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China's High-Speed Rail Diplomacy

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Executive Summary

High-speed rail (HSR)* is a symbol of China's technological progress and a significant source of national pride. In under a decade, China built the world's largest HSR network and developed globally competitive rail companies. Beijing achieved this feat through strong political and financial commitment to rail development and, significantly, technology transfer agreements between its state-owned rail companies and foreign suppliers eager to gain access to the Chinese market. In 2011, after successfully developing HSR domestically, Beijing began a state-led drive to win deals for HSR projects abroad. International observers and eventually Beijing itself dubbed this drive "high-speed rail diplomacy." China's HSR diplomacy has been motivated by a combination of foreign policy and domestic economic objectives. For the Chinese government, it provides a powerful means to project broader political influence and deepen bilateral ties. The country's rail export push is also part of Beijing's plans to become a global leader in high value-added manufacturing, while helping to absorb the country's industrial overcapacity.

Chinese rail firms initially focused on emerging markets, but in recent years have also begun to bid aggressively for contracts in developed markets, including the United States. Since 2014, China's largest rail manufacturer, China Railway Rolling Stock Corporation (CRRC), has won contracts to build subway cars for Boston, Chicago, and Los Angeles and a HSR project connecting Las Vegas to Los Angeles. CRRC is also bidding on a major contract to build subway cars for the New York City subway system. CRRC has also entered the U.S. freight market through Vertex Railcar Corporation, a North Carolina-based joint venture, in a move that has generated considerable congressional scrutiny over the economic and security risks posed by Chinese ownership of a U.S. freight rail car manufacturer.

China's initial forays into rail projects in the United States suggest Chinese rail firms have a mixed impact on U.S. industry. China's entry into the U.S. rail market can undermine competition by pitting heavily subsidized, state-controlled companies against private U.S. and foreign firms that do not receive similar benefits. Buy America regulations require foreign companies that win contracts for federally funded transport projects to source a minimum percentage of components domestically and establish U.S. production plants, which creates U.S. jobs while developing U.S. capacity in passenger rail manufacturing. Due to Buy America's emphasis on domestic manufacturing, however, foreign rail companies tend to keep their higher value-added activities, such as design and engineering, at home. Buy America does not apply to all U.S. rail projects, and the U.S. freight manufacturing industry is particularly vulnerable, as it does not enjoy Buy America's protections.

Finally, U.S. policymakers should be wary of the safety and quality of Chinese rail products. China's ability to build HSR lines overseas has yet to be fully tested, and its experience at home demonstrates questionable safety and quality standards.

China's High-Speed Rail Diplomacy: Foreign Policy and Economic Drivers

In recent years, Beijing has sought a greater leadership role in the international system. Although China's foreign policy has always had a strong economic component, economic diplomacy under the Administration of Chinese President and General Secretary of the Chinese Communist Party Xi Jinping has expanded dramatically in scope and ambition.¹ Nowhere is this more apparent than under the Xi Administration's signature foreign policy initiative, "One Belt, One Road" (OBOR), an umbrella program announced in 2013 with the stated aim of enhancing regional connectivity through infrastructure, trade, and investment.² The "belt" in OBOR refers to the Silk Road's overland route through Central Asia, while the "road" refers to the historical sea routes between China and Europe; in total, OBOR includes more than 60 countries, or 30 percent of the global economy.³

President Xi has made OBOR a centerpiece of both his diplomatic and national economic strategies. As a foreign policy initiative, OBOR aims to reshape China's strategic environment and project China's economic power.⁴

* HSR generally refers to trains that run at a maximum speed of 250 kilometers (155 miles) per hour or more. World Bank, "Cost of High Speed Rail in China One Third Lower Than in Other Countries," July 10, 2014. <http://www.worldbank.org/en/news/press-release/2014/07/10/cost-of-high-speed-rail-in-china-one-third-lower-than-in-other-countries>.

Domestically, Beijing has touted OBOR as a comprehensive, externally oriented development program for China's underdeveloped regions, as well as a means for dealing with the country's massive industrial overcapacity.⁵ In that sense, OBOR is a revamped version of China's "going out" policy. That policy was initially focused on securing natural resource assets to fuel China's heavy industry, investment, and export-driven economy.⁶ Under the Xi Administration, "going out" emphasizes projects that help China move up the value chain.*⁷

China has announced plans to invest over \$1 trillion in OBOR countries[†] and marshaled an extensive financial support structure. It includes the New Silk Road Fund (a \$40 billion fund to promote private investment along OBOR) and the Asian Infrastructure Investment Bank, as well as China's state-owned policy banks.⁸ In February 2015, the central government established a small leading group for overseeing and coordinating the implementation of OBOR initiatives, comprised of a veritable "who's who" in Chinese economic and foreign policy leadership.⁹ At the subnational level, two-thirds of China's provinces have made OBOR a development priority and have integrated it into their annual work plans.¹⁰ However, it remains unclear how such a vast undertaking will be coordinated and implemented with so many stakeholders—sometimes with competing interests—involved.¹¹

HSR projects exemplify the type of infrastructure project OBOR seeks to promote. HSR connects OBOR countries and promotes economic and people-to-people exchanges, both of which are goals outlined in the OBOR Action Plan released last March.¹² In addition, HSR is very high value-added, in line with Beijing's long-term efforts to export more sophisticated technology and rebalance its economy.¹³ Finally, overseas HSR projects expand or create new markets for Chinese rail companies, which operate in a still substantial but waning domestic market as China completes most of its HSR network over the next few years.¹⁴ Therefore, China's enhanced commitment to invest in infrastructure projects through OBOR is a welcome opportunity for Chinese rail companies to expand overseas.¹⁵

Around 2011, after successfully developing HSR domestically, Beijing began a drive to win deals for HSR projects abroad.¹⁶ International observers and eventually Beijing itself dubbed this drive "high-speed rail diplomacy."¹⁷ Chinese rail firms' overseas push benefits from strong political support: Chinese leaders, notably Premier Li Keqiang, actively promote China's HSR industry during overseas trips, and Chinese-led multilateral initiatives like OBOR provide the industry with further support.¹⁸ As of March 2016, China is in talks about HSR projects with more than 30 countries across emerging and developed markets.¹⁹

China's High-Speed Rail Sector

High-Speed Rail Development

HSR has become one of China's most successful large-scale infrastructure initiatives.²⁰ In less than a decade, China built the world's largest HSR network, which spans 19,000 kilometers (km) (11,800 miles [mi]), and developed globally competitive rail companies.²¹ Although HSR has fostered connectivity and economic growth in China, this success story has come with substantial costs, among them high debt, high-level corruption, and a deadly accident.

China began planning its HSR network in the 1990s, but did not gain headway until the early 2000s. In 2003, Liu Zhijun, the newly appointed minister of railways, proposed a "Great Leap Forward" strategy for the rail sector, emphasizing rapid HSR development. Minister Liu, who has been credited as the "father of Chinese HSR," believed the country could revolutionize its rail system through technological leapfrogging, as China was a latecomer to the HSR field.²² China's pressing need for extra railway capacity also motivated the industry's development; at the time, China's aging rail infrastructure was quickly becoming a bottleneck to economic growth.²³ Thus, in 2004 the Ministry of Railways announced the Medium- to Long-Term Railway Network Development Plan, which set a goal

* In his 2015 work report to the National People's Congress, Premier Li Keqiang identified the following as sectors Chinese companies should target as part of the "going out" strategy: railway, electric power, communications, engineering machinery, automobile, aircraft, electronics, and other equipment. Xinhua, "Report on the Work of the Government," March 16, 2015. http://news.xinhuanet.com/english/china/2015-03/16/c_134071473_3.htm.

† For comparison, the Marshall Plan totaled about \$130 billion in today's dollars. PricewaterhouseCoopers estimates that OBOR countries have a total infrastructure investment need of about \$5 trillion. *Economist*, "Our Bulldozers, Our Rules," July 2, 2016. <http://www.economist.com/news/china/21701505-chinas-foreign-policy-could-reshape-good-part-world-economy-our-bulldozers-our-rules>; PricewaterhouseCoopers, "China's New Silk Route: The Long and Winding Road," February 2016, 4. <https://www.pwc.com/gx/en/growth-markets-center/assets/pdf/china-new-silk-route.pdf>.

of having the country's total operating rail network reach 120,000 km (74,560 mi) by 2020, with 16,000 km (9,940 mi) covered by HSR lines.*²⁴

After almost a decade of unsuccessful attempts to develop indigenous HSR technology,[†] Minister Liu decided on a “technology transfer for market access” strategy, in which China would import and reverse engineer HSR technology from foreign firms to achieve indigenously manufactured HSR systems.²⁵ In 2004, China began soliciting bids from foreign firms, who were eager to tap into China's massive railway market. Contracts were awarded on the condition that foreign companies assemble the trains through local joint ventures while transferring their technical knowhow by providing access to train blueprints as well as training for Chinese engineers.²⁶

China's two major state-owned train manufacturers, China South Locomotive & Rolling Stock Corporation (CSR) and China North Locomotive & Rolling Stock Corporation (CNR), signed technology transfer contracts with Alstom (France), Siemens (Germany), Bombardier (Canada), and Kawasaki Heavy Industries (Japan) among others to introduce a complete line of HSR technology ranging from engines, dynamos, and electricity transmissions to railway signal control systems.²⁷ Chinese engineers then adapted and tweaked that technology—a process China has termed “digestion and re-innovation”—to develop independently manufactured HSR systems.²⁸ In 2007 China introduced the country's first high-speed service, featuring trains manufactured in China using foreign technology platforms.²⁹ China accelerated the pace of HSR expansion as part of government stimulus efforts following the 2008 global financial crisis.³⁰ In 2010, China debuted what it asserted was the first Chinese-designed high-speed train—the China Railway High-speed (CRH) 380A, named for its top speed of 380 km/h (236 mph); at that time, the fastest trains operating in Japan and Europe ran at about 320 km/h (199 mph).³¹

After rolling out its HSR system at breakneck pace, China slowed down its rail development program in 2011 following an accident near the city of Wenzhou and investigations into high-level corruption at the now defunct Ministry of Railways.[‡] In February 2011, then Minister of Railways Liu Zhijun came under investigation for corruption and abuse of power; the scandal exposed broader problems at the ministry with rampant debt, waste, and embezzlement.^{§32} In July 2011, two high-speed trains collided on a viaduct near Wenzhou, killing 40 passengers and injuring nearly 200 more.³³ Both events greatly eroded public confidence in the country's HSR enterprise.³⁴

The Wenzhou collision led many Chinese citizens to criticize the government for having rushed HSR expansion at the expense of safety. The lack of transparency in the government's immediate response as well as its moves to suppress media coverage of the accident further fueled public anger.^{**} In response to widespread public outrage, the government ordered an official investigation into the crash and released its findings in December 2011. The report placed “primary leadership responsibility” for the accident on top Ministry of Railways officials—in particular, the already disgraced former railway minister—and noted that 54 officials faced disciplinary action.³⁵ The investigation determined that “serious design flaws” in the signaling equipment were the proximate cause of the collision.³⁶ The report also highlighted bidding irregularities and negligent safety management practices.³⁷ An

* China met the plan's HSR construction target in 2014, six years ahead of schedule. Zhao Jian, “Railway System Expansion Should Reflect the New Economic Reality,” *Caixin*, July 8, 2016. <http://english.caixin.com/2016-07-08/100964212.html>.

