

CHAPTER 1

Ridership: The Key to Success

Introduction

This report aims to build understanding among decision makers and the public about the factors contributing to high-speed rail ridership, to better inform federal, state, and local investments. Especially as we emerge from a recession, investing in projects that can realize their promised benefits and gain a measure of financial self-sufficiency is paramount. While the potential to gain ridership is certainly not the only factor in a project's success (the ability to secure funding, maintain local support, and overcome design and engineering challenges is equally critical), ridership demand is important enough to be used as a preliminary screen of a proposed project's utility.

Projected ridership is one way to measure whether rail services can realize their potential benefits, including gains in energy efficiency, economic productivity, reducing greenhouse gas emissions, and others. If newly built high-speed rail services do not attract projected ridership over time, they will not only fail to deliver their promised benefits but they may waste energy, resources, and require excessive operating subsidies. The long term success of the new federal High Speed Intercity Passenger Rail program is dependent on investing in corridors with the potential to attract ridership and realize rail's benefits, establishing a positive track record for the program as a sound investment in our national economy.

This report builds on America 2050's previous study "Where High-Speed Rail Works Best," which evaluated connections among 27,000 city pairs in the United States to recommend where the federal government should first invest its limited stimulus dollars for high-speed rail.² That report recommended that given limited funds, federal investments should go first to corridors with the greatest demand for ridership in order to demonstrate early success and build support for a long-term, national program. This report continues in that vein, providing a more detailed analysis of actual and proposed multicity passenger rail corridors, evaluating them against factors contributing to ridership demand, accounting for their actual station locations, the network benefits of multiple stations along a corridor, and the physical rail alignments within a regional context.

Chapter 1 discusses the factors contributing to rail ridership and how an approach that evaluates rail corridors on the basis of standardized, nationally-available data could improve the transparency of the federal program and promote sound investment decisions. Chapter 2 presents the results of our analysis of close to 8,000 existing and proposed rail corridors around the country, grouped by megaregion,³ to highlight the challenges and opportunities in each region and discuss the most promising corridors. Our study offers one approach to making decisions about rail investments, which we hope will be considered by the federal government. Additionally, by building understanding about the factors that contribute to rail ridership, we aim to help shape a more successful national passenger rail program and promote sound investment and planning decisions in passenger rail.

The Federal Context for Rail Investment

High-Speed Rail (HSR) is defined differently around the world. Outside the United States, HSR generally refers to trains that travel above 150 miles per hour (250 kilometers per hour). The European Union defines HSR as newly built lines equipped for speeds of greater than 155 miles per hour (250 km per hour) or upgraded lines equipped for speeds of greater than 124 miles per hour (200 km per hour).⁴ In its 2010 guidelines, the Federal Railroad Administration (FRA) defines three distinct classes of HSR service in addition to conventional passenger rail (Table 2).⁵

The three categories of high-speed rail service provided by the FRA illustrate a federal approach that recognizes the vast range of rail service levels and regional characteristics across the country. Rather than pushing HSR that is "one size fits all," the FRA proposes to make investments appropriate to the unique characteristics of individual corridors. A potential danger of this approach is that regions anticipating "Core Express" may

2 Yoav Hagler and Petra Todorovich, "Where High-Speed Rail Works Best." New York: America 2050. http://www.america2050.org/pdf/2050_Report_Where_HSR_Works_Best.pdf

3 Megaregions are large networks of metropolitan areas connected by commuting and travel patterns, business relationships, and large infrastructure and natural systems.

4 European Union. 1996. "Council Directive 96/48/EC of 23 July 1996 on the interoperability of the trans-European high-speed rail system."

5 U.S. Department of Transportation Federal Railroad Administration 2010. "National Rail Plan: Moving Forward: A Progress Report." p. 10 and U.S. Department of Transportation Federal Railroad Administration. 2009. "Vision for High-Speed Rail in America." p. 2.

TABLE 2

FRA Definitions of High-Speed Rail and Intercity Passenger Rail

	Corridor Length (miles)	Top Speeds (mph)	Dedicated tracks	Population Served	Level of Service
Core Express Corridors	Up to 500	125-250	Yes, except in terminal areas	Major population centers	Frequent express, electrified
Regional Corridors	100-500	90-125	Dedicated and shared tracks	Mid-sized urban areas and smaller communities	Frequent
Emerging/ Feeder Routes	100-500	Up to 90	Shared tracks	Moderate population centers, with smaller, more distant areas	Less frequent*

*Assumed, FRA does not specify.

be disappointed with incremental improvements that bring their existing services up to "Regional" or "Emerging/Feeder" service, which shares tracks with freight or commuter trains, restricting top speeds and optimal trip times.

