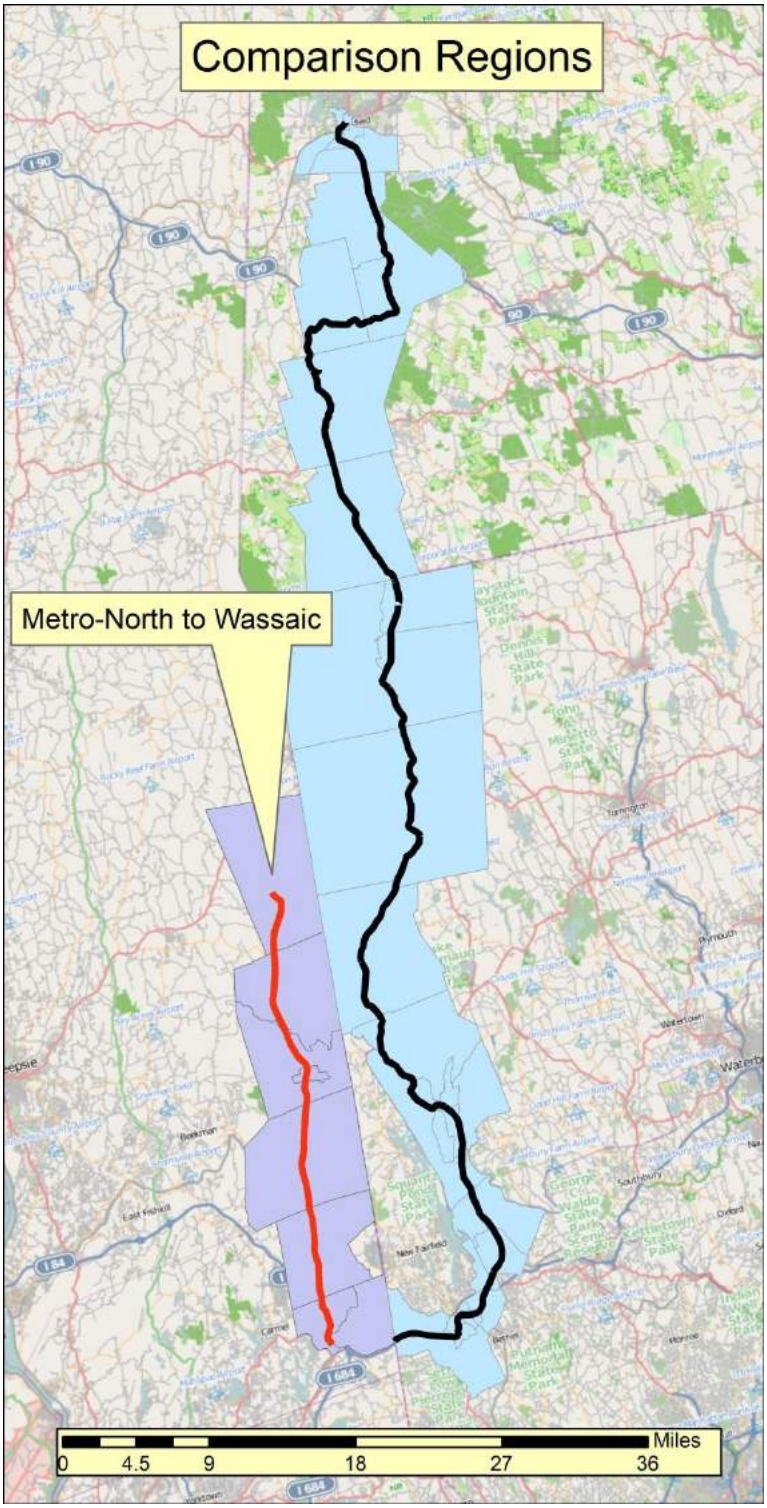

Figure 3: comparison regions for assessing impact of rail service

Focusing on the census tracts through which the railroad passes is narrower than the full region that

might possibly experience an impact, but it can be argued that *at least* these areas would be affected.

We begin by comparing the two regions visually, looking at the proportion of the housing stock in the local area that are identified by Census respondents as a second home for recreational purposes. Figure 4 below illustrates the situation.

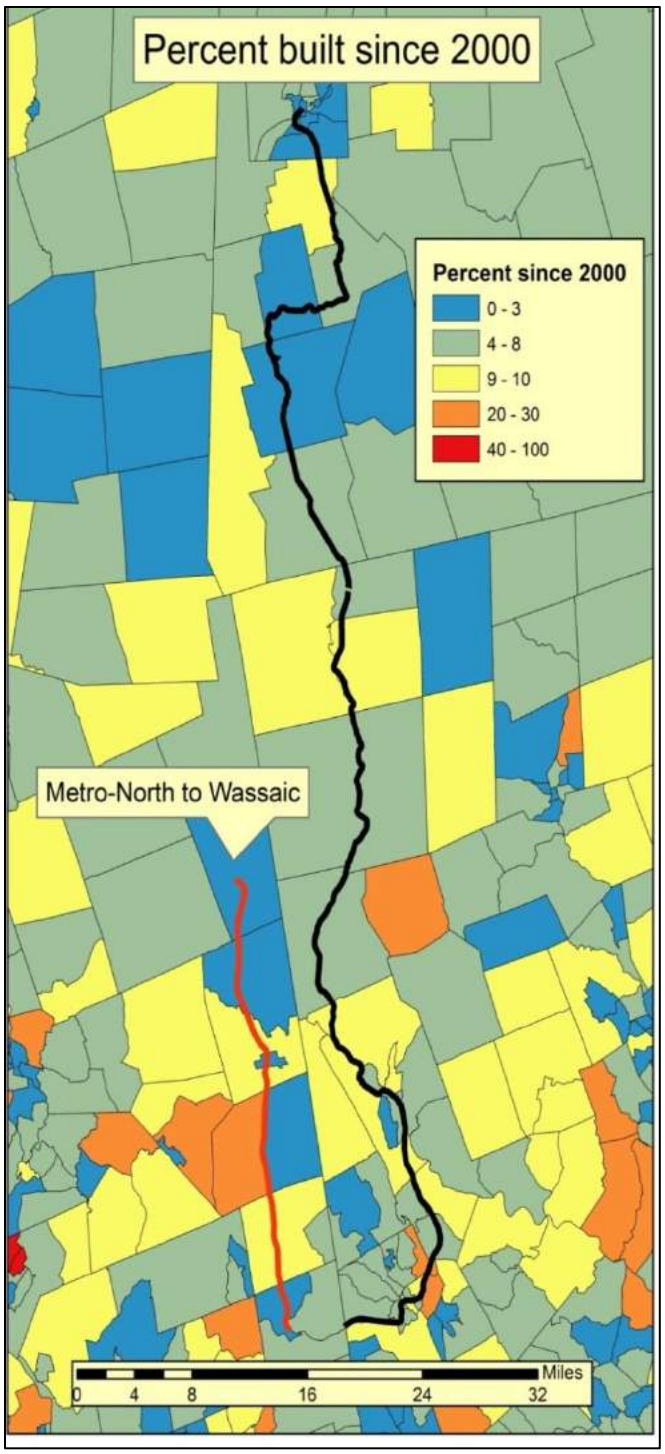

Figure 4: Percent of local housing stock built since 2000

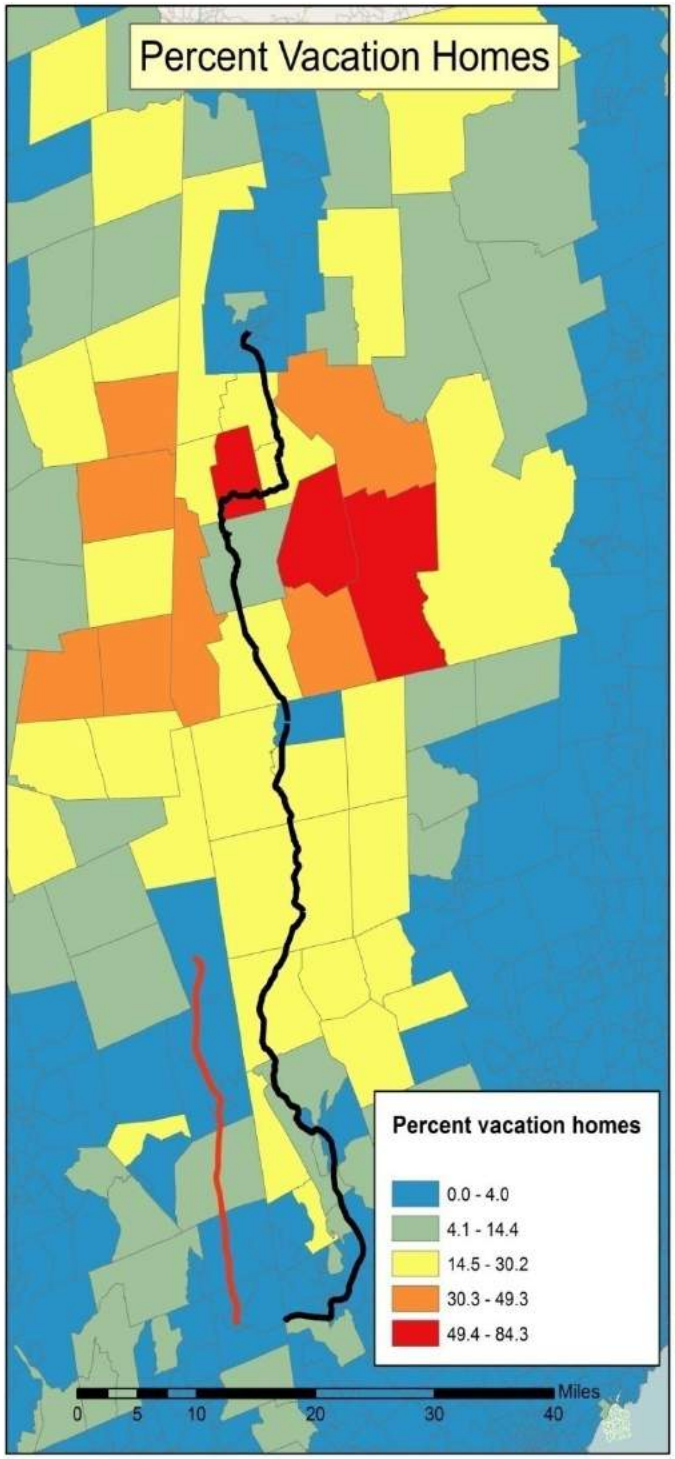

Figure 5: Percent of local housing stock identified as vacation home

The red line on the left shows the path of the Metro-North Railroad extension to Wassaic that opened and began operations in 2000. If the opening of the line had a large impact on new home construction, then we might observe an unusually large number of homes constructed since the line opened, compared with the "control region" along the proposed (but not yet operating) route for the Housatonic Railroad service. The pattern illustrated in Figure 4 does not seem to clearly support this. While there are a couple of tracts near the central portion of the new Metro North route that have 20 to 30 percent of the housing stock constructed since 2000, the overall pattern is not obviously different from that observed to the east in the control region. Indeed, the area at the northern end of the line where the impact of the rail service extension might be most strongly felt, shows very little new home construction, with fewer than 3 percent of the homes having been constructed since 2000.