† China's first domestically developed high-speed train, the China Star, was unveiled in 2002. However, less than two years later, the Ministry of Railways declared its core technology “immature” and the train was discontinued. James Anderlini and Mure Dickie, “China: A Future on Track,” *Financial Times*, September 23, 2010. <https://www.ft.com/content/2b843e4c-c745-11df-aeb1-00144feab49a>.

‡ Prior to its dissolution in 2013, the Ministry of Railways was both the industry regulator and operator. There were 16 railway bureaus and two railway group companies under the Ministry of Railways, which had two million employees. *People's Daily*, “Ministry of Railways of the People's Republic of China,” August 22, 2012. <http://en.people.cn/102759/205143/7920436.html>.

§ For an in-depth account of corruption at China's Ministry of Railways, see Evan Osnos, “Boss Rail,” *New Yorker*, October 22, 2012. <http://www.newyorker.com/magazine/2012/10/22/boss-rail>.

** News of the accident first broke on Chinese microblogs by witnesses to the accident, where the news spread rapidly. The government attempted to control coverage of the incident; leaked propaganda directives ordered media outlets not to send reporters to the scene, not to report too frequently, and not to link the story to HSR development. Many Chinese netizens accused officials of trying to cover up the crash. They were particularly incensed by photos of railway workers burying damaged rail cars from the crash, which they saw as an attempt by officials to avoid a fair investigation. James T. Areddy, “China Blast High-Speed Rail System,” *Wall Street Journal*, December 29, 2011. <http://www.wsj.com/articles/SB10001424052970204632204577126121683353312>; Tania Branigan, “Chinese Anger over Alleged Cover-Up of High-Speed Rail Crash,” *Guardian*, July 25, 2011. <https://www.theguardian.com/world/2011/jul/25/chinese-rail-crash-cover-up-claims>; Paul Pennay, “Public Calls for Change of Track Following Bullet Train Crash in China,” *Christian Science Monitor*, July 26, 2011. <http://www.csmonitor.com/World/Asia-Pacific/2011/0726/Public-calls-for-change-of-track-following-bullet-train-crash-in-China>.

earlier internal report by the Ministry of Railways reported that 106 of the 168 problems found in high-speed trains across the country were caused by “design and manufacturing quality problems.”³⁸ The official report did not, however, indicate whether the same design flaw in the signaling equipment was present on other lines, nor did it discuss manufacturing quality issues.³⁹

The crash was a setback for China’s plans to export its HSR equipment and technology abroad. Not only did the accident undercut Chinese officials’ claims of the country’s superior rail technology, but it also threatened to put a permanent stain on the country’s HSR safety record. Chinese officials undertook a number of reforms following the accident: authorities implemented nationwide safety inspections, temporarily halted new rail projects pending the safety checks, and placed speed restrictions on trains.⁴⁰ Most significantly, in March 2013, Beijing dismantled the Ministry of Railways, splitting its functions between a State Railway Administration under the Ministry of Transportation and China Railway Corporation (CRC), a new central state-owned enterprise that took over China’s commercial rail operations.⁴¹

Investment in rail development has made a strong comeback under the Xi Administration. Premier Li has said that rail spending “kills several birds with one stone,” stimulating growth in the short run while boosting productivity and efficiency in the long term.⁴² Rail spending in 2014 and 2015 neared the previous peak of 2010, when the country spent over \$100 billion on rail infrastructure.⁴³ Chinese financial magazine Caixin reported that China will invest at least \$567 billion (renminbi [RMB] 3.8 trillion) in rail infrastructure for the 2016–2020 period, compared to \$522 billion (RMB 3.5 trillion) during the 2010–2015 period.⁴⁴

The ramped up spending has added to the buildup of rail sector debt that has ballooned since the 2008 stimulus. CRC reported in May 2016 that its total debt had grown 10.4 percent year-on-year, reaching \$618 billion (RMB 4.14 trillion).⁴⁵ CRC has had to rely on government subsidies and new lending to maintain its operations.⁴⁶ Some Chinese rail experts question the wisdom of maintaining high levels of government spending on HSR, as most of China’s existing lines are expected to run at a loss due to inadequate demand.[†]⁴⁷ The rail sector’s mounting debt burden and need for further investment has prompted Beijing to reform the sector’s financing model to attract private investment.[‡] In September 2016, Chinese conglomerate Fosun International became the first private domestic firm to invest in a Chinese high-speed rail project when it announced it would invest an undisclosed amount in a \$6.9 billion public-private partnership.⁴⁸ However, attracting private investment will likely prove difficult: rail investment under the 13th Five-Year Plan is focused on the country’s underdeveloped central and western regions, projects that entail lower profitability and higher risk.⁴⁹

Nonetheless, China continues large-scale investment in the rail sector to offset its economic slowdown. In a new railway network development plan released in July 2016, China announced it will expand its railway network to 175,000 km (108,740 mi) by 2025, including 38,000 km (23,610 mi) of HSR.⁵⁰ The plan entails a 45 percent increase in the length of China’s railway network from 2015 and a 100 percent increase in high-speed rail.[§]

* Unless otherwise specified, this report uses the following exchange rate throughout: 1 U.S. dollar = 6.70 RMB.

† China’s busiest HSR line, the Beijing-Shanghai link, is the only profitable line in the country’s HSR network. The line became profitable in 2015, four years after it began operations. Rose Yu, “China’s Busiest High-Speed Rail Line Makes a Fast Buck,” *Wall Street Journal*, July 20, 2016. <http://blogs.wsj.com/chinarealtime/2016/07/20/chinas-busiest-high-speed-rail-line-makes-a-fast-buck/>; Zhao Jian, “Railway System Expansion Should Reflect the New Economy Reality,” Caixin, July 8, 2015. <http://english.caixin.com/2016-07-08/100964212.html>.

‡ In August 2013, as part of the overall restructuring of the railway sector, the State Council introduced a range of policy initiatives for rail financing, including opening ownership and operational rights to private investors and establishing a railway development fund to attract private investment. More generally, the promotion of public-private partnerships has been a flagship policy since the 2013 Third Plenary Session of the 18th Chinese Communist Party Central Committee called for more private investment in infrastructure projects. Rafael Halpin, “China’s Infrastructure Plans Hit by Private Sector Hesitancy,” *Financial Times*, May 1, 2015. <https://www.ft.com/content/ccc545b6-eff5-11e4-bb88-00144feab7de>; Economist Intelligence Unit, “High-speed rail target looms,” February 6, 2015. <http://country.eiu.com/article.aspx?articleid=492804433&Country=China&topic=Economy>; Reuters, “China Railway Fund Completes First Fundraising Round,” September 26, 2014 <http://www.reuters.com/article/china-railways-idUSL6NORR1PC20140926>; Chen Yang, “Rail Investment Target Raised Again,” *Global Times*, May 3, 2014. <http://www.globaltimes.cn/content/858115.shtml>.

§ According to China’s National Development and Reform Commission, in 2015 the country’s rail network had an operational length of 121,000 km (75,190 mi), including 19,000 km (11,800 mi) of HSR. Zhao Lei, “30,000 km Expansion of Rail Network Planned,” *China Daily*, July 22, 2016. http://www.chinadaily.com.cn/china/2016-07/22/content_26178328.htm.

In It to Win: China's High-Speed Rail Export Plans

Chinese government sources stated early on China's intent to compete with established train manufacturers abroad. For example, China's Medium- to Long-Term Railway Network Development Plan identified the creation of internationally competitive Chinese HSR brands as one of its ultimate objectives.⁵¹ The 2008 China High-Speed Train Indigenous Innovation Joint Action Plan issued by the Ministry of Science and Technology and the Ministry of Railways stated the ministries would cooperate to establish independent intellectual property rights and improve international competitiveness.⁵² After absorbing and mastering foreign HSR technology, Beijing began a drive to win deals for HSR projects abroad. Between 2010 and 2011, China pursued HSR projects with a string of countries in Southeast and Central Asia, including Thailand, Laos, and Kazakhstan.⁵³ These efforts slowed somewhat after the Wenzhou crash in July 2011 led to the restructuring of the rail ministry.

Under the Xi Administration, Beijing has made HSR exports a top priority. The government's "Made in China 2025" strategy, designed to move China's manufacturing sector up the value chain, identifies modern rail transport equipment as a priority sector.⁵⁴ Beijing views rail exports more generally as a tool for absorbing the country's massive industrial overcapacity.⁵⁵ Chinese leaders formalized the idea of transferring industrial capacity abroad into a concept called "international industrial capacity cooperation" and have promoted it in their overseas visits since 2015.⁵⁶ The concept was articulated in the State Council's *Guiding Opinions on Promoting International Cooperation in Industrial Capacity and Machinery Manufacturing* issued in May 2015, which identified 12 priority sectors for cooperation, including steel and rail.⁵⁷