However investments in upgraded, conventional passenger rail service ("classic" passenger rail, if you will) in corridors lacking the market to justify Core Express are still important. They provide residents in these regions greater mobility options and begin to build a larger market for passenger rail in those corridors, which may someday justify upgrades to Regional or Express service. These classic passenger rail lines may also act as feeder lines to Core Express services, much in the same way the Vermonter, Empire, and Keystone branch lines in the Northeast connect to the mainline Northeast Corridor, strengthening the entire network.

How and where to invest federal dollars in Core Express versus Regional and Emerging/ Feeder is a key question for national rail policy. One way to approach this is to reserve Core Express systems for the regions with the largest markets, since these are the most expensive systems to build and operate. This would explain the federal investment in Core Express in California, but not in Florida, which has a smaller potential market, due to smaller regional populations and other factors. In Florida, it seems the availability of a publicly-owned right of way and project readiness facilitated state and federal support of a dedicated Core Express system. Once built, this system will provide an important demonstration of whether high quality, frequent service can overcome other challenges to attracting rail ridership, such as decentralized land development. The analysis that follows in this report discusses how markets in California and Florida differ, based on factors such as population, density, employment characteristics, and transit accessibility.

In other regions with medium-sized markets, understanding potential ridership demand will help all levels of government make sound decisions in rail improvements. Generally, we recommend focusing federal money on capital investments in corridors that have the greatest opportunity for supporting their operating costs, as determined by ridership projections. States and local governments may decide to subsidize rail operations until services attract enough ridership to achieve self sufficient operations and maintenance, or as a policy decision to promote rail ridership.⁶ (This is, in effect what federal and state governments did with the Interstate Highway System in the 1960s and 70s, before suburban development generated significant use of the national system.)

Other factors too may determine how and where the federal government chooses to invest, such as local funding and financing, engineering and design considerations, the capacity of state and regional agencies to carry out projects, and local political

support. Federal investments may also be motivated by the desire to promote economic development in underperforming regions, such as former manufacturing economies. No matter its goals, national rail policy and decision making should be informed by a clear and objective understanding of projected ridership demand in the different corridors, drawing on nationally available data, such as we provide in this report, and new, improved data on long distance travel in America.

An additional important consideration for passenger rail investment is the impact of expanding passenger rail services on America's privately-owned and environmentally friendly freight rail network. This is less of a concern in corridors that are pursuing Core Express (Florida and California), which consist of dedicated, grade separated, rights of way that do not share tracks with commuter trains and freight trains except in station and terminal areas. However, those regions pursuing Regional or Emerging/ Feeder services are generally proposing to upgrade existing tracks owned by freight railroads to improve the frequency, trip times, and reliability of passenger service in those shared corridors. In these cases, the level of traffic on the freight railroad (is it part of the railroad's "core" network?) will certainly impact the feasibility and the cost of improving passenger service on the corridor, and should be weighed along with other project feasibility considerations.

Finally, the federal government and states should begin to actively plan and acquire rights of way together for future high-speed rail development, particularly in the most promising corridors. Right of way acquisition, especially in densely populated regions, is one of the most challenging aspects of building high-speed rail systems. Even regions pursuing only classic rail service today could save hundreds of millions of dollars in the future by acquiring pieces of rights of way as opportunities arise. Florida's farsighted construction of the Interstate-4 corridor with room down the median for high-speed trains in the 1990s was a key ingredient in its success in winning billions of federal dollars for high-speed rail in 2010.

The Need for Better Intercity Travel Data and Forecasting Models

While virtually every state pursuing passenger rail improvements performs some type of ridership demand forecast, these forecasts vary widely in their inputs and assumptions from project to project and consultant to consultant, and thus are limited in their ability to support nationwide comparisons.

⁶ While ticket revenues may cover operating costs on corridors with high levels of ridership, even in the most successful systems, rail capital costs are almost always borne by the public sector.