Perhaps the impact of the rail extension would not be felt in the form of new construction, but instead in the form of conversion of existing housing stock from use as primary residences to use as secondary residences and vacation homes. This would be observed if large numbers of New York area residents took advantage of the improved access to the area to purchase homes and use them in this manner. If this occurred, then when homeowners were surveyed as part of the American Community Survey in 2009 (the source of the data being used) we might observe a large share of the housing stock being used this way near the Metro North extension when compared with the control region. This test is illustrated in Figure 5 above.

Figure 5 does not provide support for this view. The Census tracts that are near the Metro North extension all show relatively low levels of use of homes as vacation homes. Typically less than 4 percent of the housing stock is a secondary residence, and in only two tracts (one of which also showed signs of increased construction activity since 2000) do we see this share rise to between 4 and 14 percent. The control region shows generally greater use of the housing stock for secondary residences. This is not a perfect test, because the area near the Metro North line and the control area are somewhat different in nature despite being near to one another. The demand for vacation homes in northwest Connecticut and Berkshire County may simply be larger.

It may also be that existing homeowners near the Metro North line at the time of its opening in 2000 were eager to remain in place and to take advantage of the improved access provided by the rail extension for their own travel to New York. In this case we might not observe much change in the share of the housing stock used as a second home, but if there were an increase in the demand for houses in the region we might observe an increase in the market value of the houses (as well as of buildable land in the region). To get a sense of this we examine the median value of owner-occupied housing in the two areas, and illustrate the values in Figure 6 below.

Figure 6 shows some modest support for this view, although it is difficult to tell from visual inspection alone. The set of census tracts along the Metro North expansion shows only one area with very low house values. The tracts along the northern portion of the route have median values between $162 and $327 thousand, and along the southern portion of the extension the values are even higher, ranging from $327 to $509 thousand. In the control region to the east, there is in general more variation in the median value of housing. It looks like the average values are lower in tracts along the proposed Housatonic route that we are using as a control for comparison with the Metro North region, but it also seems that in general median house values are higher in the southern area than in the northern area of the control.

To provide a quantitative comparison, we compute the weighted average values for each of the three variables: percent built after 2000, median house values and percent of housing stock used as a secondary residence for all tracts through which the Metro North extension passes and for all tracts in the control area: tracts through which the proposed

Housatonic Railroad route passes. For more complete comparison, we also compute the values for the Connecticut portion of the control region. The results are presented in Table 8.

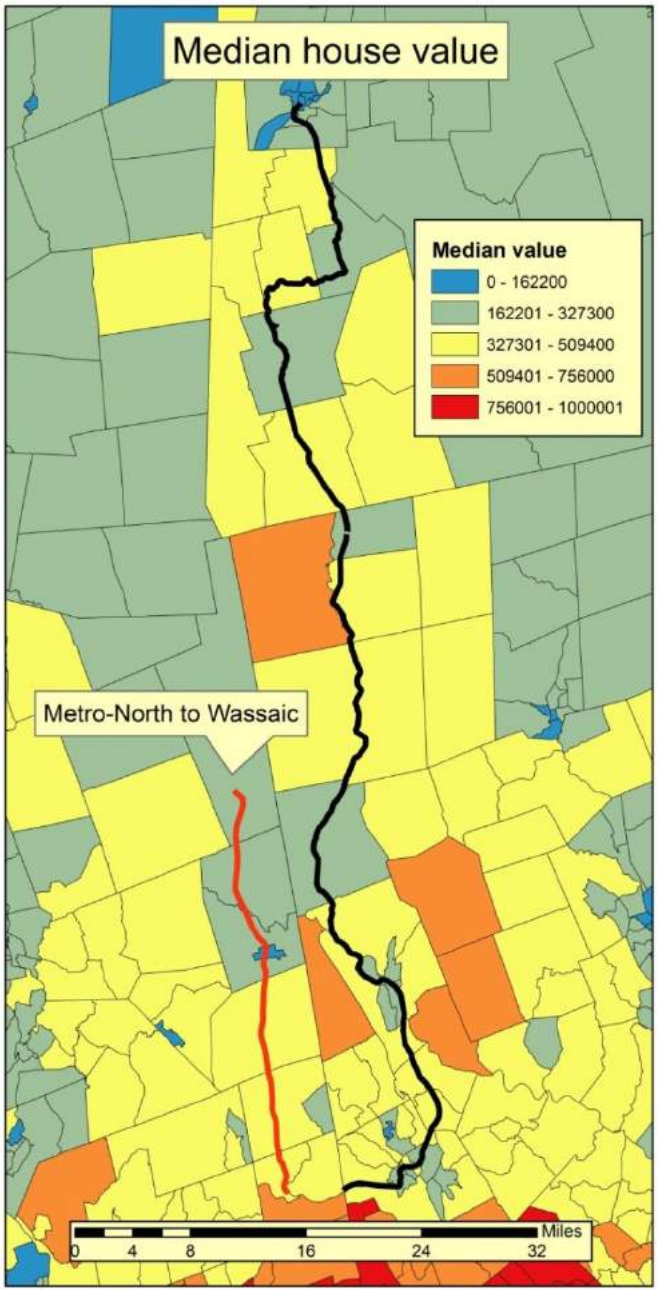

Figure 6: Median house value in region

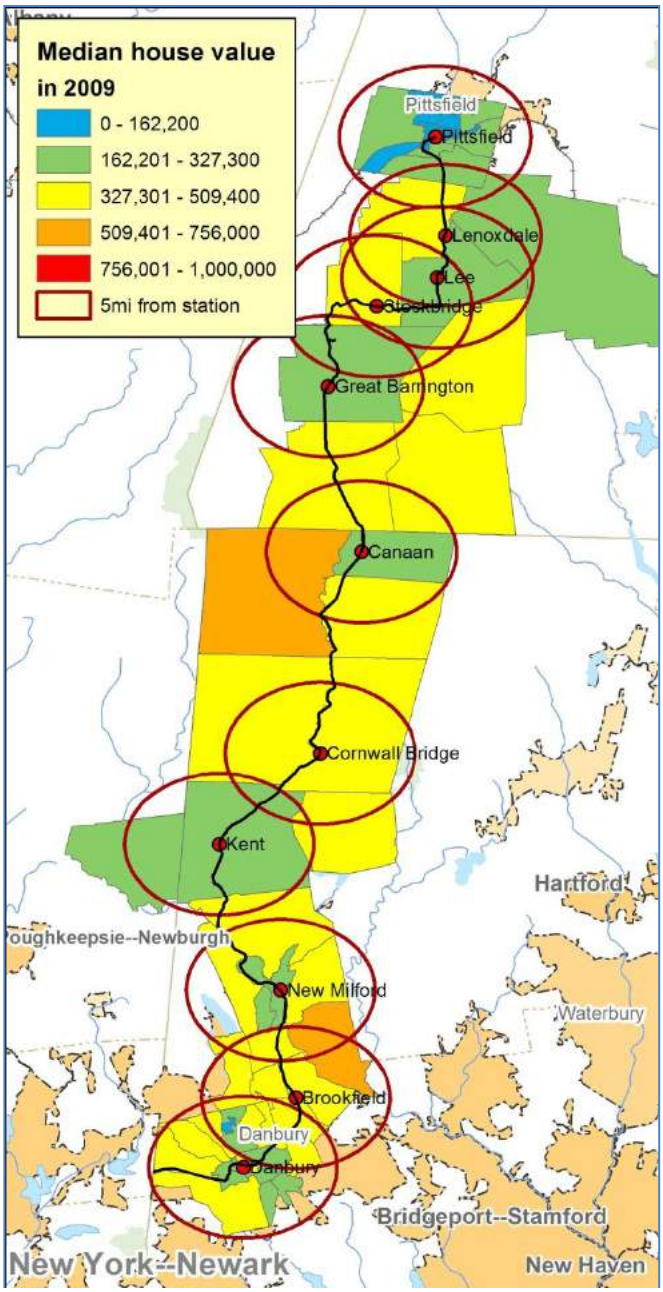

Figure 7: Median house values near possible stations

	Metro-North Tracts	Housatonic Tracts	Connecticut Tracts
Percent built after 2000	6.83	6.61	8.28
Median house value, 2009$	349,427	319,007	353,379
Percent vacation homes	2.67	6.99	5.12

Table 8: Comparison of variables in regions with and without recent rail expansion

The figures presented in Table 8 generally confirm the visual observations made from the figures. Comparing the area through which the Metro North railroad extension passes to the control area along the proposed route of the Housatonic Railroad, the area with improved rail access does not show significant distortion of the local housing market. The proportion built after 2000 and the median value of houses is slightly higher in the Metro North area, and the proportion of the housing stock being used as a vacation house is lower. None of these differences is statistically significant in the sense that all of the differences are well within the limits that might be expected to arise purely due to sampling variation.

There is also an indication that some of the differences that are observed are related to the fact that on average the area affected by the Metro North extension is further south and closer to New York City than the control region. If we compare the Metro North tracts to those along the proposed Housatonic Route in Connecticut only, we see that the Metro North tracts have a lower share built after 2000 and a slightly lower median house value.