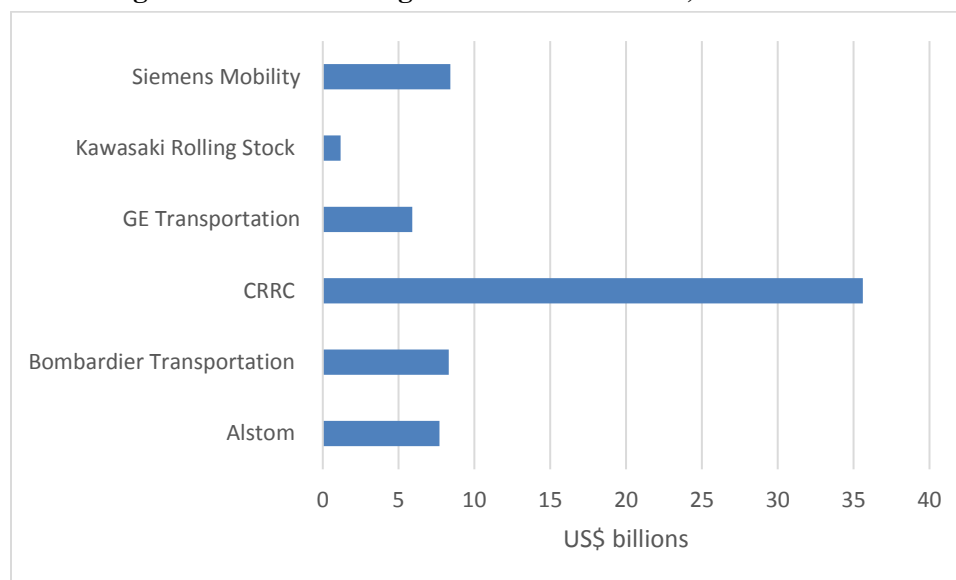
Chinese railway firms initially focused on emerging markets, but in recent years have also begun to bid aggressively for contracts in developed markets, including the United States.⁵⁸ China's first overseas HSR project, the Ankara-Istanbul high-speed railway in Turkey, was completed in 2014.[†] With "China's high-speed salesman" Premier Li touting China's HSR expertise on trips abroad, Chinese companies signed a combined \$24.7 billion worth of contracts for overseas rail projects in 2014.⁵⁹ China's two largest rail manufacturers, CNR and CSR, signed a combined \$6 billion worth of overseas rail contracts, up 60 percent from 2013.⁶⁰

Chinese rail companies make up the lion's share of the global rail market. Global management consulting firm McKinsey & Company estimated in 2015 that Chinese companies held a 41 percent share of global rail equipment revenues.⁶¹ In June 2015, Beijing combined CNR and CSR into the China Railway Rolling Stock Corporation (CRRC), in a bid to create a national export champion that would allow China to better compete for rail projects overseas.⁶² This state-directed merger brought the company's market capitalization to \$130 billion, making it the second largest industrial company in the world after General Electric (GE).⁶³ CRRC's 2015 revenue exceeded the combined revenue of five of its top competitors (see Figure 1).

* According to Gu Dawei, head of the foreign investment administration department at the National Development and Reform Commission, "Capacity cooperation means more than the export of finished products but also the transfer of the whole industrial chain to help other countries beef up their manufacturing capability." Xinhua, "China's Manufacturing Sector Eyes Wider Global Presence," May 20, 2015. http://news.xinhuanet.com/english/2015-05/20/c_134255351.htm.

† China Railway Construction Corporation and China Machinery Import and Export Corporation won the tender to build the line in 2005. The Chinese government provided a \$750 million loan for the project, \$500 million of which was on favorable terms. Amy Qin, "China Exports High-Speed Rail Technology to Turkey," *New York Times*, July 28, 2014. <http://sinosphere.blogs.nytimes.com/2014/07/28/china-exports-high-speed-rail-technology-to-turkey/>.

Figure 1: Global Rolling Stock Manufacturers, 2015 Revenue



Note: For firms whose core business is not rail manufacturing (Siemens, Kawasaki, GE, and Bombardier), annual revenue is for the firms' division that focuses on rail. GE Transportation includes locomotives and services but also non-rail businesses, such as drilling, marine solutions, and mining.

Source: Various.⁶⁴

In a 2015 interview with Bloomberg, CRRC's vice president said that the company plans to double overseas contracted sales to \$15 billion by 2020.⁶⁵ As China completes most of its HSR network over the next few years, overseas expansion will be critical for Chinese rail companies' continued growth.*⁶⁶ In the first half of 2015, CRRC earned 88 percent of its sales domestically, but its domestic sales only grew 0.9 percent year-on-year, while its revenue from overseas sales jumped 61 percent year-on-year.⁶⁷

Chinese rail companies have strong advantages as they compete for contracts abroad. They have the political and financial backing of the Chinese government; can underbid private competitors due to government subsidies, including below market rate loans; and provide faster delivery times than foreign competitors.⁶⁸ After assimilating acquired foreign technology to produce high-speed trains domestically, China debuted the first "Chinese-standard" high-speed train in 2016, which it claims uses entirely Chinese technology.⁶⁹ However, the quality and reliability of Chinese HSR exports remain uncertain.

Government Financing for Overseas Rail Projects

Chinese HSR projects are often accompanied by substantial Chinese government financing in the form of low-interest loans to host countries. In addition, Chinese rail companies have access to cheap credit from state policy banks[†] and are heavily subsidized. In its listing announcement on the Shanghai Stock Exchange, CRRC noted that in 2014 and 2015, it received \$194 million (RMB 1.3 billion) and \$268.7 million (RMB 1.8 billion) in government subsidies, respectively.⁷⁰ The company stated that were its government subsidies reduced, it would have a "definite negative impact on the company's business results and financial position."⁷¹

Foreign executives have complained the subsidies create an uneven playing field. "Alstom, KHI, and Siemens are not banks and do not have the political influence or the full weight and money of the state behind them in the way

* Facing well-developed rail networks at home, CRRC's primary foreign competitors—European, Canadian, and Japanese firms—are similarly driven to pursue projects overseas. PwC, "Assessing the Global Transport Infrastructure Market: Outlook to 2025," 2015, 2. <https://www.pwc.com/gx/en/transportation-logistics/pdf/assessing-global-transport-infrastructure-market.pdf>; *Economist*, "Making Tracks," April 23, 2009. www.economist.com/node/13528328.

[†] For example, in November 2015 China EximBank granted China Railway Corporation a credit line of up to \$75 billion (RMB 500 billion) to support its overseas expansion. Xinhua, "China EximBank to Finance China Railway's Global Projects, November 20, 2015. http://news.xinhuanet.com/english/2015-11/19/c_134834239.htm.

the Chinese rail companies do,” an unnamed senior executive at a foreign rail company said in an interview with the *Financial Times*.⁷² State-backed financing offers can be particularly decisive for winning contracts in emerging markets where governments need the support to finance infrastructure investments. In October 2015, Siemens’ chief executive called on the German government to provide more backing for the country’s industrial exporters, noting, “We see increasingly state-backed offers from China and Japan in international competitions to which we don’t really have an answer.”⁷³

Among other countries with major rail companies, Japan is the only one that offers substantial financing packages to help its companies win bids.^{*} For example, in December 2015, a consortium of Japanese firms won a \$15 billion HSR deal in India largely due to the generous financing terms the Japan government offered—a \$12 billion 50-year loan for a project with an interest rate of 0.1 percent and a ten-year grace period.⁷⁴

Cost Advantages: Lower Costs at Home but Also Abroad?

Chinese rail firms also enjoy significant cost advantages over their competitors. According to a 2014 World Bank study, the cost of HSR construction in China is about one-third lower than in other countries; Chinese HSR costs \$17 million–\$21 million per kilometer, compared with \$25 million–\$39 million per kilometer in Europe, and as much as \$52 million per kilometer currently estimated for California’s HSR project.⁷⁵ The study attributes China’s comparatively low cost of HSR construction to three key factors: China’s economies of scale in production, lower labor costs, and state-led planning.^{†76} Other factors include China’s relatively low cost of land acquisition and resettlement and its localization of the design and manufacture of goods and components.⁷⁷

Some industry analysts argue that China’s cost advantages apply to its HSR projects abroad. According to Barclays analyst Yang Song, the average selling price of Chinese high-speed trains has been roughly 32 percent lower per set than trains made by Siemens.⁷⁸ According to a senior CSR executive, delivery time for a train set takes 12 months—versus the 18 to 22 months for foreign manufacturers—due to higher labor efficiency in China.⁷⁹ However, David Dollar, a senior fellow at the Brookings Institution, argues that China’s advantages in lower labor costs and government backing may not apply in the United States, which has more restrictive labor standards and land acquisition rules.⁸⁰

Technological Capabilities and Intellectual Property Rights

With the CRH380A, Chinese officials and train manufacturers claimed they created their own intellectual property through “digesting” and innovating upon foreign technology.⁸¹ In a 2010 interview, Luo Bin, senior engineer at CSR Sifang’s Technology Development Center, said, “[The CRH380A] is an innovative design based on the technology we had already digested. This is completely the result of our autonomous design. It’s got nothing to do with Bombardier or Siemens. It’s got nothing at all to do with Shinkansen.”⁸² However, in a candid interview published in June 2011, Zhou Yimin, the former deputy director of the Ministry of Railways’ high-speed department, admitted the essential technology behind China’s high-speed trains was foreign.⁸³ According to Mr. Zhou, the 380-series trains should not run faster than 300 km/h but the rail ministry under Minister Liu had disregarded safety concerns to run the trains at an operating speed of 350 km/h. Mr. Zhou said the 380-series trains were able to go faster simply by “eating into the safety tolerances” of the originals.⁸⁴

Although foreign executives have been reluctant to publicly comment on China’s HSR technology, some privately alleged the core technology behind the CRH380A was nearly identical to acquired foreign technology; they argued that China’s “innovation” only involved cosmetic modifications to the body of the train and a beefed-up propulsion system to achieve faster speeds.⁸⁵ According to a 2010 *Financial Times* article, foreign industry executives estimated that roughly 90 percent of HSR technology used in China was derived from partnerships or equipment developed by foreign companies.⁸⁶ Japan’s Kawasaki said in a 2010 statement, “China says she owns the exclusive rights to [the CRH380A] intellectual property, but Kawasaki and other foreign companies feel otherwise.”⁸⁷

^{*} The state-owned Japan Bank of International Cooperation provides low-interest financing for overseas infrastructure projects.

[†] The study contends the existence of a credible, high-level plan for rail development (the Ministry of Railway’s Medium-to-Long Term Railway Network Development Plan) encouraged Chinese rail construction and equipment supply firms to quickly build capacity to tap into high volumes of HSR-related work. This contributed to lower unit costs for HSR construction. Gerald Ollivier, Jitendra Sondhi, and Nanyan Zhou, “High-Speed Railways in China: A Look at Construction Costs,” World Bank, July 2014, 8.