Ridership demand forecasts typically rely on regional travel demand models in which information is gathered on a study area's present and projected population, employment, household attributes, and transportation systems.⁷ The basic forecasting model is a four-step method that uses trip generation, trip distribution, mode choice, and route assignment as determinants of travel.⁸

Unfortunately, given limited available data about U.S. long distance travel, it is difficult to forecast potential ridership for high-speed rail. While national aviation data is available, it does not include the point of origin or final destination of the passenger – only airport to airport flows. There is also no up-to-date national data source for long distance automobile trips – the mode by which the majority of intercity trips take place. The most recent national study of intercity travel, the American Travel Survey, was completed in 1995 and therefore is of limited use. Thus, as a first step towards better high-speed rail planning, we strongly encourage the federal government to collect improved intercity travel data, particularly for highways. Ideally, a new survey would bring the intercity travel information in the American Travel Survey up to date. Using privacy-protected data sources from mobile and GPS technologies could help reduce the cost and improve the accuracy of this survey well beyond the 1995 American Travel Survey.

In the absence of more comprehensive, national, intercity travel data that would allow precise ridership forecasts for proposed corridors, this study presents a comparative model of ridership demand by corridor, drawing on existing data sources that are standardized for every metropolitan region. Such a comparative model of ridership demand could also help guide federal policy makers on where to make smart rail investments, and provide accountability for high-speed rail investments already being made. Instead of evaluating and comparing precise ridership estimates from the states (e.g. X riders in California versus Y riders in Texas) based on inadequate data and varying assumptions, we propose an alternative assessment framework that considers the various factors or parameters that influence ridership without attempting to pinpoint ridership explicitly.

The following section discusses parameters that could form the basis of an approach to federal investment decision making, and which we used to evaluate the corridors discussed in the following chapter.

How we Evaluated Rail Corridors in this Study

There are many different factors inherent in cities and regions that contribute to rail ridership. These include the size of central business districts, total regional population, transit accessibility, population growth, air travel demand, and variations in regional employment mix, among others. Twelve of these parameters were used to score corridors across the country in order to evaluate their relative suitability for passenger rail investments. Table 3 shows these twelve parameters

and their relative weighting in the analysis.⁹ We used our best understanding of factors that drive ridership based on available research of domestic and international rail corridors to choose the parameters and their relative weights in the table below.

Naturally, choosing to weight the parameters differently would result in prioritization of different corridors. For example, giving greater weight to population growth than current population would skew the results away from the larger, slower growing cities in the Northeast and Midwest and toward the faster growing cities in the South and West. As discussed above, whatever the system used to judge the relative merit of a corridor investment, it should be based on empirical evidence and the weighting should be consistent with the policy goals that underlie these investments.

TABLE 3

Criteria Used to Develop Corridor Score

Primary Factors: Weighted 3X

Regional Population (25Miles)	(RP)
Employment CBD (2Mile)	(ECBD)

Secondary Factors: Weighted 2X

Transit Connectivity Employment	(TCE)
Transit Connectivity Population	(TCP)
City Population (10 Mile)	(CP)
City Employment (10 Mile)	(CE)
Regional Population Growth Factor	(RPGF)
Regional Air Market	(RAM)

Tertiary Factors: Weighted 1X

Commuter Rail Connectivity Population	(CRP)
Corridor Traffic Congestion	(CTC)
Share of Financial Workers	(SF)
Share of Workers in Tourism Industry	(ST)

Preparing Data for Equation

First, each criterion was divided by the total length (in miles) of the corridor. This step results in the data being on a per mile basis, which allows for comparison between corridors of varying lengths. Without this step, longer corridors with more data points would have had an advantage over shorter corridors.

$$\text{Value}_n / \text{Length of Corridor}_n$$

For each criterion, the corridor was given a rank from zero to 7,870, based on their relative value.

$$\text{Rank (Value}_n/\text{Length}_n)$$

These ranks were then converted to a value between 0 and 1 by dividing the rank by the maximum rank in each category and subtracting that result from 1. This yielded a number between 0 and 1 for each entry with the highest value 1 and lowest 0.

$$1 - (\text{Rank}_n / \text{Maximum Rank})$$

The final equation was then applied to these adjusted corridor ranks.

$$\text{Corridor Score} = 3*(\text{RP}+\text{ECBD}) + 2*(\text{TCE}+\text{TCP}+\text{CP}+\text{CE}+\text{RPGF}+\text{RAM}) + (\text{CRP}+\text{CTC}+\text{SF}+\text{ST})$$

⁷ Walters, Jerry. 2003. "Direct Ridership Forecasting: Out of the Black Box." <http://www.smartgrowthplanning.org/PDFs/0805DirectRidershipForecastingWeb.pdf> 2003.