As mentioned above, these comparisons are not a complete test of the impacts of a rail extension in the region. Studies of extending commuter rail in the context of urban and suburban areas generally find an impact on house values and sometimes on land use as well (see citations in footnote 5 above). Very often such studies find that the effects are not experienced all along the route, but are concentrated near the stations of the passenger rail service. This makes evaluation of the impacts of the proposed Housatonic rail service somewhat difficult because final locations of passenger rail stations have not been determined. Nevertheless, there have been discussions and public meetings at which possible locations of passenger stations has been discussed. Taking a list of such stations that was mentioned at a public meeting in Connecticut, we identified the existing stations along the Housatonic Railroad tracks that are in or near to the mentioned towns where it is possible stations might be located. Figure 7 above shows the location of such stations, along with ovals that identify a distance of 5 miles from each station (the regions are oval instead of circular due to the map projection being used). Beneath these census tracts are shaded according to median house value if the tract is within 3 miles of the station.

While comparison of the Metro North extension with the region surrounding the proposed Housatonic Railroad passenger service does not suggest a very large distortion of the housing market nor extreme changes in land use, there may indeed be some increase in house prices, particularly in areas close to where the stations are located. Previous studies find house price increases ranging from 2 percent up to as much as 20 percent. Changes in values for detached single family houses appears to be towards the lower third of this range, from 2 percent to 7 percent, which is not too different from the 9.5 percent difference observed between the Metro North tracts and the control region, although as noted much or all of that difference may be due to general proximity to New York City.

To provide a conservative estimate of the possible change in total house values, we assume that the change in house values is limited to only those properties in a census tract within 3 miles of a station as shown on the map. We use data collected as part of the American Community Survey[9] to evaluate the impacts of a 1.5% increase in house values and also 3% increase in house values. These are near the bottom of the range estimated in other studies for house price impacts of improved rail access, and are generally consistent with the comparisons between the Metro North region and the control discussed above. We limit our evaluation not only to the areas relatively close to possible stations but also to the owner-occupied housing within these areas, even though there is some rental housing and the rental housing would also share in some price appreciation. The results of these calculations are shown in Table 9 below.

[9] The data are available for download online at: http://factfinder.census.gov/servlet/DCGeoSelectServlet?ds_name=ACS_2009_5YR_G00_

Area	Owner-occupied housing units	*Measured in 2009$* Total value of owner-occupied housing	Value gain with 1.5% impact	Value gain with 3% impact
Connecticut region	37,163	$ 13,513,063,200	$ 202,695,948	$ 405,391,896
Massachusetts region	25,850	$ 6,747,128,800	$ 101,206,932	$ 202,413,864
Combined region[10]	**64,523**	**$ 20,645,242,000**	**$ 309,678,630**	**$ 619,357,260**

Table 9: Estimated impacts of rail expansion on house values

Table 9 reveals that even taking a very cautious approach to estimating the impact of the proposed rail service on house values, the gain in value, and therefore the increase in aggregate wealth of the community, may be quite large. The increase in homeowner wealth attributable to the operation of the proposed passenger rail service is between $100 and $200 million in Massachusetts and $200 and $405 million in Connecticut. Over the entire region the increase in wealth would be expected to be between $310 and $619 million.

It should be remembered that this would be a "one time" increase in house values as the market adjusts to the improvements in transportation. It should also be remembered that this increase in community wealth generally will be modest for each individual owner – on the order of $1500 to $10,000. Nevertheless, it represents a real economic benefit to the region.

Some caution should be exercised in interpreting these estimates. The estimated impact of commuter rail on property values is generally obtained in the context of urban areas. Residents can potentially make use of the rail transport on a regular basis, so that the transport cost savings from rail use are large and justify paying more for a house that is accessible to the passenger rail service. This situation is more likely to be the case for properties in Connecticut, particularly towards the southern portion of the service area. The increased willingness to pay for residential property is likely to be realized to some extent throughout the service area because travel cost savings will apply to journeys north to Pittsfield as well as south towards Danbury or New York City. To increase our confidence in the result, we have assumed an impact that is at the very bottom of the range of estimates that have appeared in the literature, and have applied it only to owner occupied housing whose value has been conservatively estimated using American Community Survey data.

Given what has been observed in the area around the Metro North extension, these changes would not be expected to bring major upheaval in the housing markets. Modest changes of this magnitude are generally not enough to cause large changes in overall patterns of land use or levels of house building activity. This is particularly true in the present climate, when residential property has endured significant declines in value due to the deep recession of 2007-2009. As in the case of the local labor market, the proposed railroad passenger service can make a real (if modest) contribution towards the recovery of the housing market.

f. Environmental and traffic-related benefits

Rail transportation offers a number of environmental benefits, including reduced congestion for non-rail users on roadways, reduced land use and lower emissions per passenger kilometer traveled compared with many other forms of transportation. In some cases these important benefits accrue to the wider society or even globally rather than being

[10] Includes one census tract with residential property located in New York, west of the town of Kent, CT. Therefore the Combined region values exceed the sum of values restricted to Massachusetts alone and Connecticut alone.

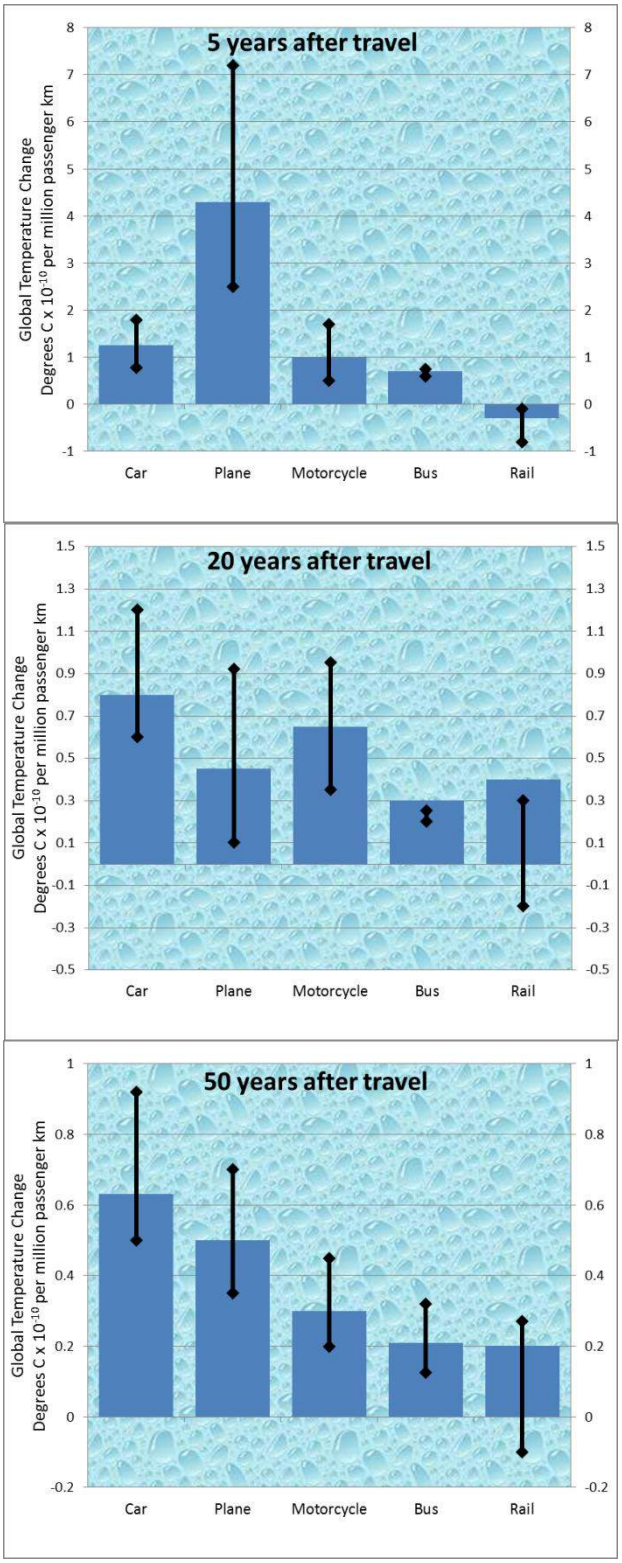

Figure 8: Climate change impacts of alternative transport modes

narrowly focused on the region to be served by the passenger rail service. Because of this they can be very difficult to evaluate in monetary terms despite the fact that they can be a factor influencing the choice of travelers when they choose which transport mode to use. The Market Street Research survey found that 4.6% of travelers from New York to the Berkshires would be interested in traveling by rail because of the perceived reduced environmental impact.

Just how much lower the environmental impact might be is underscored by some recent research on the climate change impacts of various modes of travel (relative to automobile)[11]. This remarkable research makes use of worldwide data on average performance and passenger loads of different modes of travel, and estimates the total $C0_2$ equivalent impact (integrated radiative forcing) per passenger kilometer traveled in different modes.

The research takes account of the fact that the different mixture of combustion emission gasses and the speed and location where they are emitted varies between the transport modes. As a result, the impact on global temperature varies over time. For example, because air travel involves combustion at high altitudes, the climate impacts of such travel are felt more quickly than for other modes. The researchers calculated the climate impacts 5 years, 20 years and 50 years after the travel takes place.

Using these data it is possible to calculate the change in mean global temperature per million passenger kilometers traveled in each mode. The results are displayed in Figure 8 at left.[12] The top panel in the figure provides the estimated impact on mean global temperature per million passenger kilometers traveled by each travel mode five years after the travel. The wide bars indicate the expected impact of travel on temperature, and the dark lines centered over each bar indicate the range of uncertainty for each estimate. The central and bottom panels provide the same information 20 years after travel and 50 years after travel, respectively.

The figure shows that at every time period travel by rail results in

[11] See Borken-Kleefeld, Jens *et al.*, "Specific Climate Impact of Passenger and Freight Transport", *Environmental Science and Technology*, Vol. 44, No. 15, 2010, p 5700-06.

[12] Figures adapted from "Planes, trains and automobiles: calculating the climate impact of different modes of transport" in *IIASA Options*, Winter 2010-11, p. 20, available for download at http://www.iiasa.ac.at/Admin/INF/OPT/Winter10/opt10w-web.pdf .

less change in mean global temperature than travel by automobile. At 5 years after the journey, travel by rail is actually predicted to REDUCE mean global temperature slightly. Eventually the CO_2 disperses to the upper atmosphere and does have a warming effect, although the uncertainty range associated with the impacts of rail travel suggest that its impact continues to be potentially very low even after 20 or 50 years.

