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RESEARCH SUMMARY

HIGH-SPEED RAILWAYS
Do They Produce Economic Growth?

The debate over extending the US high-speed rail (HSR) system has subsided but is still of interest to policymakers. Advocates argue that HSR can provide important stimuli to the national and select regional economies. While this argument is difficult to assess in the abstract, policymakers can gain insight by looking at HSR systems outside the United States.

In "High-Speed Railways: Do they Produce Economic Growth?," transportation economist Kenneth Button examines the broad effects HSR systems have had on macroeconomic development in Japan, Spain, and China. He also explores these systems' more localized, regional implications. The study shows that the results of HSR's introduction were generally disappointing: governments have faced problems recovering the cost of construction, and the systems have largely failed to spread employment and economic growth away from cities.

THE NATURE OF HIGH-SPEED RAILWAYS

All three HSR systems use modern information systems to monitor and control operations and to refine prices in order to achieve revenue targets. However, the systems in Japan, Spain, and China differ greatly regarding their geography, history, economics, and political priorities.

Japan

Japan's Shinkansen system, adopted to combat post–World War II congestion problems, developed the modern approach to HSR. The Shinkansen lines, now many decades old, have gone through various innovations over time. Their development has been influenced by (1) Japan's geography, dominated by densely populated coastal cities, and (2) technological progress.

Spain

The first HSR system in Spain was unveiled in 1992 for the Barcelona Olympic Games and the Seville Expo '92. It rapidly expanded at the beginning of the 21st century, and by 2015 the system became the world's second longest. Spain's HSR system is also relatively cheap, costing about $9.5 million per

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mile (compared to Japan's $33.5 million per mile and Germany's $15 million per mile), but it has been supported by large subsidies.

Traffic on Spain's system falls well below that of other HSR systems: it is about 5 percent as heavy as Japan's and about 10 percent as heavy as France's. The system serves all the regional capitals equally regardless of their population size, solidifying political power in Madrid at the center.

China

China's HSR system is heavily used (it had roughly 893 million users in 2014) and fares are much higher than fares for the country's conventional railways. After a brief slump in both use and construction in 2011, 2012 saw a boom in HSR use.

ECONOMIC DEVELOPMENT OUTCOMES

Economic development outcomes are extremely difficult to assess, especially in a changing world.

In terms of costs paid by Spanish HSR users, it helps to compare journey times and fares for similar trips between airports and between HSR stations. HSR routes used in this comparison are purposely selected to involve a change of train, vary in length, and have modal competition from low-cost air carriers. Table 1 shows the comparative costs.

Table 1. High-Speed Rail and Airline Comparisons on Selected Routes

Route	High-speed rail	Low-cost airline
Barcelona–Valladolid	$83.00 (6 hours, 48 minutes)	$44.12 (1 hour, 30 minutes)
Barcelona–Santiago de Compostela	$86.00 (12 hours, 28 minutes)	$50.20 (1 hour, 55 minutes)
Barcelona–Seville	$146.00 (5 hours, 15 minutes)	$74.49 (1 hour, 50 minutes)
Madrid–Santiago de Compostela	$49.00 (5 hours, 19 minutes)	$20.64 (1 hour, 20 minutes)
Madrid–Barcelona	$83.00 (2 hours, 50 minutes)	$70.00 (1 hour, 20 minutes)

Source: Data from websites of the railways and airlines serving these routes.

In Spain, it's clear that airlines can be both cheaper and faster between terminals than HSR; thus any other advantages that passengers of HSR gain are relatively small. However, in some cases—for example, when there is congestion at the airports or when routes are suboptimally short for air travel—HSR is more attractive than air travel.

DOES IT PAY TO UTILIZE HSR?

The costs of subsidized investment in, operations of, and maintenance on HSR systems are very much higher than often claimed, while revenues are often lower. Effects on regional equity and growth vary.

- *HSR has failed to spread employment in Japan.* The Shinkansen system does little to spread employment away from Tokyo. Although Japanese cities that have HSR connections have grown faster than those that do not, the HSR system was designed to serve areas where

economic growth was expected before the planning or building of the Shinkansen system, so it is not clear that this growth is related to HSR.

- *HSR has not generated much revenue in Spain.* A 2015 report from the Applied Economy Studies Foundation found that none of Spain's HSR lines were making an operating profit. The financial problems of the system have been exacerbated by wider macroeconomic and transportation conditions.

- *However, the Japanese system is very efficient at moving large numbers of people.* The abilities to build large developments alongside the high-speed railways, charge high ticket prices, and (until recently) limit competition from low-cost air travel have been financial advantages to parts of the Japanese system.

CONCLUSION

The experiences of Japan, Spain, and China show that HSR infrastructure can prove far more expensive than political leadership suggests before construction. Additionally, ridership and national economic development can prove disappointing when fares do not come close to covering costs. If the objective is to spread economic activity away from congested regions, the results also prove disappointing. HSR's introduction has tended to encourage longer-distance commuting to and from established economic centers rather than the geographical dispersion of employment and production.