⁸ United States Government Accountability Office. 2009. "High-speed Passenger Rail Future Development Will Depend on Addressing Financial and Other Challenges and Establishing a Clear Federal Role." Report to Congressional Requesters.

⁹ For a complete explanation of the methodology for creating the corridor scores see the Appendix.

Using the equation presented above, we calculated a score for every existing or proposed corridor of less than 600 miles in length in the country. Scores range from 0 – 20.15. This score represents a weighted per-mile average of data along the length of a corridor between any two end points. The top scoring corridor was New York-Washington, DC with a score of 20.15. This total score represents data obtained not only from New York and Washington, DC but also the metropolitan regions of Philadelphia and Baltimore that lie in between. This corridor analysis is better suited for estimating rail demand than a simple city pair analysis, as it accounts for the “network effects” of major intermediate stations. The ability of trains to gain passengers at intermediate stations is an efficiency advantage over aviation; trains can pick up additional passengers while avoiding the inconvenience and fuel expenditure of an airplane making intermediate stops. The normalization of the corridors on a per-mile basis ensures that longer corridors would not automatically score higher than shorter corridors. However, longer corridors with intermediate stations in cities of medium or large size do score higher than long corridors with few stations in between the end points, unless the end points are large generators of ridership (like in California).

How to Interpret the Scores in the Study

There is no single number above which a corridor is suitable for high-speed rail and below which it is not. Rather, these scores represent a relative ranking across twelve criteria that contribute to intercity rail ridership. While it would be tempting to designate ranges of score that indicate suitability for Core Express versus Regional and Emerging/ Feeder, the relative nature of our ranking system prevents this. Instead, we can suggest that given the significant capital requirements of Core Express, these types of investments should be reserved for the highest ranking corridors. For example, a score of 19 means that for most of the criteria used, the corridor was in the top one percent of all corridors analyzed. All corridors with scores in this range include metropolitan regions with large central business districts, large regional populations, and transit connections. These are the corridors in the country most suited for Core Express service.

Corridors with scores of above 17 were in the top 10 percent of most of the criteria analyzed. Many of these corridors may also be suitable for Core Express, or will be as they experience continued population and economic growth in the coming decades. These corridors generally include at least one major metropolitan center with a large central business district, large regional populations and transit connectivity, or compact corridors with multiple, medium sized metropolitan regions.

Corridors with scores of 10 and below were in the bottom 50 percent of most of the criteria analyzed. These corridors consisted mostly of relatively small or medium sized cities spaced at distances at the outer range of rail travel with only sparsely populated land in between. These corridors would not justify priority federal funding for Core Express, given their relative low ranking.

Of course, investment decisions about the level of service and design of the system must weigh multiple considerations, in addition to projected ridership demand. A corridor’s relative strength in ridership demand should be weighed with other investment criteria, such as engineering constraints, right-of-way conditions, and potential conflicts with freight traffic.

Table 4 displays a sample of corridors and the scores they received in this study. To compare like corridors across regions, this table is separated into three sections: short corridors of less than 150 miles; mid-length corridors of 150 to 300 miles; and long corridors greater than 300 miles. More detail will be provided on the corridors in the following chapter.

TABLE 4

Scoring of a Sample of Short, Medium, and Long Corridors

Short Corridors - 150 Miles or Less

Origin	Destination	Length	Score
New York NY	Philadelphia PA	91	19.86
Los Angeles CA	San Diego CA	150	19.62
Chicago IL	Milwaukee WI	86	19.38
Washington DC	Richmond VA	110	18.31
Sacramento CA	San Francisco CA	139	18.21
Tampa FL	Orlando FL	84	13.63

Mid-Length Corridors - 150 - 300 Miles

Origin	Destination	Length	Score
Washington DC	New York NY	224	20.15
Boston MA	New York NY	231	19.87
Portland OR	Seattle WA	185	17.37
Chicago IL	Saint Louis MO	282	16.19
Birmingham AL	Atlanta GA	164	15.93
Atlanta GA	Charlotte NC	257	15.68
Dallas TX	Houston TX	243	16.12
San Antonio TX	Houston TX	211	13.92