In the long run (after 50 years) the research implies that travel by rail imposes less than one third of the climate change impact caused by travel by automobile. As noted above, these values are based on average fuel efficiency and passenger loads from data around the world. It is possible that they might slightly overstate the relative efficiency experienced in the US context. According to the 2011 National Transportation Statistics compiled by the Bureau of Transportation Statistics[13], the BTU per passenger mile consumed in US passenger automobile transport was 3,525 in 2006 (the most recent year for which data are available). By comparison, the BTU per passenger mile on AMTRAK trains was 1,745 (in 2008, again the most recent data available). This suggests that inter-city rail in the US consumes about half the energy per passenger mile as automobile travel in the US (rather than one third). Energy consumption per passenger mile, however, is not identical to climate impact. The Borken-Kleefeld, *et al.* analysis is careful to consider the particular mix of emission gasses and the location at which and conditions under which combustion takes place. They combine these into a global climate model to determine climate impacts. For policy makers (or for consumers who are concerned about the environmental impacts of their decisions) the impact on climate seems a more directly relevant consideration than the total BTU consumption.

If the projected ridership level of 2 million one way trips per year is realized, and if the average distance traveled by a passenger is 100 miles (161 kilometers) then total passenger kilometers during the first decade of the project (7 years of passenger travel) would be 2,254 million passenger kilometers. If all of these passengers take the proposed rail service rather than travel to their destination by automobile, the planet will be 2.2×10^{-7} degrees C cooler. While this benefit will not by itself solve the global climate change problem, it does have the potential to be an important factor for some passengers. Travelers who take their Berkshire holiday using the proposed rail service can feel that they are making a more sustainable choice.

In addition to the reduced impact on global climate change and emission of other pollutants, eliminating one to two million journeys by automobile and substituting instead rail travel for all but the local (at destination) travel needs produces other important environmental and transport-related benefits. These come in the form of reduced road maintenance costs, reduced numbers of accidents (and associated economic costs) and reduced congestion.

The public roadways within the service area of the proposed passenger rail service as well as those that lie between the primary markets of New York City metropolitan area and the service area of western Massachusetts and northwestern Connecticut must be maintained at the expense of local, state and federal governments. The analysis presented in the federal highway cost allocation study[14] identifies the cost allocation to passenger automobiles for preserving and maintaining existing roadways as $0.0013 (0.13 cents) per vehicle mile traveled. We assume an average of 2 passengers per vehicle for tourism and second home travel, and 1 passenger per vehicle for commuter travel. Using estimated passenger demand provided by the railroad for different segments of the route, we estimate savings in roadway maintenance associated with the proposed passenger rail service. The estimates are presented in Table 10 below.

[13] *National Transportation Statistics*, 2011, U.S. Department of Transportation, Research and Innovative Technology Administration, Bureau of Transportation Statistics, Washington, DC. Available online at: http://www.bts.gov/publications/national_transportation_statistics/

[14] Downloaded from http://www.fhwa.dot.gov/policy/hcas/final/index.htm

Area of origin or destination	Reduction in Vehicle miles	Annual cost savings
Connecticut	52,936,000	$ 68,817
Massachusetts	98,808,150	$ 128,451
Combined region	**151,744,150**	**$ 197,267**

Table 10: Reduction in vehicle miles traveled and reduced road maintenance costs

Note that in the calculations presented in Table 10 the savings listed do not necessarily accrue to the region that is the origin or destination of the travelers. In every case some portion of the reduced road maintenance costs would accrue to the origin and destination regions, but in most cases some of the savings would also accrue to New York state and local government authorities since most of the automobile trips avoided would have involved at least some travel there.

Travel by rail entails a risk of fatal accident that is one or two orders of magnitude lower than travel by automobile. As a result, operation of the proposed passenger rail service and its projected utilization for up to 2 million one way journeys has the potential for saving lives and reducing the costs associated with fatal accidents. The projected ridership levels are used to estimate the impact. We assume that journeys from or to Connecticut entail risk of fatality per 100 million vehicle mile traveled equal to the average of the New York and the Connecticut risk levels (0.87 and 0.71 respectively). We assume that journeys from or to Massachusetts entail a risk that is the average of the New York, Connecticut and Massachusetts rate (0.61 per 100 million vehicle miles traveled). These risks are obtained from the National Highway Safety Administration[15]. As above, we assume that projected commuter journeys, if taken by automobile, have one person per vehicle and projected journeys for tourism and other visits would have two persons per vehicle.

It is of course difficult to accurately assess the cost to the economy of an accident that claims a human life. For want of a better approach we make us of cost estimates of accidents resulting in death provided by NHTSA in *The Economic Impact of Motor Vehicle Crashes, 2000*[16]*.* The results of this analysis are presented below in Table 11.

Area of origin or destination	Fatalities avoided per year	Value of avoided accidents per year
Connecticut	0.42	$ 377,740
Massachusetts	0.72	$ 651,524
Combined	**1.14**	**$ 1,029,264**

Table 11: Reduction in automobile accident fatalities

The data indicates that the proposed rail passenger service would save 1.14 lives per year in the combined region and result in a benefit to the economy (avoiding the cost of such accidents) of $1.029 million per year. Similar to the earlier analysis we cannot say that (if the rail passenger service is not available) that 4 extra fatalities per decade would take place in Connecticut and 7 extra fatalities per decade would take place in Massachusetts. The analysis suggests that these fatalities would afflict some persons traveling to or from the respective destination or origin. The accidents

[15] The NHTSA Fatality Analysis Reporting System data can be queried online at http://www-nrd.nhtsa.dot.gov/departments/nrd-30/ncsa/STSI/USA%20WEB%20REPORT.HTM

[16] Blincoe, Lawrence *et al.*, The Economic Impact of Motor Vehicle Crashes, 2000, US Department of Transportation, Washington, DC (2002). Downloaded from http://www.cita-vehicleinspection.org/Portals/cita/autofore_study/LinkedDocuments/literature/NHTSA%20the%20economic%20impact%20of%20motor%20vehicle%20crashes%202000%20USA%202002.pdf

themselves might take place anywhere en route, including in the state of New York. If the rail passenger service is provided and utilization rates are those predicted by the research and provided by Housatonic Railroad, then those lives would be saved, and the costs associated with these accidental deaths avoided.

Finally, it should be noted that while neither northwestern Connecticut nor western Massachusetts are noted for their traffic congestion, there are times when traffic congestion does occur and can cause delays. This can be of particular difficulty near major performance venues (for example, in Lenox and Lee Massachusetts prior to and after performances at the Tanglewood Music Center). In some communities discussion of alternative traffic routing patterns or other possible approaches to traffic congestion mitigation have been discussed and debated. Provision of the proposed passenger rail service could be part of an approach to dealing with these problems.

5. Conclusions

The analysis presented above has identified a wide variety of important benefits to the service area of the proposed Housatonic Railroad passenger rail service. These come in the form of increased economic output and increased employment as a result of the construction and upgrading of the railroad and associated facilities, the operation of the railroad, and the attraction of new visitors to Connecticut and Massachusetts.

The benefits also come in the form of potential increases in the value of those residential properties that are located relatively close to the stations along the route. Finally, benefits come in the form of reduced road maintenance costs, fewer traffic fatalities and the reduction in costs associated with such accidents, and in reduced pollution and contribution to climate change.

The analysis presented in the preceding sections has described the methods and approaches used to estimate the value of these benefits, and presented estimates of the benefits themselves. Some of the benefits should be considered as equivalent to annual economic flows (increases in output, revenues available to the public sector, savings in road maintenance costs and avoided costs of fatal accidents). Others are in the form of one time increases in wealth or the value of the assets owned by residents (increases in the value of residential property). Finally others are not measured in monetary terms, but constitute quantifiable and important benefits associated with the proposed rail service (jobs in the region, impact on global climate change, lives saved).

The analysis must take account of the fact that the proposed project, if it is undertaken, involves two distinct phases. During the first phase, capital improvements are undertaken and the railroad is prepared for passenger operations. This phase is expected to take 3 years. After the initial period of capital improvements is complete the second phase begins, during which the passenger service operates and the full benefits of the improved transportation are experienced.

To provide a summary overview, we calculate the benefits that can be expected during the first 10 years of the project – 3 years of capital improvement and upgrade, followed by 7 years of operation of the passenger service at the expected levels of demand. The results are given below in Table 12. The table lists the differences that would be experienced if the project moves forward, compared with a situation in which the local economy and transportation infrastructure remain as they are today. The changes consist of increases in output, employment, tax revenues and property values as well as decreases in road maintenance costs, traffic fatalities, costs of accidents and in global mean temperature relative to what can be expected if the proposed rail passenger service is not provided.

Increases in …	Connecticut	Massachusetts	Combined
Economic output per year	$ 271,495,767	$ 343,970,290	**$ 625,074,159**
Employment	221	425	**610**
State and local tax revenues	$ 11,353,143	$ 17,510,471	**$ 29,452,747**
Federal tax revenues	$ 22,654,920	$ 27,944,938	**$ 55,020,326**
Property values	$ 202,695,948	$ 101,206,932	**$ 309,678,630**
Decreases in …			
Road maintenance costs	$ 481,719	$ 899,157	**$ 1,380,869**
Costs due to fatal accidents	$ 2,644,180	$ 4,560,668	**$ 7,204,848**
Traffic fatalities (persons)	2.94	5.04	**7.98**
Global mean temperature	2.2×10^{-7} degrees Celsius		

Table 12: Accrued benefits during first 10 years of proposed rail passenger service

In a final cost-benefit analysis, it would be customary to make some assumptions about the discount rate (or to utilize the rates specified as appropriate by financial practice or by public sector granting agencies) and calculate the present values of the stream of costs and revenues. This is easy to do using the annual figures presented in the body of the report, although it should be noted that should the project proceed it is likely that the nature of the local economy will evolve. The analysis presented above is based on the structure of the local economy as it existed in 2009. If rail passenger service is provided to the region, then the local tourist economy will grow and expand, new businesses are likely to be attracted to the region because of improved transportation and also because there will be an expanded market to which they can sell their goods and services. These changes will alter the nature of the local economy and would warrant further evaluation. Such developments are the changes that comprise economic growth and development, and are an important final benefit of the proposed project.