Kawasaki said it would take legal action if China filed for patents on trains using its technology, although the company has not yet done so.*

As Chinese firms expand their HSR exports, they have grown mindful of the need to develop and protect their own HSR technology. Since 2009, Chinese rail firms have applied for HSR-related patents in countries such as the United States, Brazil, and Russia.⁸⁸ In August 2016, China debuted a “Chinese standard” high-speed train with “full intellectual property rights” that will gradually replace its current mix of trains derived from various foreign designs and specifications.⁸⁹ According to CRC chief engineer He Huawu, the new trains “will greatly reduce our production, operational and maintenance costs” and also “facilitate our efforts to export China’s railway products and technologies.”⁹⁰

Some international executives point to the experience of foreign rail companies in China as a cautionary tale for other industries.⁹¹ After Chinese state-owned firms “digested” foreign HSR technology, foreign companies were left with a shrinking share in the Chinese market due to state policies that encourage localization.⁹² As late as 2014, foreign firms supplied most advanced components used in Chinese high-speed trains (e.g., traction, brakes, and control software).⁹³ However, according to recent media reports, foreign rail firms have found themselves shut out of providing even advanced components as China improves domestic capacity and promotes homegrown technology under “Made in China 2025.”⁹⁴ At the same time, Chinese firms have become formidable global competitors, selling HSR technology at lower prices and often with financing from state-controlled banks.⁹⁵

Safety and Quality Concerns Persist

A key selling point for HSR is its strong safety record. In the history of HSR, there have been just three accidents: Germany (1998), China (2011), and Spain (2013).⁹⁶ Although the Wenzhou collision is often recalled when discussing Chinese HSR projects overseas, international transport experts assert that China’s overall HSR safety record is comparable with that of other countries, and emphasize that it remains far safer than other forms of transport. China’s HSR system has transported about 1.8 billion passengers since 2009.⁹⁷ According to Arnold Barnet, an aviation safety expert and professor at the Massachusetts Institute of Technology’s Sloan School of Management, comparing the fatalities from the Wenzhou crash to the total number of Chinese high-speed train trips completed suggest that the trains have been extremely safe overall. “Chinese high-speed rail has so far established a mortality-risk level that equals or exceeds that of the world’s safest airlines,” he said.⁹⁸

The same cannot be said for China’s conventional rail safety record. According to National Railway Administration data, in 2015 there were 1,710 train malfunction incidents and 1,037 passenger fatalities as a result of train accidents.⁹⁹ At a December 2015 management meeting, national rail operator China Railway blamed the rise in train malfunctions on declining quality standards at the country’s main rolling stock manufacturer, CRRC.¹⁰⁰ In July 2016, Singapore sent 26 defective metro trains back to their manufacturer—CSR Sifang, a CRRC subsidiary—for repairs, after discovering hairline cracks in the structure linking the body of the car to the undercarriage.¹⁰¹ CSR Sifang said that it had traced the defects back to the aluminum alloy used during the manufacturing process.¹⁰² It noted that while Singapore’s Ministry of Transport deemed the cracks not “safety critical,” it had taken the initiative to recall the defective trains “owing to its sense of responsibility to its client and its products.”¹⁰³ While the Singapore case concerns Chinese-produced metro cars, these revelations also have serious reputational repercussions for Chinese firms seeking HSR deals abroad.¹⁰⁴

Recent Setbacks to China’s Export Ambitions

Over the last two years, China’s global HSR ambitions have experienced multiple setbacks with the delay, reduction, or cancellation of projects in Thailand, Indonesia, Mexico, and the United States over regulatory, financing, and transparency concerns.¹⁰⁵ (For a list of Chinese rail projects in OBOR countries, see Appendix I, “Chinese Rail Projects in OBOR Countries, 2013–2016.”) Consequently, some industry experts have begun to

* Kawasaki said that its technology transfer contract with China’s Ministry of Railways limited Chinese firms’ use of Kawasaki technology to domestic applications. Michael Fitzpatrick, “Did China Steal Japan’s High-Speed Train?” *Fortune*, April 15, 2013. <http://fortune.com/2013/04/15/did-china-steal-japans-high-speed-train/>; Michael Standaert, “China’s High-Speed Rail Faces Questions over Intellectual Property, Reliability,” *Bloomberg*, July 20, 2011. <http://www.bna.com/chinas-highspeed-rail-n12884902491/>.

question the business case for HSR exports.¹⁰⁶ In many countries where China has pursued HSR projects, host governments lack the means to pursue HSR without Chinese financing support.¹⁰⁷

Industry experts also worry that political pressure to win overseas contracts may lead Chinese rail companies and lenders to support investments that entail substantial operational risks or are unprofitable.¹⁰⁸ Mexico canceled a \$3.7 billion project, ultimately blaming budget cuts.* In Indonesia, China beat out Japan to win a HSR contract primarily due to its willingness to forgo loan guarantees or state funding from the Indonesian government, an approach that entails high financial risks for China.¹⁰⁹ Thailand announced it would significantly shorten and self-finance a planned Chinese-built line after failing to secure satisfactory financing terms; Thailand considered the total project costs as well as the interest rate China offered for financing the deal prohibitively high.¹¹⁰

Chinese industry experts have also expressed doubts over whether China's HSR model can be replicated elsewhere.¹¹¹ China has a number of unique advantages for HSR development, including large-scale state planning and financing, and a dense and rapidly urbanizing population. It has also been relatively free from issues that have stymied HSR development elsewhere—concerns like raising sufficient capital, securing rights-of-way, or dealing with local opposition to specific rail routes.¹¹²

Chinese Rail Projects in the United States

China's rail firms have set their sights on the U.S. market. They believe the U.S. rail market is huge and underdeveloped but primed for development—if they can get a foothold, opportunities for future expansion will follow.¹¹³ They also believe the United States presents an opportunity to showcase Chinese HSR technology: “If you [are] operating in the U.S. market, then other countries should accept your products more easily,” said Shi Yonghong, vice-president of the China Chamber of Commerce for Import & Export of Machinery and Electronic Products.¹¹⁴

But China's rail companies are finding the U.S. market tough to crack. U.S. policymakers have been split over the need for HSR and some have voiced their opposition to Chinese involvement in U.S. infrastructure.¹¹⁵ Furthermore, U.S. domestic content requirements for transportation infrastructure projects—commonly known as “Buy America”—can reduce profit margins for foreign firms. Finally, Chinese firms face stiff competition from Japanese and European rail firms for U.S. rail projects.¹¹⁶

Chinese rail firms' U.S. push comes at a time when federal infrastructure funding is uncertain and HSR remains largely conceptual. The prospects for HSR development in the United States looked bright in 2009, when President Barack Obama unveiled a plan to build a series of HSR lines and included \$8 billion in the 2009 stimulus package for that purpose.¹¹⁷ However, Congress voted to eliminate federal financing for HSR development in 2011.¹¹⁸ Since then, Congressional opposition to public financing of mass transit projects has left California the only U.S. state pursuing a public HSR system.¹¹⁹ At least two privately-led HSR projects—XpressWest's Las Vegas-Los Angeles line and Texas Central's Dallas-Houston line—are in various stages of development.¹²⁰

Approved by California voters in 2008, California's high-speed line is envisioned to connect Los Angeles and San Francisco by 2029, and later expand to San Diego and Sacramento, and comes with an estimated \$68 billion price tag for the Los Angeles-San Francisco link.¹²¹ Chinese rail firms have expressed a strong interest in building California's HSR line. A team of Chinese firms led by China Railway International responded to a 2015 request for expressions of interest from the California High-Speed Rail Authority[†]; the team volunteered in their response that under “appropriate loan conditions,” China Exim Bank could “satisfy the financing needs of the project.”¹²² But

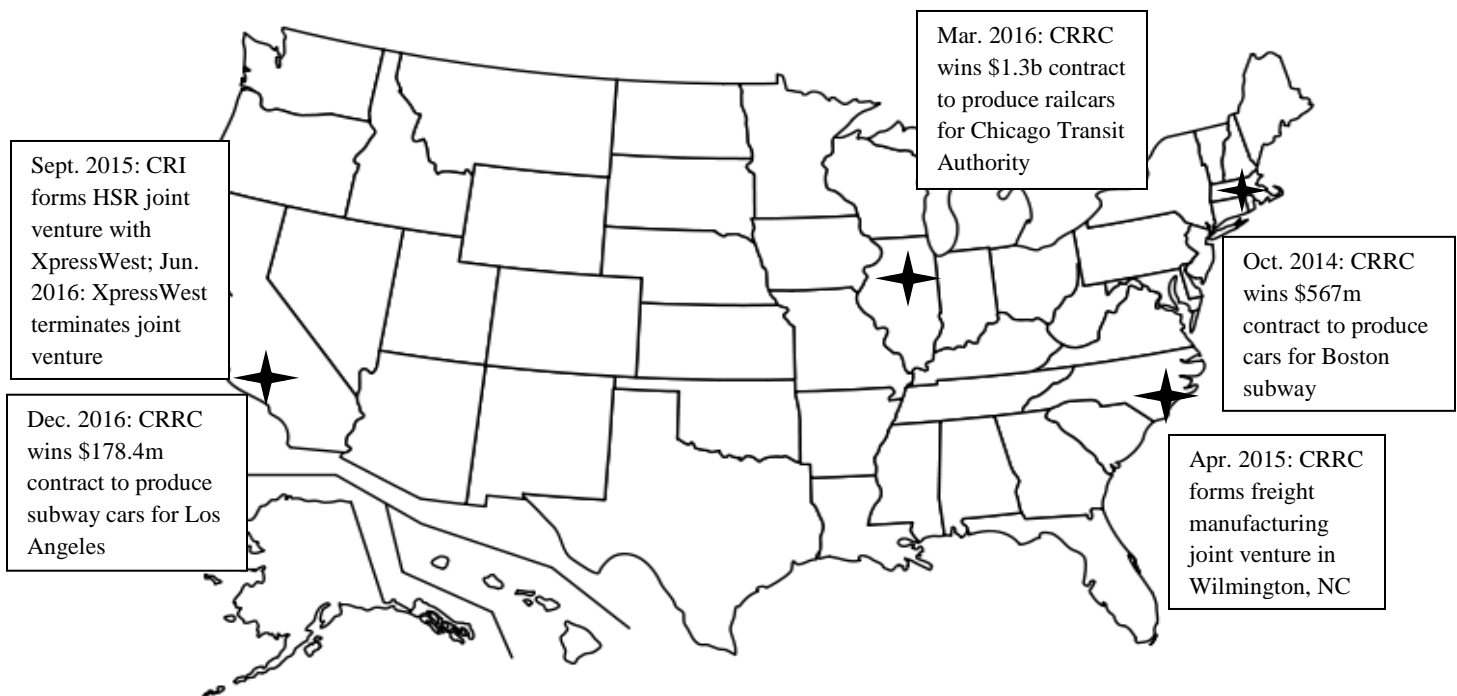
* Mexico canceled the contract in November 2014 amid concerns about the bidding process. The Mexican government relaunched the bid in 2015 only to cancel the project again, citing budget constraints. BBC, “Mexico to Pay China Rail Firm for Cancelling Project,” May 22, 2015. www.bbc.com/news/business-32840712.