Long Corridors - Greater than 300 Miles

Origin	Dest	Length	Score
Washington DC	Boston MA	455	19.81
Los Angeles CA	San Francisco CA	453	17.98
Los Angeles CA	Las Vegas NV	338	16.94
Chicago IL	Minneapolis MN	423	16.66
Washington DC	Charlotte NC	376	15.16
San Antonio TX	Dallas TX	312	14.75
Tampa FL	Miami FL	319	13.93
Charlotte NC	Richmond VA	369	11.88
New Orleans LA	Houston TX	362	11.27
Denver CO	Albuquerque NM	476	9.91

Geographic Zones

Throughout the study, to analyze population and employment density around train stations, we created geographic zones of 2-mile, 10-mile, and 25-mile radii around the existing or proposed train station, or lacking a train station, the center of the city's central business district. Creating standard zones allows equal comparison of different cities for which political boundaries of municipalities and regions may vary widely.

These geographic zones also allow for a better examination of variation in population density across regions. This is well demonstrated in the case of Philadelphia and Houston – two metropolitan statistical areas of approximately 6 million people, but drastically different spatial development characteristics.

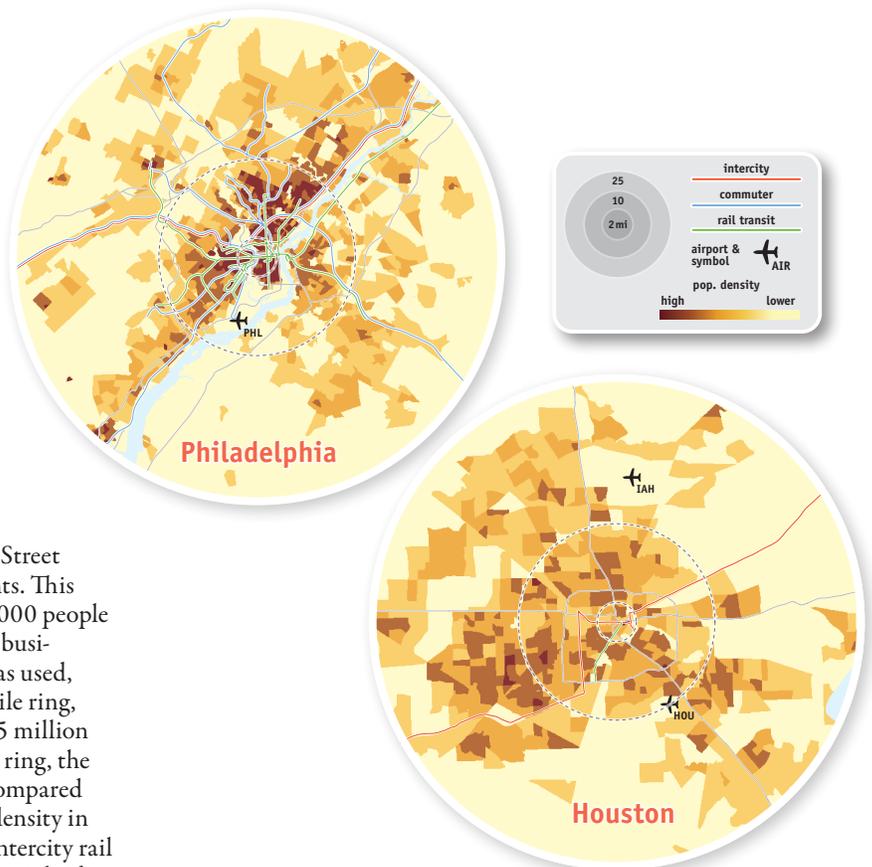
Within the 2-mile radius of Philadelphia's 30th Street Station, there are approximately 220,000 inhabitants. This contrasts sharply with Houston's population of 72,000 people living within 2 miles of center of Houston's central business district (the center point of Houston's CBD was used, as it lacked a downtown train station.) At the 10-mile ring, Philadelphia has 2.1 million people compared to 1.5 million people in the same area of Houston. At the 25-mile ring, the regions balance out – 4.6 million in Philadelphia compared to 4.5 million people in Houston. The population density in Philadelphia's 2-mile and 10-mile radii around its intercity rail station suggest that there would be many more potential riders and destinations within walking distance of Philadelphia's train station, which is also served by a robust local and regional rail system. In Houston, most potential rail riders would need to access the train station by automobile, requiring extensive parking, and possibly precluding some of the transit oriented development opportunities and energy efficiencies of high-speed rail.