6. Appendix tables

Table A1: Impacts on output in each sector of the economy in the combined region

	Construction (2009 $)			*Operations (2009 $)*		
	Direct	**Indirect Induced**	**Total**	**Direct**	**Indirect Induced**	**Total**
Total all sectors	**66,666,666**	**34,153,602**	**100,820,268**	**30,885,624**	**15,201,998**	**46,087,622**
Transit and ground passenger transportation	-	86,462	86,462	22,660,000	41,338	22,701,338
Maint/repair construct of nonresident structures	45,333,333	135,886	45,469,219	-	106,486	106,486
Construct other new nonresidential structures	11,000,000	-	11,000,000	-	-	-
Hotels and motels- including casino hotels	-	172,818	172,818	4,433,718	82,473	4,516,192
Railroad rolling stock manufacturing	10,000,000	9,892	10,009,892	-	4,943	4,943
Food services and drinking places	-	1,086,976	1,086,976	2,574,051	596,406	3,170,457
Imputed rental activity for owner-occ dwellings	-	3,086,101	3,086,101	-	1,548,259	1,548,259
Real estate establishments	-	1,517,049	1,517,049	-	818,484	818,484
Architectural- engineering- and related services	-	3,194,317	3,194,317	-	67,727	67,727
Wholesale trade businesses	-	1,781,778	1,781,778	-	533,954	533,954
Offices of physicians- dentists- and other health	-	1,333,593	1,333,593	-	691,582	691,582
Private hospitals	-	1,093,188	1,093,188	-	566,379	566,379
Retail Stores – Miscellaneous	-	229,789	229,789	722,322	71,002	793,324
Nondepository credit intermediation and related	-	851,748	851,748	-	448,050	448,050
Management of companies and enterprises	-	714,356	714,356	-	470,333	470,333
Monetary authorities and depository credit inst	-	747,376	747,376	-	366,358	366,358
Telecommunications	-	674,130	674,130	-	339,598	339,598
Insurance carriers	-	334,925	334,925	-	355,095	355,095
Automotive equipment rental and leasing	-	108,175	108,175	357,192	76,022	433,214
Management- scientific- and technical consult	-	257,638	257,638	-	361,395	361,395
Retail Stores - Food and beverage	-	611,345	611,345	-	208,933	208,933
Pharmaceutical preparation manufacturing	-	460,836	460,836	-	241,610	241,610
Legal services	-	517,399	517,399	-	186,466	186,466
Nursing and residential care facilities	-	417,736	417,736	-	213,507	213,507
Accounting- tax preparation- bookkeeping	-	401,500	401,500	-	209,568	209,568
Services to buildings and dwellings	-	304,973	304,973	-	243,837	243,837
Retail Stores - Motor vehicle and parts	-	469,415	469,415	-	149,072	149,072
Other state and local government enterprises	-	280,673	280,673	-	221,760	221,760
Advertising and related services	333,333	113,027	446,360	-	131,337	131,337
Automotive repair and maintenance	-	451,015	451,015	-	98,499	98,499
Electric power generation- transmission	-	231,316	231,316	-	186,196	186,196
Retail Nonstores - Direct and electronic sale	-	341,023	341,023	-	136,440	136,440
Retail Stores - General merchandise	-	379,437	379,437	-	115,092	115,092
Commercial and industrial machinery and equip	-	552,207	552,207	-	38,986	38,986
Waste management and remediation services	-	162,085	162,085	-	204,883	204,883
Retail Stores - Gasoline stations	-	197,708	197,708	120,198	69,311	189,509
Employment services	-	205,733	205,733	-	183,897	183,897
Dry-cleaning and laundry services	-	46,850	46,850	-	231,315	231,315
Transport by truck	-	373,062	373,062	-	89,010	89,010
Asphalt paving mixture and block manufacturing	-	545,686	545,686	-	5,661	5,661
Retail Stores - Building material and garden	-	307,509	307,509	-	105,670	105,670
Retail Stores - Clothing and clothing accessories	-	293,191	293,191	-	103,629	103,629
Retail Stores - Health and personal care	-	308,648	308,648	-	94,312	94,312
Other plastics product manufacturing	-	371,980	371,980	-	54,950	54,950
Private junior colleges- colleges- universities	-	209,641	209,641	-	103,566	103,566

	Construction (2009 $)			*Operations (2009 $)*		
	Direct	**Indirect Induced**	**Total**	**Direct**	**Indirect Induced**	**Total**
Medical and diagnostic labs and outpatient	-	202,451	202,451	-	104,174	104,174
Lessors of nonfinancial intangible assets	-	216,600	216,600	-	95,902	95,902
Insurance agencies- brokerages- and related	-	91,839	91,839	-	142,284	142,284
Securities- commodity contracts- investments	-	187,410	187,410	-	97,504	97,504
US Postal Service	-	88,662	88,662	-	127,959	127,959
Newspaper publishers	-	105,547	105,547	-	118,104	118,104
Periodical publishers	-	103,564	103,564	-	111,338	111,338
Office administrative services	-	113,194	113,194	-	106,921	106,921
Civic- social- professional- and similar	-	174,879	174,879	-	78,913	78,913
Couriers and messengers	-	89,681	89,681	-	108,961	108,961
Natural gas distribution	-	154,822	154,822	-	74,635	74,635
Commercial and industrial machinery and equip	-	248,594	248,594	-	32,356	32,356
Maint& repair construct of residential structure	-	144,909	144,909	-	73,833	73,833
Machine shops	-	48,716	48,716	-	110,894	110,894
Private elementary and secondary schools	-	143,409	143,409	-	68,348	68,348
Child day care services	-	119,796	119,796	18,143	59,660	77,803
Personal care services	-	133,155	133,155	-	68,643	68,643
Relay and industrial control manufacturing	-	266,616	266,616	-	9,201	9,201
Motion picture and video industries	-	112,773	112,773	-	68,028	68,028
Other computer related services- including fax	-	160,891	160,891	-	46,756	46,756
Other engine equipment manufacturing	-	13,781	13,781	-	107,272	107,272
Religious organizations	-	119,509	119,509	-	60,039	60,039
Retail Stores - Furniture and home furnishing	-	138,871	138,871	-	49,347	49,347
Home health care services	-	113,909	113,909	-	58,360	58,360
All other miscellaneous professional- scientific	-	119,478	119,478	-	55,627	55,627
Retail Stores - Electronics and appliances	-	144,694	144,694	-	44,394	44,394
Other private educational services	-	106,520	106,520	-	54,608	54,608
Environmental and other technical consulting	-	77,085	77,085	-	66,710	66,710
Ball and roller bearing manufacturing	-	88,474	88,474	-	60,890	60,890
Wood windows and doors and millwork manuf.	-	208,469	208,469	-	7,791	7,791
Warehousing and storage	-	74,559	74,559	-	62,250	62,250
Printing	-	60,124	60,124	-	65,421	65,421
Retail Stores - Sporting goods- hobby- book	-	122,639	122,639	-	35,544	35,544
Grantmaking- giving- and social advocacy	-	94,476	94,476	-	47,474	47,474
Individual and family services	-	91,264	91,264	-	45,855	45,855
Crown and closure manufacturing and metal	-	28,167	28,167	-	66,508	66,508
Promoters of performing arts and sports	-	54,533	54,533	-	48,171	48,171
Radio and television broadcasting	-	44,743	44,743	-	50,138	50,138
Semiconductor and related device manuf.	-	110,597	110,597	-	20,797	20,797
All other chemical product and preparation	-	106,373	106,373	-	19,560	19,560
Wiring device manufacturing	-	50,071	50,071	-	43,657	43,657
Other personal services	-	69,150	69,150	-	34,920	34,920
Personal and household goods repair and maint	-	97,435	97,435	-	21,717	21,717
General and consumer goods rental except vid.	-	62,191	62,191	-	35,875	35,875
Other amusement and recreation industries	-	67,612	67,612	-	33,112	33,112
Travel arrangement and reservation services	-	30,644	30,644	-	45,650	45,650
Scenic and sightseeing transportation	-	51,351	51,351	-	32,910	32,910
Other basic organic chemical manufacturing	-	71,253	71,253	-	22,017	22,017
Business support services	-	42,862	42,862	-	33,736	33,736

	Construction (2009 $)			*Operations (2009 $)*		
	Direct	**Indirect Induced**	**Total**	**Direct**	**Indirect Induced**	**Total**
Private household operations	-	56,006	56,006	-	27,525	27,525
Amusement parks- arcades- and gambling	-	52,865	52,865	-	26,771	26,771
Computer systems design services	-	57,758	57,758	-	24,624	24,624
Other support services	-	53,154	53,154	-	25,830	25,830
Independent artists- writers- and performers	-	43,652	43,652	-	27,119	27,119
Electronic and precision equipment repair	-	60,547	60,547	-	18,819	18,819
Plastics packaging materials	-	69,494	69,494	-	13,934	13,934
Seasoning and dressing manufacturing	-	30,134	30,134	-	30,112	30,112
Veterinary services	-	46,165	46,165	-	23,238	23,238
Cable and other subscription programming	-	28,999	28,999	-	29,671	29,671
Motor vehicle body manufacturing	-	15,170	15,170	-	33,512	33,512
Investigation and security services	-	37,548	37,548	-	23,407	23,407
Community food- housing- and other relief	-	41,161	41,161	-	20,681	20,681
Wood kitchen cabinet and countertop manuf.	-	65,926	65,926	-	10,056	10,056
Fitness and recreational sports centers	-	42,885	42,885	-	19,692	19,692
Urethane and other foam product (except polys)	-	63,987	63,987	-	9,529	9,529
Transport by rail	-	55,163	55,163	-	13,167	13,167
Industrial gas manufacturing	-	59,705	59,705	-	9,860	9,860
Directory- mailing list- and other publishers	-	22,535	22,535	-	24,816	24,816
Sawmills and wood preservation	-	73,018	73,018	-	1,416	1,416
Performing arts companies	-	27,410	27,410	-	20,891	20,891
Specialized design services	-	46,869	46,869	-	11,844	11,844
Surgical appliance and supplies manufacturing	-	33,123	33,123	-	17,526	17,526
Death care services	-	31,633	31,633	-	17,222	17,222
Toilet preparation manufacturing	-	36,922	36,922	-	14,906	14,906
Adhesive manufacturing	-	61,040	61,040	-	4,046	4,046
In-vitro diagnostic substance manufacturing	-	40,544	40,544	-	12,696	12,696
Scientific research and development services	-	43,346	43,346	-	10,181	10,181
Plastics material and resin manufacturing	-	38,920	38,920	-	11,990	11,990
Funds- trusts- and other financial vehicles	-	30,634	30,634	-	15,268	15,268
Automatic environmental control manufacturing	-	40,817	40,817	-	10,875	10,875
Museums- historical sites- zoos- and parks	-	29,956	29,956	-	15,050	15,050
All other crop farming	-	56,670	56,670	-	3,226	3,226
Soap and cleaning compound manufacturing	-	33,848	33,848	-	12,455	12,455
Data processing- hosting- ISP- web search	-	24,656	24,656	-	15,927	15,927
Custom computer programming services	-	29,937	29,937	-	12,940	12,940
Surgical and medical instrument- laboratory	-	24,790	24,790	-	13,947	13,947
Switchgear and switchboard apparatus manuf.	-	52,844	52,844	-	1,500	1,500
Turned product and screw- nut- and bolt manuf.	-	36,861	36,861	-	6,685	6,685
Bread and bakery product manufacturing	-	18,550	18,550	-	14,386	14,386
Other communications equipment manuf.	-	46,314	46,314	-	1,645	1,645
Software publishers	-	37,035	37,035	-	5,119	5,119
Other accommodations	-	22,462	22,462	-	11,093	11,093
Coating- engraving- heat treating and allied	-	32,249	32,249	-	6,541	6,541
Spring and wire product manufacturing	-	36,658	36,658	-	4,179	4,179
* Not unique commod (S&LG electricity)	-	15,955	15,955	-	13,021	13,021
Spectator sports companies	-	19,608	19,608	-	11,392	11,392
Printed circuit assembly (electronic assembly	-	33,231	33,231	-	4,907	4,907
Mechanical power transmission equipment	-	27,955	27,955	-	6,624	6,624