† The California High-Speed Rail Authority's 2016 business plan notes its intention to procure providers for rail infrastructure, rolling stock, and civil works construction. To date, it has awarded three civil works construction contracts, but has not yet awarded contracts for rail infrastructure and rolling stock. The Authority is “continuing engagement with the private sector, including more than 50 world-class firms, soliciting their advice and expertise on project delivery.” California High-Speed Rail Authority, *Connecting and Transforming California: 2016 Business Plan*, May 1, 2016, 17, 39–47. http://www.hsr.ca.gov/docs/about/business_plans/2016_BusinessPlan.pdf.

given the project’s significant funding gap,^{*} it warned California would need to provide additional public financing and guarantee future project debt to reassure potential investors.¹²³ Construction began in 2015 for portions of the network after protracted delays—without Chinese involvement in this first stage.[†]

Since 2014, Chinese rail firms have won four contracts in the United States: one for an HSR project and three contracts to build metro rail cars (see Figure 2). In December 2016, CRRC submitted a bid for a major contract to build 1,025 subway cars for New York City’s transit system.[‡] In addition, CRRC recently partnered with a North Carolina-based rail company to build freight cars, for which it has drawn significant congressional scrutiny.

Figure 2: China’s Growing Footprint in the U.S. Rail Market



Source: Compiled by Commission staff.

^{*} California still needs a large amount of funding to complete its rail line. About \$13 billion of the estimated \$68 billion needed to build the line has been raised through state and federal funds, plus a pledge of a portion of cap-and-trade proceeds. Robin Respaut, “Chinese Firms Want to Build, Finance California High-Speed Train,” Reuters, October 16, 2015. <http://www.reuters.com/article/us-california-rail-china-idUSKCN0SB01C20151017>.

[†] The California High-Speed Rail Authority has awarded three civil works construction contracts: The first contract, for \$985 million, was awarded in 2013 to Tutor Perini/Zachry/Parsons, a joint venture of U.S. firms. The second contract, for about \$1.4 billion, was awarded in 2015 to Dragados/Flatiron/Shimmick, a consortium of U.S. subsidiaries of two European firms and a U.S. firm. The third contract, for \$348 million, went to a U.S. subsidiary of Spain’s Ferrovial S.A. Tim Sheehan, “High-Speed Rail Board Awards Third San Joaquin Valley Construction Contract,” *Fresno Bee*, January 12, 2016. www.fresnobee.com/news/local/high-speed-rail/article54370025.html; Ralph Vartabedian, “Bids for Bullet Train Construction Show Apparent Winner for Next Phase,” *Los Angeles Times*, January 5, 2016. www.latimes.com/local/lanow/la-me-bids-for-bullet-train-2016010-story.html; Tim Sheehan, “Heavy Equipment Finally Moving on California High-speed Rail Construction,” *Fresno Bee*, June 16, 2015. www.fresnobee.com/news/local/high-speed-rail/article24647566.html.

[‡] CRRC has a tentative agreement to purchase land in Fort Edward, New York, where it plans to build an assembly plant if it wins the contract. CRRC and Bombardier Transportation—longtime international competitors—signed a strategic cooperation agreement in September 2016 to partner on international bids, and according to press reports, may collaborate on the New York City subway contract. Robin K. Cooper and Michael DeMasi, “Fort Edward Manufacturing Jobs Hinge on New York City Subway Contract,” *Albany Business Review*, December 8, 2016. <http://www.bizjournals.com/albany/news/2016/12/08/manufacturing-jobs-hinge-on-nyc-subway-contract.html>; Zhong Nan, “On the Fast Track to Expansion,” *China Daily*, December 5, 2016. http://usa.chinadaily.com.cn/business/2016-12/05/content_27566114.htm; Allison Lampert, “China’s CRRC, Bombardier to Join Forces on International Bids,” Reuters, September 23, 2016. <http://www.reuters.com/article/bombardier-crrc-idUSL2N1BZ1YN>.

Derailed Ambitions: CRI and XpressWest

On the eve of President Xi's visit to the United States in September 2015 came an announcement of a joint venture between China Railway International (CRI) USA, a consortium led by China's national railroad, and XpressWest, a private railroad company set up by Las Vegas-based hotel and casino developer Marnell Companies, to build a 230-mile HSR passenger line linking Las Vegas and Los Angeles.¹²⁴ CRI chairman Yang Zhongmin said the project—China's first contract for an HSR project in the United States—was a “landmark in overseas investment for the Chinese railway sector and [would] serve as a model of international cooperation.”¹²⁵ CRI pledged \$100 million in initial project funding and construction was expected to commence in the fall of 2016.¹²⁶ But nine months later, the deal abruptly fell apart, with both sides offering contradictory accounts.

XpressWest called the deal off in June 2016 and claimed in a statement that its decision was “based primarily on difficulties associated with timely performance and CRI's challenge in obtaining required authority to proceed with required development activities.”¹²⁷ However, XpressWest also said its biggest challenge remained U.S. requirements that high-speed rolling stock be manufactured in the United States. “As everyone knows, there are no high-speed trains manufactured in the United States. This inflexible requirement has been a fundamental barrier to financing high-speed rail in our country,” the statement said.¹²⁸

In response, CRI's chairman, Yang Zhongmin, argued the domestic manufacturing requirement raised by XpressWest did not apply as no federal funds were involved in the project, which was “purely commercial.”¹²⁹ A China Railway spokesperson called XpressWest's decision “irresponsible,” stating that XpressWest had violated the terms of their agreement by making the announcement unilaterally while the two sides were still in negotiations.¹³⁰ An unnamed CRI source told Caixin that the two sides were locked in a dispute over the project's financial terms and that XpressWest had decided to terminate the joint venture because CRI refused to make certain concessions.¹³¹

The project had been many years in the making; XpressWest began to develop plans for the network in 2005.¹³² According to its website, XpressWest is “the only proposed high-speed rail project in the United States that has completed the environmental review process, obtained all required right-of-way approvals, and received authorization from Surface Transportation Board to construct and operate a high-speed rail system. Moreover . . . XpressWest has accomplished these significant milestones without obtaining any public funding to date.”¹³³ The initial phase of the proposed XpressWest line will connect Las Vegas with Victorville, California, and cost \$8 billion. The second phase will link Victorville with Palmdale, where riders can connect with the existing Metrolink commuter rail system to take the train to Los Angeles. In its final phase, XpressWest plans to link up its system to California's HSR system. In total, the project is estimated to cost \$12.7 billion.¹³⁴ XpressWest said it would search “aggressively” for other development partnerships and options.¹³⁵

Massachusetts Bay Transportation Authority Metro Car Deal

In October 2014, the Massachusetts Bay Transportation Authority (MBTA) awarded CRRC MA, a CRRC[†] subsidiary, a \$567 million contract to supply 284 metro cars for Boston's subway system, marking China's first rail-related deal in the United States.¹³⁶ Construction is scheduled to get underway in 2016, with the first delivery of the metro cars expected in 2018.¹³⁷

* XpressWest's statement noted its intention to renew its request for federal loans. The company's decision to terminate the partnership may have been due in part to its assessment that existing project terms would not satisfy Buy America provisions, which would be necessary for a successful application for federal funding. Besides CRI's statement that it would provide \$100 million in initial capital, details about the terms of the joint venture and its financing have been scant. XpressWest, “XpressWest to Continue Development of Nevada-California Interstate High-Speed Passenger Rail System without Assistance from China Railway International U.S.A., Co., Ltd.,” June 8, 2016.

† At the time the contract was awarded, CRRC MA was CNR MA. CNR and CSR finalized their merger into China Railway Rolling Stock Corporation (CRRC) in June 2015, after which CNR MA became CRRC MA. CSR had also submitted a proposal but was disqualified by MBTA for receiving “unacceptable” ratings in three evaluation categories: technical approach, manufacturing approach, and quality assurance. Lu Bingyang, “CSR, CNR Merger Said to Become Official with Gov't Registration,” Caixin, June 2, 2015. <http://english.caixin.com/2015-06-02/100815577.html>; Massachusetts Bay Transportation Authority, “Overall Technical Proposal Rating,” August 22, 2014.

www.mbtta.com/uploadedfiles/Business_Center/Bidding_and_Solicitations/Senior%20Selection%20Committee%20Consensus%20Evaluation%20Worksheet%20-%20%20CSR,%20Overall%20Rating.PDF.

CRRC MA beat out Bombardier (Canada), CAF (Spain), Hyundai Rotem (Korea), and Kawasaki (Japan) for the deal. CRRC MA received acceptable and good ratings across the Massachusetts Department of Transportation's evaluation categories—which included technical factors, past performance, and quality assurance—outperforming its competitors.¹³⁸ CRRC MA's price proposal was also significantly lower than its competition—Hyundai Rotem came closest with a bid of \$720.6 million, while Bombardier's bid of \$1.08 billion was almost twice that of CRRC MA's.¹³⁹ CRRC MA President Xiwei Lu said the company was able to offer such a low bid in part because it viewed the MBTA project as an entry point to the U.S. market: “We are committed to be here. I want to enter this market. So I don't calculate all the investment in one project.”¹⁴⁰

Massachusetts decided to forgo federal funding and pay for the project with state bonds in order to include a “Make It in Massachusetts” requirement. The requirement obliged bidders to assemble the cars in state and mandated at least 60 percent of railcar components come from the United States, which mirrors the Federal Transit Administration's Buy America requirements.¹⁴¹ Then governor Deval Patrick stated that the provisions were aimed at developing a transit car manufacturing industry in Massachusetts.¹⁴² CRRC MA agreed to build a \$95 million final assembly plant in Springfield, Massachusetts; it will invest \$60 million toward the plant's construction. The Springfield plant is expected to create 250 local jobs.¹⁴³ CRRC MA plans on using the plant as a base of operations to bid on other rail and transit projects in the United States.¹⁴⁴ “We are not here for just one project. We are entering into the entire North American market from here,” said CRRC MA's Mr. Lu.¹⁴⁵

CRRC MA will purchase 60 percent of its rail car components from U.S. suppliers and has begun to solicit local parts manufacturers around Springfield.¹⁴⁶ CRRC has also partnered with local institutions—including the Regional Employment Board of Hampden County, the engineering departments of area colleges and universities, and local sheet metal and electrical unions—to develop a rail car workforce.[†]