Understanding the Factors Contributing to Passenger Rail Ridership

This section describes the rationale for selecting the different factors contributing to rail ridership analyzed in this study, and factors not analyzed that also may have an impact. In general, the study adopts a regional planning perspective on factors that drive ridership demand, focusing on the interplay between land use and transportation and how it impacts transportation behavior.

Corridor Geography and Characteristics

Despite the excitement that high-speed rail has generated in the national dialogue, it would be foolish to promote high-speed rail in every community. Successful high-speed rail systems around the world generally operate in very specific conditions, primarily in corridors of approximately 100–600 miles in length where HSR can connect major employment centers and population hubs with other large and moderate-sized employ-



ment centers and population hubs. Such corridors exist primarily in the nation's 11 megaregions, where over 70 percent of the nation's population and productivity (as measured by regional GDP) is concentrated.¹⁰

Within the megaregions, high-speed rail competes with different modes depending on the distance of the trip. For trip distances of up to 200 miles, rail competes primarily with private automobile travel. Local transit connectivity, residential and employment density, and regional congestion on the road network will positively impact rail ridership at this distance. Under 200 miles, reliable rail service can attract would-be drivers by offering door to door trip times competitive with auto travel, even without obtaining world class speeds.¹¹

Over longer distances (200–600 miles), rail competes with automobiles and air travel. In competition with air, there are two separate but equally important markets: origin-destination travelers and interlined or connecting passengers.

Since the end point for origin-destination air travelers is a place within the metro region and not the rail station or airport, the potential to capture these air passengers will tend to respond directly to variations in trip time and frequency. To compete with air travel at these distances, very high speeds must be maintained, and high capacity Core Express systems are appropriate. The relative accessibility of major attractions within the region to the high-speed rail station, on foot or by connecting transportation options, will also help determine the competitiveness of high-speed rail for these types of trips.

¹⁰ America 2050. 2008. "America 2050: An Infrastructure Vision for 21st Century America." p. 11. Regional Plan Association, New York, New York.

¹¹ Steer Davies Gleave. 2004. "High Speed Rail: International Comparisons" Prepared for Commission for Integrated Transport.

“Interlined” passengers are those passengers travelling to an airport with the intent of connecting to another flight. These air passengers differ from origin-destination passengers in that their destination is the airport, not another point within the metro region. It is therefore more difficult to attract these passengers to rail, even with competitive trip times and frequent service. The diversion to rail of interlined passengers depends on additional interventions beyond high speeds and frequencies on rail, including: 1) physical integration of tracks and terminals, 2) fare and pricing integration and 3) logistical integration of baggage, check-in, and security. To get higher rates of interlined passengers to divert to rail all three types of integration must occur. Places where airports and rail stations are seamlessly integrated in all three areas, such as Germany and Switzerland, have been more successful in attracting interlined passengers to rail than with physical connections alone.¹²

Regional Parameters

Regional parameters here refer to spatial, demographic, employment and growth rate characteristics of metropolitan regions that respond gradually to policy and planning interventions.

Population

Total **population** of the service area is the most basic driver of intercity rail ridership, aside from the quality of service provided.¹³ Larger cities and regions generate more trips, because of a larger potential customer base and greater numbers of destinations for visitors and business trips.

Population density is an important determinant of rail ridership; different levels of density account for the variation in ridership between regions of the same population size, but different land development patterns. High residential densities around a train station provide access to greater numbers of potential passengers. Higher densities along transit corridors connecting to a train station also increases the number of people who can access the train station easily. Also, as residential densities increase, car ownership declines; families that own fewer or no cars are more likely to take transit and intercity rail.¹⁴

By its nodal nature, rail has the tendency to serve and reinforce concentrations of population, employment and commerce, while highways and road networks have the opposite, decentralizing effect. And unlike intercity air travel, rail brings people directly into city center, reinforcing those centers as the primary location for services and activities. The more population, employment, and institutions are located in centers, the greater potential intercity travel market can be served by rail.