	Construction (2009 $)			*Operations (2009 $)*		
	Direct	**Indirect Induced**	**Total**	**Direct**	**Indirect Induced**	**Total**
Internet publishing and broadcasting	-	12,431	12,431	-	13,187	13,187
Car washes	-	24,152	24,152	-	7,854	7,854
Water- sewage and other treatment	-	12,329	12,329	-	12,121	12,121
Nonferrous metal (except copper and alum.)	-	35,934	35,934	-	1,768	1,768
All other forging- stamping- and sintering	-	22,013	22,013	-	5,955	5,955
Greenhouse- nursery- and floriculture product	-	15,786	15,786	-	8,535	8,535
Video tape and disc rental	-	16,137	16,137	-	8,123	8,123
Polystyrene foam product manufacturing	-	23,680	23,680	-	3,880	3,880
Animal (except poultry) slaughtering- rendering	-	11,551	11,551	-	8,921	8,921
Power-driven handtool manufacturing	-	24,392	24,392	-	2,744	2,744
Electromedical and electrotherapeutic app.	-	13,536	13,536	-	6,990	6,990
Aircraft manufacturing	-	22,439	22,439	-	2,938	2,938
Glass product manufacturing made of purchased	-	18,375	18,375	-	4,646	4,646
Other information services	-	9,938	9,938	-	7,711	7,711
Communication and energy wire and cable mfg.	-	24,268	24,268	-	1,338	1,338
Photographic services	-	13,639	13,639	-	5,409	5,409
All other miscellaneous electrical equipment	-	18,596	18,596	-	3,077	3,077
Other concrete product manufacturing	-	24,674	24,674	-	251	251
Animal production- except cattle and poultry	-	9,654	9,654	-	6,481	6,481
Mining and quarrying stone	-	23,449	23,449	-	163	163
Seafood product preparation and packaging	-	5,619	5,619	-	7,441	7,441
Nonupholstered wood household furniture mfg.	-	10,732	10,732	-	5,217	5,217
Magnetic and optical recording media mfg.	-	2,712	2,712	-	8,472	8,472
Steel product manufacturing from purchased	-	19,616	19,616	-	1,058	1,058
Vending- commercial- industrial- and office	-	13,911	13,911	-	3,053	3,053
Book publishers	-	8,644	8,644	-	4,497	4,497
All other basic inorganic chemical manufacturing	-	12,314	12,314	-	2,865	2,865
Storage battery manufacturing	-	11,893	11,893	-	2,768	2,768
* Not unique commod (S&LG passenger transit)	-	8,298	8,298	-	3,969	3,969
Transport by air	-	8,673	8,673	-	3,722	3,722
Unlaminated plastics profile shape manuf.	-	13,364	13,364	-	1,702	1,702
All other food manufacturing	-	6,420	6,420	-	4,559	4,559
Sign manufacturing	-	4,858	4,858	-	4,992	4,992
Transport by water	-	8,460	8,460	-	3,339	3,339
Hardware manufacturing	-	11,161	11,161	-	2,169	2,169
Printing ink manufacturing	-	4,036	4,036	-	5,015	5,015
Valve and fittings other than plumbing manuf.	-	10,741	10,741	-	1,809	1,809
Soft drink and ice manufacturing	-	4,500	4,500	-	4,466	4,466
Broadcast and wireless communications equip.	-	7,410	7,410	-	3,016	3,016
Other pressed and blown glass and glassware	-	7,021	7,021	-	3,172	3,172
Iron and steel mills and ferroalloy manuf.	-	12,679	12,679	-	680	680
Other industrial machinery manufacturing	-	8,367	8,367	-	2,394	2,394
Poultry and egg production	-	5,612	5,612	-	3,511	3,511
Plumbing fixture fitting and trim manufacturing	-	11,395	11,395	-	864	864
Aircraft engine and engine parts manufacturing	-	8,774	8,774	-	1,916	1,916
Showcase- partition- shelving- and locker mfg.	-	8,996	8,996	-	1,795	1,795
Sound recording industries	-	4,935	4,935	-	3,306	3,306
Cutting tool and machine tool accessory manuf.	-	7,244	7,244	-	1,389	1,389
Other electronic component manufacturing	-	7,230	7,230	-	1,391	1,391

	Construction (2009 $)			*Operations (2009 $)*		
	Direct	**Indirect Induced**	**Total**	**Direct**	**Indirect Induced**	**Total**
Special tool- die- jig- and fixture manufacturing	-	2,682	2,682	-	3,235	3,235
Copper rolling- drawing- extruding and alloying	-	8,842	8,842	-	339	339
Industrial process variable instruments manuf.	-	5,904	5,904	-	1,557	1,557
Ice cream and frozen dessert manufacturing	-	2,478	2,478	-	2,917	2,917
Irradiation apparatus manufacturing	-	5,634	5,634	-	1,386	1,386
Ophthalmic goods manufacturing	-	3,964	3,964	-	2,023	2,023
Search- detection- and navigation instruments	-	5,349	5,349	-	1,282	1,282
Fruit farming	-	3,687	3,687	-	1,985	1,985
Industrial mold manufacturing	-	2,401	2,401	-	2,437	2,437
Material handling equipment manufacturing	-	5,905	5,905	-	849	849
Womens and girls cut and sew apparel manuf.	-	3,418	3,418	-	1,741	1,741
Electronic computer manufacturing	-	3,251	3,251	-	1,668	1,668
Telephone apparatus manufacturing	-	2,986	2,986	-	1,700	1,700
Handtool manufacturing	-	3,224	3,224	-	1,485	1,485
Support activities for printing	-	3,444	3,444	-	1,255	1,255
Semiconductor machinery manufacturing	-	1,804	1,804	-	1,755	1,755
Textile bag and canvas mills	-	3,565	3,565	-	922	922
Bowling centers	-	2,596	2,596	-	1,268	1,268
Dental equipment and supplies manufacturing	-	2,541	2,541	-	1,253	1,253
Mining and quarrying sand- gravel- clay- and	-	5,105	5,105	-	113	113
Photographic and photocopying equipment mfg.	-	2,517	2,517	-	1,214	1,214
Other rubber product manufacturing	-	1,248	1,248	-	1,729	1,729
Commercial logging	-	4,974	4,974	-	113	113
Ornamental and architectural metal products	-	4,549	4,549	-	205	205
Support activities for agriculture and forest	-	3,229	3,229	-	735	735
Extraction of oil and natural gas	-	2,025	2,025	-	1,180	1,180
Computer terminals and other computer periph.	-	2,107	2,107	-	1,061	1,061
Coated and laminated paper- packaging paper	-	3,009	3,009	-	669	669
Ammunition manufacturing	-	3,584	3,584	-	397	397
Prefabricated wood building manufacturing	-	4,053	4,053	-	191	191
Vegetable and melon farming	-	1,964	1,964	-	1,081	1,081
Watch- clock- and other measuring and control	-	2,744	2,744	-	690	690
Fertilizer manufacturing	-	3,861	3,861	-	154	154
All other textile product mills	-	3,285	3,285	-	356	356
Wood container and pallet manufacturing	-	2,506	2,506	-	664	664
All other paper bag and coated and treated pap.	-	1,826	1,826	-	932	932
Metal can- box- and other metal container	-	1,871	1,871	-	892	892
Custom roll forming	-	3,596	3,596	-	129	129
Plate work and fabricated structural product	-	3,585	3,585	-	41	41
Curtain and linen mills	-	1,435	1,435	-	836	836
Small electrical appliance manufacturing	-	3,086	3,086	-	91	91
Cattle ranching and farming	-	1,182	1,182	-	887	887
Pesticide and other agricultural chemical mfg.	-	2,057	2,057	-	492	492
Fats and oils refining and blending	-	1,018	1,018	-	901	901
Lighting fixture manufacturing	-	2,645	2,645	-	200	200
Chocolate and confectionery manufacturing	-	1,083	1,083	-	865	865
Electronic capacitor- resistor- coil- transformers	-	1,864	1,864	-	508	508
Upholstered household furniture manufacturing	-	1,355	1,355	-	719	719
Dental laboratories manufacturing	-	1,355	1,355	-	703	703