CRRC MA's selection for the procurement has come under fire from U.S. industry groups, including the Alliance for American Manufacturing. In a letter to Massachusetts Governor Deval Patrick, the Alliance voiced its concern over the selection of a Chinese state-owned enterprise for the procurement: “[CRRC MA's] state ownership [means], in effect, that Massachusetts taxpayers will be subsidizing the activities of the Chinese government, even if only in a modest way. Moreover, Massachusetts taxpayers will have helped the state-owned CNR to establish a manufacturing presence in the U.S. market, creating permanent, unbalanced competition with private sector firms.”¹⁴⁷

Chicago Transit Authority Rail Car Deal

In March 2016, CRRC subsidiary CSR Sifang America was awarded a \$1.3 billion contract to build 400 new 7000-series rail cars for the Chicago Transit Authority (CTA), with an option for another 446 cars.¹⁴⁸ CSR submitted the lowest bid, \$226 million less than the bid submitted by Bombardier, which built the last batch of CTA cars.¹⁴⁹ The first cars are expected to go into service in 2020.¹⁵⁰

CTA included a “U.S. Employment” provision in the bid solicitation, asking bidders to provide the number and type of new jobs they planned to create, as well as to outline their job recruitment and workforce training plans.¹⁵¹ As part of its bid, CSR pledged to build a \$40 million assembly factory in the south side of Chicago, which is expected to create 170 jobs, employing mostly union, high-skilled workers.¹⁵² Chicago Mayor Rahm Emanuel, who had worked with Chicago labor groups and CTA to include the U.S. Employment provision, hailed the deal as “a day that will go down in history” because it would bring rail car manufacturing back to Chicago.¹⁵³ The city's last rail manufacturing plant, which had built rail cars for CTA, New York City, and Amtrak, was shuttered in 1982. Although the project is not subject to Buy America requirements, CSR has pledged that at least 69 percent of rail

* The transit car industry flourished in Springfield, Massachusetts, from 1845 until the Great Depression era. Springfield was home to one of the world's largest rail manufacturers, Wason Manufacturing Company. The company went out of business in 1932. Jim Kinney, “Chinese Rail Car Factory in Springfield Slated to Produce Boston T Cars ‘Is on Schedule’: Consultant,” *Mass Live*, January 27, 2016. http://www.masslive.com/business-news/index.ssf/2016/01/crrc_ma_chinese_rail_car_maker_opens_thr.html.

† For instance, workers hired for the Springfield assembly plant will be sent to a local vocational school for training. Beginning in 2017, some workers will be sent to China for training. Jim Kenney, “CRRC MA to Begin to Develop Workforce for New Springfield Rail Car Factory,” *Mass Live*, March 24, 2016. www.masslive.com/business-news/index.ssf/2016/03/crrc_ma_will_begin_to_develop_workforce.html.

car components will be made in the United States, which exceeds Buy America standards.¹⁵⁴ Nineteen of CSR's 24 rail car suppliers have headquarters or facilities in the United States.¹⁵⁵

After news that Singapore had sent back defective rail cars made by CSR Sifang for repair emerged in July 2016, a CTA spokeswoman said, "CTA's contract with CSR Sifang includes a number of quality controls for the new rail cars. The manufacturer is only paid as CTA fully inspects and accepts each rail car, and all rail cars are covered by a two-year bumper to bumper warranty."¹⁵⁶

Los Angeles Metro Transit Authority Subway Car Deal

In December 2016, CRRC MA was awarded a \$178.4 million deal to build 64 new subway cars for Los Angeles's metro rail system, with an option for an additional 218 cars.¹⁵⁷ CRRC MA plans on manufacturing the car shells in its Changchun, China facility, with final assembly of the subway cars taking place at its new plant in Springfield, Massachusetts. CRRC MA also committed to having major component manufacturing for air conditioning and lighting systems performed at a facility in Los Angeles and agreed to a U.S. content standard of 65 percent.¹⁵⁸ Production on the cars is scheduled to begin in 2019, with the delivery of the cars expected in 2021.¹⁵⁹

CRRC MA beat out Hyundai Rotem for the contract, receiving higher scores across the Los Angeles Metro Transit Authority's five evaluation categories. The proposals were evaluated based on each firm's past experience and performance on rail vehicle delivery, price proposal, technical compliance, project management experience, and voluntary local employment program, with the greatest weight being placed on past experience and performance.¹⁶⁰

CRRC's Freight Manufacturing Joint Venture

Vertex Railcar Corporation, a joint venture to manufacture freight railcars in Wilmington, North Carolina, was formed in April 2015 by start-up U.S. railroad tank car manufacturer Vertex Rail Technologies, CRRC, and Hong Kong-registered private equity firm Majestic Legend Holdings.¹⁶¹ Under the terms of the joint venture agreement, CRRC would initially receive a minority stake (22 percent), while Majestic and Vertex Rail Technologies would own a 45 percent and 33 percent stake, respectively; once Vertex becomes a fully operating company, CRRC can buy its partners' shares to increase its stake to 50 percent.¹⁶²

Vertex marks China's first foray into the U.S. freight car manufacturing market and was formed in part to target expected increased demand for tank cars following the passage of new safety regulations for existing and new tank cars in the United States and Canada.¹⁶³ In addition to tank cars, the company's product line includes hopper wagons.* The company has hired 200 employees for its production facility in Wilmington and plans to employ around 1,300 workers at the site.¹⁶⁴ CRRC supplied components for initial production and provided training for Vertex employees.¹⁶⁵ In September 2015, Vertex began assembling hopper wagons from pre-cut steel parts from China and U.S.-made components, and delivered its first batch of wagons in December 2015.¹⁶⁶

CRRC's involvement in Vertex has attracted considerable congressional scrutiny. A July 2016 letter from more than 50 members of the U.S. House of Representatives called upon the Committee on Foreign Investment in the United States (CFIUS) to "thoroughly investigate the pending transfer of ownership in the Vertex Railcar Corporation involving the China Railway Rolling Stock Corporation and Majestic Legend Holdings" and raised a number of economic and security risks posed by CRRC ownership of Vertex.¹⁶⁷ The letter said CRRC "is able to access subsidized financing from the Chinese government, which has already enabled the company to underbid private competitors for rail car contracts in Boston and Chicago. In effect, American rail manufacturers and its associated industries, such as steel, are now competing against the resources of the world's second largest economy."¹⁶⁸ The letter also raised concerns that "critical rail infrastructure and the sensitive cargo that it carries will become increasingly vulnerable to hackers as the proliferation of Chinese state investment continues without adequate scrutiny."¹⁶⁹ A Vertex spokesman said the letter was "misguided" and a result of lobbying efforts by Vertex's competitors.[†] A letter raising similar concerns was sent to CFIUS by a bipartisan group of over 40 senators

* Hopper wagons are a type of railroad freight car used to transport bulk commodities such as coal, ore, grain, and track ballast.

† "We believe this letter is a direct result of railcar lobbyists of our competitors attempting to manipulate the system to stifle competition," the Vertex spokesman said. He added that Vertex is "proactively reaching out to the Treasury Department, among others, to provide an

in September 2016.¹⁷⁰ In response, Vertex filed a notice with CFIUS, and in December 2016, the company announced CFIUS had completed its review of the joint venture and found “no unresolved national security issues relating to the transaction.”¹⁷¹

NORINCO Considers Freight Railcar Venture in Maine

China North Industries Group (NORINCO), a state-owned defense conglomerate that also has a rail transportation division, has been in talks to build freight railcars at a former U.S. Air Force base in Limestone, Maine. In 2014, NORINCO signed a preliminary agreement with Loring Development Authority and equipment refurbishment company Maine Military Authority (MMA) to work towards establishing a railcar manufacturing facility in Limestone.¹⁷² The proposed facility would be located at Loring Commerce Center, a commercial industrial and aviation park developed from the former Loring Air Force Base, which closed in 1994. For NORINCO, the project represents an opportunity to target demand for tank cars that meet new safety standards in the United States and Canada.¹⁷³ Progress on the project has stalled as NORINCO faces a slower Chinese economy and reduced demand for railcars in North America.¹⁷⁴ In addition, the company has been unable to secure a work visa for a key executive.¹⁷⁵

NORINCO has faced nonproliferation sanctions from the U.S. government in the past—in the 1990s, after being implicated in a sting operation conducted by the Bureau of Alcohol, Tobacco and Firearms, and in 2003, for the alleged transfer of missile technology to Iran.¹⁷⁶ The sanctions were lifted in 2007 after the company worked with experts from the University of Georgia to set up an internal unit to help ensure its compliance with U.S. and international export control laws.¹⁷⁷ More recently, NORINCO came under fire for selling \$38 million worth of arms to the government of South Sudan in 2014, in the midst of the country’s civil war.¹⁷⁸

Mixed Competitiveness Effects on U.S. Rail Industry

The United States was once a rolling stock manufacturing powerhouse, but many of its iconic passenger rail companies went out of business by the 1950s, when the federal government shifted infrastructure spending to highways and airports.¹⁷⁹ At about the same time, other countries were stepping up their investments in passenger rail, and in the ensuing decades, Europe and Japan built world-class passenger rail systems and their rail companies became global industry leaders.¹⁸⁰ Today, U.S. companies retain a strong presence only in the freight rail sector.¹⁸¹ As such, China’s competitors for passenger rail projects in the United States and elsewhere in the world have been European and Japanese, not U.S., rail companies. Still, China’s entry into the U.S. rail market can undermine competition by pitting heavily subsidized, state-controlled companies against private U.S. and foreign firms that do not receive similar benefits.

Congress has passed several domestic content laws to protect the U.S. manufacturing industry and manufacturing jobs. Buy America, which has its origins in the Surface Transportation Assistance Act of 1978, refers to several similar statutes and regulations that apply to federally funded transportation projects.¹⁸² Buy America governs the use of iron and steel and manufactured goods in transport projects; unless a nationwide or project-specific waiver is granted,^{*} domestic content thresholds under Buy America are 100 percent for iron and steel and differs by agency and product for manufactured goods.¹⁸³ For example, Federal Transit Administration (FTA) rules mandate that rolling stock procurements have at least 60 percent domestic content and final assembly must take place in the United States, while the Federal Railroad Administration (FRA) has a 100 percent domestic content standard for HSR procurement.¹⁸⁴ (For a comparison of Buy America provisions applying to various U.S. Department of

introduction to Vertex and address the inaccuracies contained in the letter.” Cece Nunn, “Vertex Railcar Responds to Call for Investigation from Members of Congress,” *Greater Wilmington Business Journal*, July 29, 2016.
http://www.wilmingtonbiz.com/more_news/2016/07/29/vertex_railcar_responds_to_call_for_investigation_from_members_of_congress/15083.

