

**Title:** China's Bullet Trains Mitigate the Cost of Mega City Growth

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**Short summary**

**Policy Motivation for Research:**

The concept of the “bullet train” (or High Speed Railways, HSR) was born in 1964 with the formal opening of the well-known “Shinkansen” in Japan. The bullet train is regarded as one of the most significant technological breakthroughs in passenger transportation developed in the second half of the 20<sup>th</sup> century.

In 1990s, most Chinese conventional trains moved at speeds below 60 kilometers per hour. The Ministry of Railway (MOR) announced its ambitious bullet train plan in 2006. The first group of bullet train lines was opened in April 2007, boosting the speed of some major trains to 200 to 250 km/h. In August 2008, new bullet trains opened between Beijing and Tianjin reached a higher top speed of about 350 km/h. By the end of 2010, China's bullet train service length reached 8,358 kilometers, which is the most in the world.

This project investigates how the introduction of fast trains that connect cities affects both China's mega cities and the 2<sup>nd</sup> and 3<sup>rd</sup> tier cities that now have much easier access to the mega cities. Today, the mega cities of Beijing, Guangzhou and Shanghai suffer from pollution, and congestion. Further population and employment growth will further scale up these quality of life challenges.

The introduction of the bullet train effectively creates new relatively close (measured in travel time) satellite cities. Cities such as Tianjin in China are only a 25 minute ride by bullet train from downtown Beijing. The introduction of the bullet train increases the menu of locational options for urban firms and workers.

By encouraging the growth in the nearby 2<sup>nd</sup> and 3<sup>rd</sup> tier cities, this transport investment creates a “safety valve” for the mega cities and thus defuses the challenge of mega-city growth – substitute for suburbs in the mega-city and reduces congestion and pollution. This is crucial for China's urban policy makers because China faces mega city challenges, and these trains will help Chinese mega cities to better enjoy agglomeration economies without suffering from agglomeration diseconomies.

**Policy Impacts:**

Our study has implications for mitigating urban quality of life externalities and for considering equitable financing of public goods. Mega cities around the world suffer from high levels of air pollution and traffic congestion. Given rising household income and increased suburban growth, rapid motorization is taking place in the mega cities and this further degrades local air pollution and increases traffic congestion. The introduction of the bullet train increases the menu of locational choices for urban firms and households in China.

The net effect of this new transport mode will be to reduce suburban growth in the mega cities and to increase the demand for land in the satellite cities at locations close to where the bullet trains stop. We predict that real estate prices will rise in 2<sup>nd</sup> and 3<sup>rd</sup> tier cities that are relatively close to the mega-cities and now have bullet train access to these cities. A subset of megacity workers and firms who do not need daily contact with the mega city will decentralize and locate in the 2<sup>nd</sup> and 3<sup>rd</sup> tier cities and will use the bullet train to infrequently connect with mega city firms and government officials.

Bullet trains are expensive and cities around China do not proportionately gain from their construction. These cities disproportionately gain from the introduction of the bullet train should pay a higher share of the financing costs.

**Audience:**

The Chinese Central government

The local governments of 2<sup>nd</sup> and 3<sup>rd</sup> tier cities close to mega cities

Urban and environmental economists

The general public

**Main sections:**

**Policy Implications:**

**China's bullet trains contribute to creating an integrated system of cities.** Bullet trains move at a speed of roughly 175 miles per hour and this allows nearby 2nd and 3rd tier cities (50 to 150 miles from the Superstars that are too far from the mega city to access by car, but too close to fly to) to become connected to mega cities and this increases the demand by workers and firms to locate in these satellite cities.

**Bullet train investment offers the benefits of larger trading market in labor and ideas WITHOUT the costs of mega city growth.** Bullet trains increase the menu of locations that have access to the mega cities. If firms and individuals can swiftly move from nearby cities to mega cities then they can enjoy the benefits of mega city access without suffering the social costs associated with mega city growth. In this sense, the bullet trains create a “safety valve” for the mega cities and this alleviates concern about such a city growing “too big”.

**Real estate prices and human capital in suburban cities will rise due to bullet train introduction.** Bullet trains encourage firm fragmentation and firm sorting depending on their idiosyncratic demand for mega city access. Firms have the option to locate their headquarters in the major cities and send other activities to the nearby cheaper city. Firms that need infrequent access to the major city’s deal makers and government officials can decentralize and locate in the bullet train accessible 2<sup>nd</sup> and 3<sup>rd</sup> tier cities. Residents of the 2<sup>nd</sup> tier city can take the bullet train to the mega city to enjoy culture, services and amenities. Both increase the demand for real estate in the connected nearby cities so real estate prices there will rise.

If the new entrants to the suburban cities have greater educational attainment than the incumbent residents then the average human capital level in the bullet train connected cities will rise.

### **Implementation:**

Our project represents a first step in evaluating the benefits of China’s investment in bullet trains. Our examination of real estate price dynamics across different cities provides valuable information about how market integration is valued. Future research will be able to examine what types of firms and households are relocating to these satellite cities and to test whether firms are fragmenting or whether entire firms are relocating to these cities. Too little time has passed since the opening of the trains for us to be able to test this. A second valuable extension of this research would be to examine trends in air pollution and traffic congestion in the megacities before and after the introduction of the bullet train. While we doubt that an objective time trend break would be observed, the rise of the satellite cities offers mega cities a “safety valve” that should insure them against sharp declines in local quality of life. If such a decline were to occur than households and firms would respond by relocating to the nearby city and this would slow the quality of life crisis.

**Dissemination:**

Development and Reform Committee, P. R. China

The Ministry of Railway, P. R. China

The local governments of 2<sup>nd</sup> and 3<sup>rd</sup> tier cities close to Beijing, Shanghai and Guangzhou

Urban and environmental economists

Blogs such as Vox EU

The general public

**Further Readings:**

Siqi Zheng and Matthew E. Kahn. China's Bullet Trains Mitigate the Cost of Mega City Growth. IGC working paper, 2012.