	Construction (2009 $)			*Operations (2009 $)*		
	Direct	**Indirect Induced**	**Total**	**Direct**	**Indirect Induced**	**Total**
Carbon and graphite product manufacturing	-	104	104	-	1,206	1,206
Plastics and rubber industry machinery manuf.	-	2,128	2,128	-	331	331
Lime and gypsum product manufacturing	-	2,528	2,528	-	93	93
Electronic connector manufacturing	-	1,958	1,958	-	337	337
Coffee and tea manufacturing	-	940	940	-	735	735
Other aircraft parts and auxiliary equipment	-	1,493	1,493	-	450	450
Totalizing fluid meters and counting devices	-	1,001	1,001	-	643	643
Cut stone and stone product manufacturing	-	1,913	1,913	-	247	247
Apparel accessories and other apparel manuf.	-	1,118	1,118	-	571	571
Metal cutting and forming machine tool manuf.	-	1,078	1,078	-	552	552
Analytical laboratory instrument manufacturing	-	1,505	1,505	-	339	339
Paperboard container manufacturing	-	1,760	1,760	-	229	229
Paper mills	-	673	673	-	684	684
Fabricated pipe and pipe fitting manufacturing	-	2,174	2,174	-	24	24
Wineries	-	745	745	-	590	590
Electricity and signal testing instruments mfg.	-	1,082	1,082	-	293	293
Metal and other household furniture manuf.	-	843	843	-	373	373
Other commercial and service industry machine	-	1,592	1,592	-	37	37
Pump and pumping equipment manufacturing	-	415	415	-	529	529
Facilities support services	-	550	550	-	457	457
Software- audio- and video media for reproduct.	-	756	756	-	359	359
Industrial process furnace and oven manuf.	-	103	103	-	629	629
Distilleries	-	417	417	-	457	457
Air purification and ventilation equipment mfg.	-	1,112	1,112	-	151	151
Turbine and turbine generator set units manuf.	-	563	563	-	381	381
Other fabricated metal manufacturing	-	1,106	1,106	-	134	134
Aluminum product manufacturing	-	960	960	-	158	158
Bare printed circuit board manufacturing	-	999	999	-	99	99
Apparel knitting mills	-	560	560	-	285	285
Mattress manufacturing	-	543	543	-	265	265
Nonferrous metal foundries	-	720	720	-	163	163
Cut and sew apparel contractors	-	477	477	-	250	250
Mens and boys cut and sew apparel manuf.	-	471	471	-	241	241
Office supplies (except paper) manufacturing	-	607	607	-	182	182
Air and gas compressor manufacturing	-	754	754	-	100	100
Rolling mill and other metalworking machinery	-	394	394	-	219	219
Textile and fabric finishing mills	-	461	461	-	173	173
Mining and oil and gas field machinery manuf.	-	489	489	-	156	156
All other miscellaneous manufacturing	-	341	341	-	213	213
Blind and shade manufacturing	-	394	394	-	182	182
Household cooking appliance manufacturing	-	397	397	-	161	161
Pottery- ceramics- and plumbing fixture manuf.	-	471	471	-	108	108
All other converted paper product manuf.	-	419	419	-	107	107
Dairy cattle and milk production	-	244	244	-	158	158
Gasket- packing- and sealing device manuf.	-	265	265	-	143	143
Commercial hunting and trapping	-	272	272	-	138	138
Doll- toy- and game manufacturing	-	365	365	-	92	92
Other general purpose machinery manuf.	-	373	373	-	88	88
Frozen food manufacturing	-	189	189	-	141	141

	Construction (2009 $)			*Operations (2009 $)*		
	Direct	**Indirect Induced**	**Total**	**Direct**	**Indirect Induced**	**Total**
Jewelry and silverware manufacturing	-	194	194	-	101	101
Optical instrument and lens manufacturing	-	296	296	-	53	53
Carpet and rug mills	-	99	99	-	133	133
Packaging machinery manufacturing	-	253	253	-	45	45
Broadwoven fabric mills	-	165	165	-	75	75
Confectionery manufacturing from purchased	-	116	116	-	89	89
Sporting and athletic goods manufacturing	-	135	135	-	70	70
Musical instrument manufacturing	-	141	141	-	57	57
Custom architectural wood manufacturing	-	151	151	-	50	50
Support activities for oil and gas operations	-	76	76	-	52	52
Brick- tile- and other structural clay products	-	162	162	-	10	10
Tire manufacturing	-	25	25	-	58	58
Paint and coating manufacturing	-	149	149	-	4	4
Miscellaneous nonmetallic mineral product mfg.	-	119	119	-	3	3
Sanitary paper product manufacturing	-	64	64	-	18	18
Heating equipment (except warm air furnaces)	-	84	84	-	9	9
Concrete pipe- brick- and block manufacturing	-	84	84	-	6	6
Fiber- yarn- and thread mills	-	41	41	-	18	18
Ready-mix concrete manufacturing	-	71	71	-	1	1
Artificial and synthetic fibers and filaments	-	33	33	-	10	10
Arms- ordnance- and accessories manufacturing	-	35	35	-	6	6
Narrow fabric mills and schiffli machine	-	22	22	-	8	8
Stationery product manufacturing	-	16	16	-	6	6
Mining and quarrying other nonmetallic mineral	-	21	21	-	3	3
Tree nut farming	-	7	7	-	4	4
Mineral wool manufacturing	-	4	4	-	2	2
Air conditioning- refrigeration- and warm air	-	1	1	-	0	0

Table A2: Impacts on employment in each sector of the economy in the combined region

	Construction (numbers of jobs)			*Operations (numbers of jobs)*		
	Direct	**Indirect and Induced**	**Total**	**Direct**	**Indirect and Induced**	**Total**
Total all sectors	**494.0**	**238.7**	**732.7**	**449.0**	**108.6**	**557.5**
Transit and ground passenger transportation	0.0	1.3	1.3	353.5	0.6	354.1
Maint /repair construct of nonresident structures	393.0	1.2	394.2	0.0	0.9	0.9
Construct other new nonresidential structures	81.9	0.0	81.9	0.0	0.0	0.0
Hotels and motels- including casino hotels	0.0	1.4	1.4	35.2	0.7	35.8
Railroad rolling stock manufacturing	16.7	0.0	16.7	0.0	0.0	0.0
Food services and drinking places	0.0	16.8	16.8	39.8	9.2	49.0
Imputed rental activity for owner-occ dwellings	0.0	0.0	0.0	0.0	0.0	0.0
Real estate establishments	0.0	13.8	13.8	0.0	7.4	7.4
Architectural- engineering- and related services	0.0	23.4	23.4	0.0	0.5	0.5
Wholesale trade businesses	0.0	8.1	8.1	0.0	2.4	2.4
Offices of physicians- dentists- and other health	0.0	9.3	9.3	0.0	4.8	4.8
Private hospitals	0.0	7.1	7.1	0.0	3.7	3.7
Retail Stores - Miscellaneous	0.0	5.9	5.9	18.6	1.8	20.4
Nondepository credit intermediation and related	0.0	0.9	0.9	0.0	0.5	0.5
Management of companies and enterprises	0.0	2.7	2.7	0.0	1.8	1.8
Monetary authorities and depository credit inst	0.0	2.5	2.5	0.0	1.2	1.2
Telecommunications	0.0	1.6	1.6	0.0	0.8	0.8
Insurance carriers	0.0	0.8	0.8	0.0	0.8	0.8
Automotive equipment rental and leasing	0.0	0.2	0.2	0.7	0.2	0.9
Management- scientific- and technical consult	0.0	1.3	1.3	0.0	1.8	1.8
Retail Stores - Food and beverage	0.0	9.3	9.3	0.0	3.2	3.2
Pharmaceutical preparation manufacturing	0.0	0.3	0.3	0.0	0.1	0.1
Legal services	0.0	3.8	3.8	0.0	1.4	1.4
Nursing and residential care facilities	0.0	5.9	5.9	0.0	3.0	3.0
Accounting- tax preparation- bookkeeping	0.0	3.4	3.4	0.0	1.8	1.8
Services to buildings and dwellings	0.0	4.5	4.5	0.0	3.6	3.6
Retail Stores - Motor vehicle and parts	0.0	5.3	5.3	0.0	1.7	1.7
Other state and local government enterprises	0.0	1.0	1.0	0.0	0.8	0.8
Advertising and related services	2.4	0.8	3.2	0.0	1.0	1.0
Automotive repair and maintenance	0.0	4.5	4.5	0.0	1.0	1.0
Electric power generation- transmission	0.0	0.3	0.3	0.0	0.2	0.2
Retail Nonstores - Direct and electronic sale	0.0	2.1	2.1	0.0	0.8	0.8
Retail Stores - General merchandise	0.0	7.1	7.1	0.0	2.1	2.1
Commercial and industrial machinery and equip	0.0	0.9	0.9	0.0	0.1	0.1
Waste management and remediation services	0.0	0.7	0.7	0.0	0.9	0.9
Retail Stores - Gasoline stations	0.0	1.4	1.4	0.8	0.5	1.3
Employment services	0.0	3.6	3.6	0.0	3.2	3.2
Dry-cleaning and laundry services	0.0	0.7	0.7	0.0	3.7	3.7
Transport by truck	0.0	2.5	2.5	0.0	0.6	0.6
Asphalt paving mixture and block manufacturing	0.0	0.6	0.6	0.0	0.0	0.0
Retail Stores - Building material and garden	0.0	3.6	3.6	0.0	1.2	1.2
Retail Stores - Clothing and clothing accessories	0.0	5.1	5.1	0.0	1.8	1.8
Retail Stores - Health and personal care	0.0	3.9	3.9	0.0	1.2	1.2
Other plastics product manufacturing	0.0	1.6	1.6	0.0	0.2	0.2