* In general, U.S. Department of Transportation agencies can issue waivers based on three grounds: when Buy America’s application is “inconsistent with the public interest”; when covered goods are not produced in a “sufficient and reasonably available amount” or “satisfactory quality” in the United States; or when using domestic materials would increase the cost of the overall project by more than 25 percent. Barbara G. Werther and Amy E. Garber, “Navigating the Buy America Act in Federal Transit Authority Funded Contracts,” *American Bar Association*, March 2014.
http://www.americanbar.org/publications/under_construction/2014/march_2014/buy_america.html.

Transportation agencies relevant to the rail sector, see Appendix II, “Department of Transportation Buy America Requirements for Rail Projects.”) In addition to Buy America requirements at the federal level, many states and municipalities have regulations and rules imposing similar requirements for transportation projects.

A recent Congressional Research Service report assesses that Buy America has a small, positive effect on the U.S. rail industry, but also notes the lack of empirical evidence regarding its impact:

*Although the Buy America provisions have been in place in some form for almost 40 years, it is difficult to know how they have affected steel and rolling stock manufacturing in the United States, whether measured by jobs, output, or any other indicator. Empirical evidence on the economic benefits or costs of domestic preference laws is largely lacking, in part because the effects are small compared with macroeconomic forces such as global economic growth and the related growth in demand for steel.... Buy America has likely promoted the production of rail cars and buses in the United States, but these industries are relatively small, and demand is related strongly to the combined level of federal, state, and local government funding.*¹⁸⁵

China’s initial forays into passenger rail projects in the United States suggest Chinese rail firms have mixed, though limited, effects on U.S. manufacturing. With its rail projects in Boston and Chicago, CRRC committed to purchasing components from U.S. manufacturers and establishing U.S. assembly plants, to meet U.S. domestic content rules. In that way, Chinese rail projects in the United States can create U.S. manufacturing jobs and facilitate the development of the U.S. passenger rail industry. However, actual domestic content can be lower than what Buy America requirements suggest, due to how it defines a domestic end product. Both FTA and FRA Buy America provisions define domestic end product as one where: “(1) All of the manufacturing processes for the end product...take place in the United States; and (2) All of the components of the product [are] of U.S. origin. A component is considered of U.S. origin if it is manufactured in the United States, regardless of the origin of its subcomponents.”¹⁸⁶ Thus, a component made entirely from foreign subcomponents could still be considered 100 percent domestic under Buy America if it was assembled or manufactured into its final form in the United States.¹⁸⁷

The U.S. domestic content regime has another limitation: a report prepared for the Commission by researchers at the University of California, San Diego, concluded that “consistent with [Buy America] requirements, just the final assembly occurs in the United States, and higher-value activities such as design, engineering, and systems integration are kept in the [foreign company’s] home country, or in locations nearer to larger markets.”¹⁸⁸

The U.S. freight rail manufacturing industry does not enjoy Buy America’s protections and could be negatively affected by Chinese involvement in the U.S. freight market.¹⁸⁹ Freight railcars are the most common type of railway rolling stock manufactured in the United States.¹⁹⁰ Unlike passenger rail manufacturing, which in the United States is dominated by foreign-owned firms, the United States is home to several major U.S.-owned freight rail manufacturers (see Table 1).¹⁹¹ According to the Federal Railroad Administration, the U.S. freight rail industry is a \$60 billion industry and supports an estimated 221,000 jobs across the country.¹⁹² China’s entry into the U.S. freight market could hurt U.S. freight rail manufacturers, which would have to compete with heavily subsidized, state-controlled companies.

Table 1: U.S. Freight Railcar Manufacturers

| | |
|--|--|
| <p>Trinity Industries Founded: 1933 Headquarters: Dallas Revenue: \$6.4 billion (2015) Number of employees: 22,030</p> | <p>Amsted Industries Founded: 1902 Headquarters: Chicago, Illinois Revenue: \$5.2 billion (2015) Number of employees: 2,150</p> |
| <p>Greenbrier Companies Founded: 1981 Headquarters: Lake Oswego, Oregon Revenue: \$2.6 billion (2015) Number of employees: 10,689</p> | <p>American Railcar Industries Founded: 1988 Headquarters: St. Charles, Missouri Revenue: \$889 million (2015) Number of employees: 2,407</p> |
| <p>FreightCar America Founded: 1901</p> | <p>Vertex Rail Technologies Year founded: 2014</p> |

| | |
|--|--|
| Headquarters: Chicago, Illinois Revenue: \$772.9 million (2015) Number of employees: 500 | Headquarters: Wilmington, North Carolina Anticipated revenue: \$600 million Number of employees: 200 |
|--|--|

Source: Various.¹⁹³

Australia’s experience offers a cautionary tale for how Chinese state rail firms’ entrance into a new market can undermine private competitors and have major impacts over the long term. In less than a decade since CRRC entered the Australian rail market, the Australian railcar industry dropped from four major players to just one supplier, Bradken. The company went from holding 70 percent of the domestic market in 2008 to less than 30 percent in 2015.¹⁹⁴ Moreover, as a result of competition from Chinese state-owned rail manufacturers, Bradken has shifted much of its rolling stock manufacturing to China to remain competitive.¹⁹⁵

Conclusions

With robust population growth in major U.S. cities, particularly in megaregions such as the Boston-Washington corridor, demand for public transit and intercity passenger rail is projected to grow, according to data on current ridership trends.*¹⁹⁶ While the near-term prospects for HSR in the United States appear dim, HSR may play a greater role as the United States moves toward a cleaner, more sustainable transportation system. If the United States chooses to develop HSR, under present conditions, contracts will almost certainly go to well-established foreign rail companies—including Chinese companies—as the United States lacks an HSR manufacturing industry.

Increased Chinese interest in the U.S. passenger rail market could have a mixed impact on U.S. industry. The presence of heavily subsidized Chinese state-owned rail firms could undermine competition from private companies, both U.S.-based and foreign. At the same time, Buy America provisions require foreign companies that win contracts for taxpayer-funded transport projects to source a minimum percentage of components domestically and establish U.S. production facilities, which creates U.S. jobs and develops U.S. capacity in passenger rail manufacturing. U.S. policymakers, however, should be cautious of the safety and quality of Chinese rail products. China’s ability to build HSR lines overseas has yet to be fully tested; despite the flurry of HSR deals signed by Chinese firms overseas in recent years, only one—the Ankara-Istanbul line in Turkey—has been completed. China’s experience with passenger rail at home raises questions about safety and quality standards.

While the HSR sector represents one of China’s most promising opportunities to become a major high-technology exporter, the country’s HSR export push has so far yielded mixed results. Nurtured by the state, China’s rail firms rapidly adapted and indigenized imported HSR technology and now offer globally competitive products. With ample access to state financing, Chinese rail companies are able to offer low bidding prices—even at an economic loss—to win deals in new markets. The recent merger of China’s two largest rail firms is expected to further boost China’s competitiveness abroad, although China’s recent setbacks across a number of markets have led some Chinese industry experts to question the business value of exporting HSR. Nonetheless, Chinese rail firms are likely to become an increasingly dominant presence in rail projects around the world as Beijing pursues rail diplomacy to connect itself with neighboring and distant partners.

* For example, annual passenger trips on Amtrak, the primary U.S. passenger rail carrier, increased from 21 million in 2000 to 30.8 million in 2015, or 47 percent. American Public Transportation Association, “Open for Business: the Business Case for Investment in Public Transportation,” March 2016, 6. <https://www.apta.com/resources/reportsandpublications/Documents/APTA-Business-Case-2016.pdf>.

Appendix I: Chinese Rail Projects in OBOR Countries, 2013-2016

| Country | Project | Status | Companies | Price (US\$ bn) | Financing and Loans | Total Chinese Transport Investments 2013–16* (US\$ bn) |
|------------|---|--|---|-----------------------|--|--|
| Bangladesh | Padma Bridge Rail Link (215 km) | Contract awarded without tender May 2016 ¹⁹⁷ | China Railway Group Ltd. ¹⁹⁸ | \$4.47 ¹⁹⁹ | China will provide \$3.16 bn loan; remainder provided by Bangladesh ²⁰⁰ | \$3.32 |
| Cambodia | Preah Vihear-Koh Kong Railway (400 km) | MOU signed Dec. 2012 ²⁰¹ | China Railway Group ²⁰² | \$9.6 [†] | n/a | \$0.38 |
| Hungary | Hungary-Serbia High-Speed Railway (350 km) | China, Hungary and Serbia signed MOU Nov. 2013 ²⁰³ Contract awarded Nov. 2015 [‡] | China-Hungary consortium [§] | \$1.6 ^{**} | n/a | \$1.33 |
| Indonesia | Jakarta-Bandung High-Speed Railway (142.3 km) | Contract awarded Oct. 2015, to be completed by 2019 ²⁰⁴ | China-Indonesia consortium (KCIC) ^{††} | \$5.5 ²⁰⁵ | China Development Bank to provide 75% of funding, remainder to | \$1.48 |

* Total Chinese transport investment data are from the American Enterprise Institute's China Global Investment Tracker (CGIT). CGIT relies on corporate disclosures; for instance, for overseas engineering and construction projects, data come from major Chinese firms such as Sinomach and China State Construction Engineering. Derek Scissors, "China Global Investment Tracker," *American Enterprise Institute*. <https://www.aei.org/china-global-investment-tracker/>.

† The \$9.6 billion includes costs for both the rail link and sea port. Prak Chan Thul, "Chinese Firm Plans \$11 Bln Rail, Port, Steel Projects in Cambodia," Reuters, January 2, 2013. <http://www.reuters.com/article/cambodia-china-investment-idUSL4N0A71JL20130102>.

‡ The contract for the Hungarian section of the project is China's first HSR deal in the EU. Brenda Goh, "China Railway Group Team Wins \$1.6 Bln Hungary High-Speed Rail Contract," Reuters, November 25, 2015. <http://in.reuters.com/article/china-hungary-railway-idINL8N13K1YF20151125>.

§ The consortium is led by China Railway Group, and includes China Railway International, a subsidiary of national operator China Railway Corporation, and Hungarian State Railways. The Chinese firms account for 85 percent of the consortium. Brenda Goh, "China Railway Group Team Wins \$1.6 Bln Hungary High-speed Rail Contract," *Reuters*, November 25, 2015. <http://in.reuters.com/article/china-hungary-railway-idINL8N13K1YF20151125>.

** The \$1.6 billion is for the Hungarian section of the project. Brenda Goh, "China Railway Group Team Wins \$1.6 Bln Hungary High-speed Rail Contract," Reuters, November 25, 2015. <http://in.reuters.com/article/china-hungary-railway-idINL8N13K1YF20151125>.

