Book Review: High-Speed Rail: International Lessons for U.S. Policy Makers
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High-Speed Rail: International Lessons for U.S. Policy Makers

by Melvin A. Sacks

The authors of *High Speed Rail*, Petra Todorovich, Daniel Schned, and Robert Lane, state that over the past 50 years U.S. transportation spending has favored interstate highway and aviation systems. In contrast, China, Japan, Spain, France and Germany have been working on modern high-speed rail (HSR) systems. In the United States, HSR construction has been stalled because of a lack of additional appropriations from Congress. A high-speed line in California is still on track to be completed, though with relatively modest federal funding.

The authors divide the book into several parts: international experience with HSR, the potential benefits of HSR, U.S. policy and programs for HSR, and HSR progress in California and the Northeast corridor.

HSR in cities in Europe, China, and Japan attract commercial development and urban regeneration. It offers greater operating energy efficiency than competing modes and takes up less land than highways. The authors state that an HSR line could create similar transportation, economic, environmental, and safety benefits in America if only there was sufficient funding.

Since the 1964 inauguration of Japan's first Shinkansen bullet train connecting Tokyo to Osaka, commercial HSR has been constructed in 14 countries, generating billions of passenger trips. It saves many hours in travel time, is reliable, rapid and safe, increases regional mobility and accessibility, saves energy by reduced fuel use, regenerates cities and regions, and increases economic productivity.

The United States failed to develop HSR and fully realize its benefits despite numerous planning studies and aborted attempts to expand rail service in various regions since 1960. Americans are therefore unfamiliar with HSR and its potential benefits. Aviation and highways have been funded in the tens of billions of dollars, but not so passenger rail. Such funding has been a precondition to bringing large rail capital projects to fruition in other countries. The authors could have developed a detailed discussion of how the U.S. political process and its divergent ideologies, especially with parsimonious congressional appropriations, prevent meaningful infrastructure improvements, particularly in regard to rail projects, presently and in the near future. However, the authors do well in pointing out the divergence between advanced countries with developed HSR systems and the United States, currently without a true HSR network.

At least 19 countries around the world are building or planning new HSR lines. China has invested several hundred billion dollars in building the world's most extensive HSR system. In Saudi Arabia, Haramain's high-speed line will operate on the 280-mile line from Mecca to Jeddah.

In the United States, President Barack Obama, in his 2012 budget, proposed $53 billion over the following six years to begin developing a national high-speed and connected passenger rail network that could connect 80% of Americans. Congress rejected the proposal, calling it wasteful and not true high-speed technology. In light of the opposition, proponents need to lay out a compelling case for its benefits for any possibility legislative success.

High-speed trains with an advanced signaling system can operate with greater frequency, creating greater capacity to move passengers. In 2011, 11 countries directly operated high-speed trains at speeds up to 185 mph and several can reach 215 mph, the current international standard. High speed trains often travel in dedicated high-speed tracks.

Two of the most notable HSR technologies introduced are tilting mechanisms to counteract physical forces around curves and magnetic levitation trains, without tilting mechanisms but requiring installation of new dedicated high-speed tracks.

GENESIS AND TRACK RECORD

The high-speed Tokyo line in Japan has carried more than five billion passengers and is the world's busiest HSR line.

The authors point out that HSR did not come right away, and it was not until 1981 that France introduced the TGV, Europe's first high-speed line connecting Paris with Lyon. It reduces travel time to two hours for the 280-mile journey. In the 1980s Germany, Belgium, and Spain converted to HSR lines. Since 2000 HSR lines have been introduced in England, South Korea, Switzerland, Taiwan, Netherlands, and Turkey. China opened its first HSR line in 2003 and shortly after built the world's most extensive HSR network with well over 5,000 miles of HSR.

This long experience with HSR in other countries gives them an advantage in design, manufacturing, and safety issues compared with the United States. Also, government is largely involved in the development and operation of HSR overseas, and the authors could have noted the hostility to government in many quarters in the United States that views government funding of significant infrastructure projects unfavorably. In the United States, only the Acela is somewhat high speed and briefly reaches 150 miles per hour but averages only 75 miles per hour. Infrastructure along the Northeast Corridor seriously needs upgrading. For example, the Baltimore tunnel built in 1873, currently used by Acela and regional and commuter trains, limits speeds on the Northeast Corridor to 30 mph due to a sharp turn and steep grade. Outside the Northeast Corridor, trains are owned by freight railroads, and this restricts the ability to develop passenger rail speed frequency and reliability. U.S. administrations and congresses tried to develop selected HSR corridors in a program called high-speed Intercity Passenger Rail, but Congress wasn't allocating a competitive grant program of sufficient funding.

California's HSR was initially awarded a federal grant designed to be a core express service with top speeds of 220 miles per hour on new dedicated tracks. Since the train going at 200 miles per hour requires 16 miles of straight track and also need significant distances to break and come to a stop, stations must be well spaced along HSR corridors.

ECONOMIC BENEFITS

The authors note that after 50 years of international experience HSR has proven it is capable of producing a wide range of transportation, economic, and environmental benefits:

- Shortened travel time, especially between urban centers. It improves overall access to many destinations. It captures over 80% of air for rail trips if a high-speed train trip is less than two and a half hours.
- Excellent safety records.
- Better on-time performance than cars or airplanes.
- Efficiencies: the typical HSR line has the ability to transport the same number of people in the same direction as a three-lane highway but on a fraction of the land area.