	Construction (numbers of jobs)			*Operations (numbers of jobs)*		
	Direct	**Indirect and Induced**	**Total**	**Direct**	**Indirect and Induced**	**Total**
Private junior colleges- colleges- universities	0.0	2.2	2.2	0.0	1.1	1.1
Medical and diagnostic labs and outpatient	0.0	1.6	1.6	0.0	0.8	0.8
Lessors of nonfinancial intangible assets	0.0	0.1	0.1	0.0	0.0	0.0
Insurance agencies- brokerages- and related	0.0	0.6	0.6	0.0	0.9	0.9
Securities- commodity contracts- investments	0.0	1.5	1.5	0.0	0.8	0.8
US Postal Service	0.0	0.9	0.9	0.0	1.2	1.2
Newspaper publishers	0.0	0.9	0.9	0.0	1.1	1.1
Periodical publishers	0.0	0.4	0.4	0.0	0.4	0.4
Office administrative services	0.0	0.9	0.9	0.0	0.9	0.9
Civic- social- professional- and similar	0.0	3.2	3.2	0.0	1.5	1.5
Couriers and messengers	0.0	0.8	0.8	0.0	0.9	0.9
Natural gas distribution	0.0	0.1	0.1	0.0	0.1	0.1
Commercial and industrial machinery and equip	0.0	1.9	1.9	0.0	0.2	0.2
Maint& repair construct of residential structure	0.0	1.1	1.1	0.0	0.5	0.5
Machine shops	0.0	0.3	0.3	0.0	0.7	0.7
Private elementary and secondary schools	0.0	2.5	2.5	0.0	1.2	1.2
Child day care services	0.0	2.6	2.6	0.4	1.3	1.7
Personal care services	0.0	1.5	1.5	0.0	0.8	0.8
Relay and industrial control manufacturing	0.0	0.4	0.4	0.0	0.0	0.0
Motion picture and video industries	0.0	0.5	0.5	0.0	0.3	0.3
Other computer related services- including fax	0.0	0.7	0.7	0.0	0.2	0.2
Other engine equipment manufacturing	0.0	0.0	0.0	0.0	0.2	0.2
Religious organizations	0.0	0.7	0.7	0.0	0.4	0.4
Retail Stores - Furniture and home furnishing	0.0	1.6	1.6	0.0	0.6	0.6
Home health care services	0.0	1.8	1.8	0.0	0.9	0.9
All other miscellaneous professional- scientific	0.0	0.3	0.3	0.0	0.2	0.2
Retail Stores - Electronics and appliances	0.0	1.8	1.8	0.0	0.6	0.6
Other private educational services	0.0	1.9	1.9	0.0	1.0	1.0
Environmental and other technical consulting	0.0	0.5	0.5	0.0	0.4	0.4
Ball and roller bearing manufacturing	0.0	0.3	0.3	0.0	0.2	0.2
Wood windows and doors and millwork manuf.	0.0	1.2	1.2	0.0	0.0	0.0
Warehousing and storage	0.0	0.6	0.6	0.0	0.5	0.5
Printing	0.0	0.3	0.3	0.0	0.4	0.4
Retail Stores - Sporting goods- hobby- book	0.0	2.7	2.7	0.0	0.8	0.8
Grantmaking- giving- and social advocacy	0.0	0.8	0.8	0.0	0.4	0.4
Individual and family services	0.0	1.9	1.9	0.0	0.9	0.9
Crown and closure manufacturing and metal	0.0	0.1	0.1	0.0	0.3	0.3
Promoters of performing arts and sports	0.0	1.2	1.2	0.0	1.1	1.1
Radio and television broadcasting	0.0	0.2	0.2	0.0	0.2	0.2
Semiconductor and related device manuf.	0.0	0.2	0.2	0.0	0.0	0.0
All other chemical product and preparation	0.0	0.2	0.2	0.0	0.0	0.0
Wiring device manufacturing	0.0	0.2	0.2	0.0	0.1	0.1
Other personal services	0.0	0.4	0.4	0.0	0.2	0.2
Personal and household goods repair and maint	0.0	0.5	0.5	0.0	0.1	0.1
General and consumer goods rental except vid.	0.0	0.3	0.3	0.0	0.2	0.2
Other amusement and recreation industries	0.0	1.0	1.0	0.0	0.5	0.5
Travel arrangement and reservation services	0.0	0.3	0.3	0.0	0.4	0.4
Scenic and sightseeing transportation	0.0	0.3	0.3	0.0	0.2	0.2
Other basic organic chemical manufacturing	0.0	0.0	0.0	0.0	0.0	0.0

	Construction (numbers of jobs)			*Operations (numbers of jobs)*		
	Direct	**Indirect and Induced**	**Total**	**Direct**	**Indirect and Induced**	**Total**
Business support services	0.0	0.6	0.6	0.0	0.5	0.5
Private household operations	0.0	3.5	3.5	0.0	1.7	1.7
Amusement parks- arcades- and gambling	0.0	0.8	0.8	0.0	0.4	0.4
Computer systems design services	0.0	0.6	0.6	0.0	0.3	0.3
Other support services	0.0	0.5	0.5	0.0	0.2	0.2
Independent artists- writers- and performers	0.0	0.3	0.3	0.0	0.2	0.2
Electronic and precision equipment repair	0.0	0.3	0.3	0.0	0.1	0.1
Plastics packaging materials	0.0	0.2	0.2	0.0	0.0	0.0
Seasoning and dressing manufacturing	0.0	0.1	0.1	0.0	0.1	0.1
Veterinary services	0.0	0.7	0.7	0.0	0.3	0.3
Cable and other subscription programming	0.0	0.1	0.1	0.0	0.1	0.1
Motor vehicle body manufacturing	0.0	0.0	0.0	0.0	0.1	0.1
Investigation and security services	0.0	0.9	0.9	0.0	0.5	0.5
Community food- housing- and other relief	0.0	0.8	0.8	0.0	0.4	0.4
Wood kitchen cabinet and countertop manuf.	0.0	0.5	0.5	0.0	0.1	0.1
Fitness and recreational sports centers	0.0	1.1	1.1	0.0	0.5	0.5
Urethane and other foam product (except polys)	0.0	0.2	0.2	0.0	0.0	0.0
Transport by rail	0.0	0.2	0.2	0.0	0.0	0.0
Industrial gas manufacturing	0.0	0.0	0.0	0.0	0.0	0.0
Directory- mailing list- and other publishers	0.0	0.1	0.1	0.0	0.1	0.1
Sawmills and wood preservation	0.0	0.3	0.3	0.0	0.0	0.0
Performing arts companies	0.0	0.8	0.8	0.0	0.6	0.6
Specialized design services	0.0	0.4	0.4	0.0	0.1	0.1
Surgical appliance and supplies manufacturing	0.0	0.1	0.1	0.0	0.1	0.1
Death care services	0.0	0.3	0.3	0.0	0.2	0.2
Toilet preparation manufacturing	0.0	0.0	0.0	0.0	0.0	0.0
Adhesive manufacturing	0.0	0.1	0.1	0.0	0.0	0.0
In-vitro diagnostic substance manufacturing	0.0	0.1	0.1	0.0	0.0	0.0
Scientific research and development services	0.0	0.2	0.2	0.0	0.1	0.1
Plastics material and resin manufacturing	0.0	0.0	0.0	0.0	0.0	0.0
Funds- trusts- and other financial vehicles	0.0	0.1	0.1	0.0	0.0	0.0
Automatic environmental control manufacturing	0.0	0.1	0.1	0.0	0.0	0.0
Museums- historical sites- zoos- and parks	0.0	0.2	0.2	0.0	0.1	0.1
All other crop farming	0.0	0.4	0.4	0.0	0.0	0.0
Soap and cleaning compound manufacturing	0.0	0.0	0.0	0.0	0.0	0.0
Data processing- hosting- ISP- web search	0.0	0.1	0.1	0.0	0.1	0.1
Custom computer programming services	0.0	0.2	0.2	0.0	0.1	0.1
Surgical and medical instrument- laboratory	0.0	0.1	0.1	0.0	0.0	0.0
Switchgear and switchboard apparatus manuf.	0.0	0.2	0.2	0.0	0.0	0.0
Turned product and screw- nut- and bolt manuf.	0.0	0.2	0.2	0.0	0.0	0.0
Bread and bakery product manufacturing	0.0	0.1	0.1	0.0	0.1	0.1
Other communications equipment manuf.	0.0	0.1	0.1	0.0	0.0	0.0
Software publishers	0.0	0.1	0.1	0.0	0.0	0.0
Other accommodations	0.0	0.3	0.3	0.0	0.1	0.1
Coating- engraving- heat treating and allied	0.0	0.1	0.1	0.0	0.0	0.0
Spring and wire product manufacturing	0.0	0.2	0.2	0.0	0.0	0.0
* Not unique commod (S&LG electricity)	0.0	0.0	0.0	0.0	0.0	0.0
Spectator sports companies	0.0	0.7	0.7	0.0	0.4	0.4
Printed circuit assembly (electronic assembly	0.0	0.1	0.1	0.0	0.0	0.0

	Construction (numbers of jobs)			*Operations (numbers of jobs)*		
	Direct	**Indirect and Induced**	**Total**	**Direct**	**Indirect and Induced**	**Total**
Mechanical power transmission equipment	0.0	0.1	0.1	0.0	0.0	0.0
Internet publishing and broadcasting	0.0	0.1	0.1	0.0	0.1	0.1
Car washes	0.0	0.6	0.6	0.0	0.2	0.2
Water- sewage and other treatment	0.0	0.0	0.0	0.0	0.0	0.0
Nonferrous metal (except copper and alum.)	0.0	0.1	0.1	0.0	0.0	0.0
All other forging- stamping- and sintering	0.0	0.1	0.1	0.0	0.0	0.0
Greenhouse- nursery- and floriculture product	0.0	0.2	0.2	0.0	0.1	0.1
Video tape and disc rental	0.0	0.2	0.2	0.0	0.1	0.1
Polystyrene foam product manufacturing	0.0	0.1	0.1	0.0	0.0	0.0
Animal (except poultry) slaughtering- rendering	0.0	0.0	0.0	0.0	0.0	0.0
Power-driven handtool manufacturing	0.0	0.1	0.1	0.0	0.0	0.0
Electromedical and electrotherapeutic app.	0.0	0.0	0.0	0.0	0.0	0.0
Aircraft manufacturing	0.0	0.0	0.0	0.0	0.0	0.0
Glass product manufacturing made of purchased	0.0	0.1	0.1	0.0	0.0	0.0
Other information services	0.0	0.1	0.1	0.0	0.1	0.1
Communication and energy wire and cable mfg.	0.0	0.0	0.0	0.0	0.0	0.0
Photographic services	0.0	0.1	0.1	0.0	0.1	0.1
All other miscellaneous electrical equipment	0.0	0.1	0.1	0.0	0.0	0.0
Other concrete product manufacturing	0.0	0.1	0.1	0.0	0.0	0.0
Animal production- except cattle and poultry	0.0	0.3	0.3	0.0	0.2	0.2
Mining and quarrying stone	0.0	0.1	0.1	0.0	0.0	0.0
Seafood product preparation and packaging	0.0	0.0	0.0	0.0	0.0	0.0
Nonupholstered wood household furniture mfg.	0.0	0.1	0.1	0.0	0.0	0.0
Magnetic and optical recording media mfg.	0.0	0.0	0.0	0.0	0.0	0.0
Steel product manufacturing from purchased	0.0	0.0	0.0	0.0	0.0	0.0
Vending- commercial- industrial- and office	0.0	0.0	0.0	0.0	0.0	0.0
Book publishers	0.0	0.0	0.0	0.0	0.0	0.0
All other basic inorganic chemical manufacturing	0.0	0.0	0.0	0.0	0.0	0.0
Storage battery manufacturing	0.0	0.0	0.0	0.0	0.0	0.0
* Not unique commod (S&LG passenger transit)	0.0	0.2	0.2	0.0	0.1	0.1