Projected population growth is also critical to assessing the potential of a high-speed rail corridor. In regions that are growing quickly, high-speed rail and related regional development strategies have the potential to shape urban growth patterns over the next half century. Many of the Sunbelt cities that grew

rapidly around the interstate highway system in the second half of the 20th century are projected to continue to grow at high rates in the coming decades and have the opportunity to redirect future growth to urban cores around rail stations.

Employment and Labor Market

Employment and **employment density** are major generators of ridership for intercity rail systems. The market for high-speed rail, especially for Core Express service in which ticket prices tend to be high, depends heavily on business travel.¹⁵ Rail’s competitive advantage over other modes is its ability to link city centers and cover significant distances in a relatively short amount of time. Large central business districts are critical in focusing intercity business travel into areas that are easily accessed by rail. For this reason, while total regional population might have more predictive capacity than total regional employment, the existence of large clusters of centralized employment in central business districts is relatively more important to predicting intercity rail ridership than population density.

The **composition of the labor market** also impacts the potential ridership of new high-speed rail systems. Since knowledge industries require bringing people together for face-to-face communication and knowledge exchange, cities and regions with high levels of knowledge sector employment will benefit the most from introduction of high-speed rail systems.¹⁶ A study of the German rail network and its ridership demonstrated that there is more demand for intercity rail travel in knowledge based economies than in manufacturing economies.¹⁷

If a region is already well-served by transit, it will also be better suited for intercity rail travel.

Transit Connections

The presence of local and regional transit systems is critical to intercity ridership for two reasons. First, as mentioned above, transit increases the catchment area of intercity rail, connecting departing passengers to the station and arriving passengers to their destinations around the region, all without the need to park or rent a car. Second, a successful transit network is dependent on the major destinations of a region (employment, government, services, institutions, homes) being concentrated in central business districts (CBDs) accessible by that system.¹⁸ This characteristic will also contribute to the success in attracting intercity rail riders originating and arriving in that region. Thus, if a region is already well-served by transit, it will also be better suited for intercity rail travel.

¹² Harman, Reg. 2006 “High Speed Trains and the Development and Regeneration of Cities.” Greengauge 21.

¹³ Chen, ChiaLin and Peter Hall. 2009. “The Impacts of High Speed Trains on the British Economic Geography: A Study of the UK’s IC125/225 and its Effects” University College London.

¹⁴ America 2050 Report. Forthcoming. “The German Experience: Rail Ridership, Population Density, and Labor Markets in Germany.” New York: Regional Plan Association.

¹⁵ Pushkarev, Boris S., Jeffrey M. Zupan, and Robert S. Cumella, 1982. Urban Rail in America: An Exploration of Criteria for Fixed-Guideway Transit. Bloomington: Indiana University Press.

¹² Phone interview with Anthony Perl, Director of Urban Studies Program, Simon Fraser University. 16 March 2010.

¹³ Harman, Reg. 2006. “High Speed Trains and the Development and Regeneration of Cities.” Greengauge 21.

¹⁴ Holtzclaw, John W. 2000. “Smart Growth -- As Seen From the Air Convenient Neighborhood, Skip the Car.” Paper Presented at the Air & Waste Management Association’s 93rd Annual Meeting & Exhibition, Salt Lake City, Utah.

The importance of regional transit connectivity is evident on the Japanese high-speed rail system, where the Tokaido line of the Shinkansen high-speed railway, connecting Tokyo, Osaka, and Kyoto, carries 150 million passengers a year.¹⁹ In contrast, the volume on the twelve classic passenger rail lines connecting to the Tokaido line was more than double the HSR volumes in the same year, carrying nearly 400 million passengers. Thus by connecting to these feeder networks, the Shinkansen serves as many people as it does, not because 150 million people a year can walk or drive to the train station, but because classic intercity and commuter trains bring those people to the major nodes on the Tokaido line within a couple of minutes of departure for convenient cross platform transfers. This example also serves to illustrate how high-speed rail should be considered the pinnacle of the rail transit network, serving the less-frequent, high value, intercity business and discretionary trips. Annual ridership figures of local transit and commuter rail service are generally several orders of magnitude greater than intercity rail ridership because they occur on a daily basis.