†† KCIC is a joint venture between four Indonesian state-owned firms and China Railway International. The Indonesian government granted KCIC a fixed concession period of 50 years beginning in May 2019. Farida Susanty, "High-Speed Railway Secures Nod," *Jakarta Post*, August 5, 2016. www.thejakartapost.com/news/2016/08/05/high-speed-railway-secures-nod.html.

| Country | Project | Status | Companies | Price (US\$ bn) | Financing and Loans | Total Chinese Transport Investments 2013–16* (US\$ bn) |
|------------|--|--|--|-------------------------|---|--|
| | | | | | be raised by KCIC ^{*206} | |
| Iran | Tehran-Mashhad Railway Electrification Project (926 km) | Contract awarded Jun. 2014 [†] | China National Machinery Import and Export Corp. (CMC) and Iranian MAPNA Group | \$2.0 | China EximBank to finance 85% of project, remainder to be financed by Iran ²⁰⁷ | \$2.25 |
| Laos | Kunming-Vientiane Railway (418 km) | MOU Signed Nov. 2015, to be completed by 2020 ²⁰⁸ | China Railway Corp. | \$6.27 | China funds 70%, Laos 30% ²⁰⁹ | \$1.56 |
| Malaysia | Gemas-Johor Bahru Railway Electrification Project (197 km) | Contract awarded Dec. 2015 ²¹⁰ Construction to start late 2016, to be completed by 2020 ²¹¹ | China Railway Corp. | \$2.0 ²¹² | n/a | \$10.53 |
| | East Coast Rail Line (620 km) | Contract awarded Nov. 2016, to be completed by 2022 ²¹³ | China Communications Construction Co. | \$13.1 | China EximBank to provide unspecified loan | |
| Montenegro | Kolasin-Kos Railway (9.86 km) | Contract awarded Oct. 2015 [‡] | China Civil Engineering Construction Corporation | \$0.0065 ²¹⁵ | Financed by EBRD loan ²¹⁶ | \$1.12 |

* According to an official from Indonesia’s Ministry of State Enterprises, the decision to award the contract to China over Japan was “based on the financial, not purely on the technical. The financial package offered by the Chinese is way more interesting than the Japanese—there is no government guarantee whatsoever. The project ... doesn’t involve any state budget at all.” Robin Harding, Avantika Chilkoti, and Tom Mitchell, “Japan Cries Foul after Indonesia Awards Rail Contract to China,” *Financial Times*, October 1, 2015. <https://www.ft.com/content/eca4af84-67fa-11e5-97d0-1456a776a4f5>.

† The contract is for installing and maintaining overhead electrification equipment and supplying 70 electric locomotives. *Railway Gazette*, “President Launches Tehran-Mashhad Electrification Project,” February 8, 2016. <http://www.railwaygazette.com/news/infrastructure/single-view/view/president-launches-tehran-mashhad-electrification-project.html>.

‡ Despite its short length, CCECC said the rail upgrading contract was a “breakthrough,” paving the way for the company to enter central and eastern European markets. Xinhua, “Chinese Firms Wins Railway Project in Montenegro,” October 15, 2015. http://news.xinhuanet.com/english/2015-10/15/c_134717046.htm.

| Country | Project | Status | Companies | Price (US\$ bn) | Financing and Loans | Total Chinese Transport Investments 2013–16* (US\$ bn) |
|-----------|---|--|--|---|---|--|
| | | | (CCECC) and Zeljeznicka Infrastruktura Crne Gore (ZICG) ²¹⁴ | | | |
| Pakistan | Pakistan Railways Mainline Upgrading Project (1,687 km) | MOU signed Apr. 2015* | n/a | \$10.0 ²¹⁷ | China Exim Bank to provide \$8.5 bn loan ²¹⁸ | \$9.68 |
| Russia | Moscow-Beijing High-Speed Railway (7000 km) | MOU signed Oct. 2014 ²¹⁹ | n/a | \$242.0 ²²⁰ | n/a | \$3 |
| | Moscow-Kazan High-Speed Railway (770 km) [†] | MOU signed Oct. 2014 ²²¹ Contract signed Jun. 2015 ²²² | China Railway Corp and JSC Russian Railways ²²³ | \$16.7 with added \$0.38 in design costs [‡] | China to provide a \$6 bn loan ²²⁴ | |
| Serbia | Hungary-Serbia High-Speed Railway (350 km) | China, Hungary and Serbia signed MOU Nov. 2013 ²²⁵ Contract awarded Nov. 2015 ²²⁶ | China Railway-led consortium ²²⁷ | n/a | n/a | \$1.57 |
| Sri Lanka | Matarata-Kataragama Railway (115 km) | MOU signed 2006 Construction began in Aug. | China National Machinery Import and | \$0.37 ²³⁰ | \$278.2m concessional loan from China Exim | \$6.87 |

* The rail network upgrading project is part of the \$46 billion China-Pakistan Economic Corridor (CPEC) package covered under the CPEC Framework Agreement signed between China and Pakistan in April 2015. *Economic Times* (India), “China to Invest \$8.5 Billion to Upgrade Pakistan’s Rail Network, Build Gas Pipeline,” June 9, 2016. <http://economictimes.indiatimes.com/news/international/world-news/china-to-invest-8-5-billion-to-upgrade-pakistans-rail-network-build-gas-pipeline/articleshow/52671956.cms>.

[†] The Moscow-Kazan line is intended to be the first segment of the Moscow-Beijing HSR line.

[‡] The \$383 million contract signed between China Railway Group and JSC Russian Railways in June 2015 is the design portion of the project. Once the designs are developed, a separate tender will be held for the construction of the rail link, which is estimated to cost \$16.7 billion. Paul Sonne, “China to Design New Russian High-Speed Railway,” *Wall Street Journal*, June 19, 2015. <http://www.wsj.com/articles/china-to-design-new-russian-high-speed-railway-1434729400>

| Country | Project | Status | Companies | Price (US\$ bn) | Financing and Loans | Total Chinese Transport Investments 2013–16* (US\$ bn) |
|----------|---|---|---|----------------------|--|--|
| | | 2013, to be completed by Dec. 2017 ²²⁸ | Export Corp. (CMC) ²²⁹ | | Bank, remainder funded by Sri Lanka ²³¹ | |
| Thailand | Bangkok-Nakhon Ratchasima High-Speed Railway (250 km) | MOU signed Dec. 2014* | China Railway Corp. ²³² | \$5.0 | Thailand to finance ²³³ | \$2.84 |
| Turkey | Ankara-Istanbul High-Speed Railway (533 km) | Bid won in 2005, maiden voyage Jul. 2014 ²³⁴ | Chinese-Turkish consortium [†] | \$4.1 ²³⁵ | China provided \$750m loan, European Investment Bank provided \$1.4 bn loan ²³⁶ | \$0.92 |

* Construction for the line has been delayed due to disagreements between China and Thailand over project costs, financing terms, and development rights. The project was initially envisioned as an 845 km line, with an estimated cost of \$15.7 billion. Costs dropped to around \$5 billion for a shortened line after Thailand opted to forgo Chinese financing in March 2016. Thailand considered the total investment costs as well as the interest rate China offered for financing the deal as prohibitively high. Thailand will still obtain Chinese-made trains and contract Chinese engineers for the revised line. Shawn W. Crispin, “China-Thailand Railway Project Gets Untracked,” *Diplomat* (Japan), April 1, 2016. <http://thediplomat.com/2016/04/china-thailand-railway-project-gets-untracked/>; Zhang Chunxiao, Yang Yunyan, and Chen Jiabao, “News Analysis: Railway Cooperation with China Ushers in New Era for Thai Infrastructure Development,” Xinhua, December 20, 2015. http://news.xinhuanet.com/english/2015-12/20/c_134934982.htm.

† Consortium composed of China Railway Construction Corp., China National Machinery Import and Export Corp., Cengiz Construction, and Ibrahim Cecen Ictas Construction.

Appendix II: U.S. Department of Transportation Buy America Requirements for Rail Projects

| Federal Transit Administration (FTA) | Federal Railroad Administration (FRA) | Amtrak (National Railroad Passenger Corporation) |
|---|---|--|
| 49 U.S.C. § 5323(j); 49 C.F.R. Part 661 | High Speed Rail Program 49 U.S.C. Chapters 244, 246; § 24405 | 49 U.S.C. §24305 |
| Domestic Content: 100% U.S.-made requirement for iron, steel, and manufactured goods; for rolling stock procurements, Buy America does not apply if the cost of components produced in the United States is more than 60% of the cost of all components and final assembly occurs in the United States | Domestic Content: 100% U.S.-made requirement for iron, steel, and manufactured goods | Domestic Content: All manufactured and unmanufactured goods must be “substantially” domestic; manufactured products must have undergone final assembly in the United States and have 50% or more domestic component content by cost |
| Price Threshold: Above \$100,000 | Price Threshold: Above \$100,000 | Price Threshold: \$1 million and above |
| Potentially Affected Industries: Iron and steel producers; manufacturers of products and components related to forms of public transport (buses, rail cars, etc.) | Potentially Affected Industries: Steel manufacturers; rolling stock manufacturers; rail equipment service manufacturers | Potentially Affected Industries: Steel manufacturers; rolling stock manufacturers (rail cars, locomotives); rail service goods, rail material, maintenance-of-way equipment |
| Waivers: 1. Inconsistent with the public interest, which can include a wide range of impacts on domestic markets or firms, or on project outcomes 2. Insufficient quantity or quality of iron, steel, or manufactured products in the United States 3. Inclusion of iron, steel, or manufactured good would increase overall project costs by more than 25% | Waivers: 1. Inconsistent with the public interest 2. Insufficient quantity or quality of iron, steel, or manufactured product in the United States 3. Inclusion of domestic material will increase the cost of the overall project contract by more than 25% 4. Rolling stock or power train equipment cannot be bought and delivered within a reasonable time | Waivers: 1. Inconsistent with the public interest 2. Insufficient quantity or quality of iron, steel, or manufactured product in the United States 3. Rolling stock or power train equipment cannot be bought and delivered within a reasonable time 4. Waived "if the cost of imposing requirements is unreasonable" |

Source: U.S. Department of Transportation, *Buy America Provisions—Side-by-Side*. <http://www.transportation.gov/buy-america-provisions-side-side-comparison>; Congressional Research Service, “Effects of Buy America on Transportation Infrastructure and U.S. Manufacturing: Policy Options,” November 10, 2015, 18. <https://www.fas.org/sgp/crs/misc/R44266.pdf>.

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