HSR's ability to promote economic growth is grounded on its capacity to increase access to markets. Economic development is more likely to occur in places with more and better transportation infrastructure. HSR increases productivity, employment, and wages.

HSR stations attract new tourist and business travelers who might not have made the trip otherwise. A study by the U.S. Conference of Mayors in 2010 concluded that building HSR would increase spending annually by about $225 million in the Orlando region, $360 million in Metropolitan Los Angeles, $15 million in the Chicago area, and $100 million in Greater Albany, New York.

HSR creates thousands of construction-related jobs in design, engineering, planning, and construction, as well as maintenance and operations. In China, over 100,000 construction workers have been involved in building the HSR line that connects Beijing and Shanghai. Sustained investment could foster the development of new manufacturing industries for rail cars and other equipment, and generate large amounts of related employment. HSR can rejuvenate neighborhoods around HSR stations. HSR can generate growth in real estate markets and anchor investment in commercial and residential developments around train stations.

ENVIRONMENTAL BENEFITS

HSR offers greater operating efficiencies on a per-passenger-mile basis than competing modes, such as single occupancy automobiles, or airplanes that require significant amounts of fuel to get off the ground. Japanese trains are estimated to use one-quarter of the energy of airplanes and one-sixth of private automobiles per passenger mile. But high-speed trains must maximize load factors to realize greater efficiencies.

Attracting passengers to HSR can reduce overall energy usage. HSR is the only available mode of long-distance travel that is not currently dependent on motor fuels. However, it is powered by electricity, which is often generated by fossil fuels. A new HSR line in the Northeast Corridor, powered by electricity from the current energy mix, would shift 30 million riders from cars and planes to rails, attract six million new riders, and still reduce car emissions of carbon monoxide by more than three million tons annually. Here the authors could have more solidly tied the need to reduce emissions to the urgent need of reducing carbon dioxide, which increases global warming.

TECHNOLOGICAL INNOVATIONS

Innovation is needed in HSR. Since more energy is devoted to higher speeds, designing trains to be lighter in weight and more aerodynamic would require greater innovation, especially for crash worthiness. This presents a challenge to U.S. HSR. In addition, crash avoidance systems require innovation in advanced signaling systems.

U.S. POLICY

The initial commitment to high-speed rail began in 2008 when Congress passed the Passenger Rail Investment Procurement Act (PRIIA), which authorized funds for Amtrak and the states to develop HSR corridors between 2009 and 2013. Appropriations totaling $10.5 billion for high-speed and passenger rail became the centerpiece of the Obama Administration in its infrastructure agenda. However, the subsequent Congressional appropriation for FY 2011 stripped the passenger program of any funding in 2011 and rescinded $400 million from the FY 2010 budget. That put the brakes on HSR.

CALIFORNIA AND NORTHEAST CORRIDOR

California's 2009 population of 37 million people is expected to grow by 25 million by 2050. The Northeast will add an additional 12 million people by 2050. Major highways and airports are reaching capacity and HSR is badly needed to move people around. California would need to add

3,000 highway lane miles and five new airports at twice the cost if HSR is not available. Otherwise California will experience very high congestion on its highways.

Upon completion of HSR, the California system will operate trains at speeds up to 220 miles per hour, reducing the travel time to two hours 40 minutes for the 432-mile trip from Los Angeles to San Francisco. The cost is at least $43 billion and its funding includes public-private partnerships. Developing the first segment of the Initial Operating Section from Madera to Bakersfield will cost $6 billion, consisting of $3.3 billion in federal funding and $2.6 billion in Proposition 1A bond proceeds. It is the largest HSR project in the United States and a success or failure would signal whether future HSR lines in the country will be built. But opposition has grown as the expense of HSR in California has impinged on other budget priorities. Local communities are also voicing opposition. Defunding of PRIIA has raised doubts about continued federal participation in the HSR program.

The 450-mile Northeast Corridor (NEC) between Boston and Washington is America's most intensely used rail line and one of the most heavily traveled corridor in the world, accounting for approximately 13 million annual passengers. Since November 2009 Amtrak has experienced 20 consecutive years of ridership growth. Amtrak predicts that by 2050 ridership will grow 59%. But roadblocks for HSR include outmoded tracks, bridges, power, and communication systems on many stretches that need to be upgraded. Amtrak needs $8.8 billion to achieve a state of good repair in a congressional environment of cost-cutting. This is in addition to $43.5 billion to expand the corridor's capacity and reliability. Amtrak introduced Acela Express for highest speed rail service in December 2000, but has struggled to obtain enough funding for basic maintenance, capital investments, or funding to improve reliability. Lacking a dedicated track network, Acela trains mostly operate in congested tracks that also carry northeast regional service and assorted commuter rail lines, resulting in much lower rates of on-time performance and frequency compared with HSR systems around the world. Acela trains average only 62 miles per hour between New York and Boston. Economic mobility benefits would be enhanced if a dedicated HSR right-of-way could be built. But the cost would be over $117 billion. The $27 trillion economy in the Northeast is known for its high population density and its growing congestion of existing rail, roads, and runways, making a strong case for this HSR investment. But without federal support, national and regional HSR projects are unlikely to secure a necessary state or private funding commitments needed to proceed.

In summary, the authors did a good job of presenting the international experience with HSR, the benefits, and the lack of progress for HSR in the United States. The authors could have made even a stronger case for the congestion and consequent harm to the economy if an efficient means of moving people, most notably high-speed rail, does not proceed in the United States.

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