Existing Intercity Travel Markets

Whether there is existing demand for travel between major cities is a good indication of whether there will be demand for high-speed rail service connecting those cities. Given the paucity of national long distance travel data, in this study we studied air travel volumes and highway congestion on intercity routes as proxies to indicate potential demand for intercity services. As will be discussed in Chapter 2, major short-haul air markets in California, the Northeast, Texas, and the Midwest, indicate likely demand for rail in those same corridors.

Existing rail ridership is also a good indication of demand for upgraded services on that corridor. This measure is also limited, however, due to the dearth of existing reliable intercity rail services outside a few select corridors in the Northeast, California, and the Midwest. However, those rail corridors today that show strong and/or growing ridership would likely grow even further with investments to improve reliability, trip times, and frequencies.

Level of Service and Competition

Outside of the Northeast Corridor, the low level of rail ridership in the United States can primarily be attributed to poor levels of service. Few trips per day, lengthy trip times, and frequent delays attract a riding public that is composed mostly of train enthusiasts and people with few other options.

Train service must meet a minimum standard of frequency, trip time, and reliability in the first place to attract any riders at all. Above that standard, attracting riders from other modes, such as air and automobiles is relative to the quality of the competing options in that corridor. Even for longer trips (300–600 miles), private automobiles still capture more travelers than rail²⁰ because they get drivers to their destination faster and more conveniently. In the Pacific Northwest Rail Corridor, for example, drivers may be tempted to take the train traveling this 187-mile route from Portland to Seattle, but at a trip time of 3 hours and 30 minutes and with only 4 trains per day and delays, the trip does not offer a significant time savings

compared to driving and is less reliable. Despite this, ridership on this corridor has more than tripled since the mid-1990s, due to steady, incremental improvements to service led by the state of Washington. Given the infrequency of service, it is not surprising that the vast majority of passengers on this corridor are leisure travelers;²¹ business travelers generally require greater scheduling flexibility.

Providing a minimum of 1–2 trains per hour with trip times competitive with auto travel is necessary to capture a significant share of the intercity travel market, as takes place in the successful Northeast Corridor. Above that threshold, factors such as on-time performance, connecting transportation options, comfort, ticket price, booking convenience and flexibility, and amenities, such as wireless internet service, all make a difference in attracting riders.

Recently, curbside buses have proliferated in the Northeast Corridor, where competitors such as MegaBus and BoltBus have succeeded in attracting riders new to public transit because of selling points like low fares, free wireless internet, and frequent service (up to every half hour) between major Northeastern cities. What the buses do not offer is speed or reliability, as they primarily travel the highly congested Interstate-95. The success of the buses in the Northeast demonstrates that the potential market for intercity transit services is much greater than those who currently ride the rails, particularly if the price and amenities are right.

Other factors that influence how many people chose rail are the relative appeal and cost of other options. Factors such as high gas prices, highway tolls, highway congestion, airport security, airport delays, and lower rates of auto ownership could all push people to passenger rail. In regions with low levels of highway congestion, on-time air travel, and low gas prices, rail may not be particularly attractive, particularly for trips under 200 miles.

Summary

These regional parameters form the basis of our detailed analysis of corridors by megaregion described in the following chapter. It bears noting that given the diversity of spatial development patterns in the United States, any national model will prejudice certain types of regions over others. Research of existing high-speed rail systems around the world suggests that densely developed cities and regions with transit networks and intercity travel markets generate the greatest ridership demand. However, a counterpoint is that high-speed rail that connects to airports and park-and-ride facilities is just as effective in attracting riders in auto-oriented regions. While we have not seen evidence of this in European case studies, such a model has not yet been attempted in the United States. Regardless of what parameters are weighted most heavily in the model in use, the advantage of the approach presented in this paper is that the weighting and choice of inputs is completely transparent, allowing critical evaluation of whether the investment choices match the intent of public policies.

¹⁹ Central Japan Railway Company. 2008. Annual Report.

²⁰ According to the American Travel Survey, private automobiles accounted for 91 percent of trips 300 – 499 miles and 76 percent of trips 500 – 999 miles. U.S. Department of Transportation Bureau of Transportation Statistics. “1995 American Travel Survey,” p. 3.

²¹ Washington State Department of Transportation. 2006. “Amtrak Cascades Ridership and Revenue Forecasts Technical Report.” Vol. 5 P. 4–1.