Policy brief
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Transport Infrastructure and Economic Growth in China

In brief

- Transport infrastructure investments are seen to be a driver for economic growth by promoting access to economic markets. However, the causal mechanisms behind this are contested.

- This study examines the effect of transportation networks in China on long term regional growth, during the period of 1986-2005. This study addresses the 'average effect' of access to transport infrastructure, and whether areas that have better access to transportation networks serve as engines of growth when new economic opportunities arise and growth becomes possible.

- **Key findings:**
  - Regions closer to historical transportation networks have higher GDP per capita levels, higher income inequality and a higher number of firms. But the effects on per capita GDP were small in percentage terms.
  - Distant counties grew as much counties near the transportation lines, implying that greater access had zero effect on growth. Annual GDP grew at 9.8% with nearer counties growing at 10% and distant counties growing at 9.3%.
  - Transportation may lead to substantial cost savings, but these effects may be mitigated by limits on the mobility of factors such as capital, skill, and management within China.

- This finding should not be interpreted as saying that investment in transport infrastructure does not effect growth, rather it underscores the importance of other factors in mitigating the effects of infrastructure on growth. Growth policy should not target transportation quality in isolation, but also consider the quality of factor markets and in some cases, prioritize factor mobility.

Policy Motivation

"The causal effects of investing in transportation infrastructure are contested"

Transport infrastructure is widely thought to promote growth. Many countries continue to make substantial infrastructure investments based on the logic that people need access if they are to benefit from ideas and markets. But the causal effects of investing in transportation infrastructure are contested. Some experts, notably Savage, believe it is indispensable; while others, notably Fogel, believe that is should not be policy goal, that instead it should be left to market forces to develop the infrastructure when the demand necessitates it. Unambiguous estimates of the size and direction of effects could impact policy.

To shed light on this important debate, we study the effect of transportation networks in China. China's road and rail networks were laid out in such as way that a region's access to part of the the transportation network is unrelated to this region's potential; the network was built decades before China experienced rapid growth, when China and the colonial powers decided to build railroads connecting historical cities to themselves, and to the newly established treaty port. Thus, if a region happened to be on a straight line connecting one of the cities, they are more likely today to be next to a major highway and a railroad.

We take advantage of these facts, using data covering two decades of rapid growth (1986-2005), to address the question "What is the *average effect* of access to transportation infrastructure on regional growth in the *long term*?"

There are three points of emphasis in this question. First, does access to better transportation enrich or impoverish the *average region*. This emphasizes the *average* in "average effect." Improved connectivity could attract or generate more new economic activity but it could also facilitate the flight of labor and capital. Within the region, labor and capital could fly from the off-line to the on-line places, concentrating growth in the better connected places, such as the big cities. This means the average effect is ambiguous, and we care about it insofar as better connectivity can create winners and lowers and we care about overall welfare. Second, do areas that have better access to transportation networks serve as engines of growth when new economic opportunities arise and growth becomes possible? Here, the emphasis falls on *effect*. We want to know whether better transportation can drive growth, to know whether growth policy should target transportation.

"Our findings point to modest effects on the level of GDP, and essentially no effect on growth"

Both questions are about the long-run. The interest is not just on the immediate impacts of improved access on trade and prices, but on the consequent changes in the localization patterns of economic activity as labor and capital relocate.

Our findings point to modest effects on the level of GDP, and essentially no effect on growth. This suggests that the benefits of infrastructure can be limited by factor mobility. Institutional failures in developing countries often limit the internal mobility of capital and goods. Given institutional barriers on factor mobility in China, our finding underscores the critical interplay between the quality of transportation infrastructure and the quality of factor markets. Growth policy should not target transportation quality in isolation, but also consider the quality of factor markets. Policy should, in some cases, prioritize factor mobility.

Findings

Greater access had a positive but small effect on GDP

Regions closer to historical transportation networks have higher levels of GDP per capita, higher income inequality and a higher number of firms. Per Capita GDP was higher in places closer to the line but the effect was small in percentage terms. This is consistent with other independent household data, which finds no significant effect on average household income.

Greater access had zero effect on growth

"Regions closer to historical transportation networks have higher levels of GDP per capita, higher income inequality and a higher number of firms"

Distant counties grew as much as counties nearer the line. Annual GDP grew at 9.8%, with the nearer counties growing at 10% and the distant counties at 9.3%; and the correlation between distance and growth is -0.002 with a standard error of 0.003. The growth effect of proximity to the line is a precisely measured zero.

Limits on factor mobility may mitigate the effect of greater access

These results are consistent with a model where transportation does lead to substantial cost savings, but the effects are mitigated by limits on mobility of factors such as for capital, skill, and management within China. The model predicts (a) that when capital is less mobile than goods and there are significant agglomeration spillovers, inequality increases with greater connectivity; and (b) that distant counties will have fewer manufacturing firms. We find that both inequality and allocation of capital have the predicted patterns, suggesting that the benefits of infrastructure can be greatly limited by factor mobility.

Implementation

The finding that region with greater transportation access did not experience higher growth in China should not be interpreted as saying that investment in transportation infrastructure does not promote growth. Rather they underscore the importance of other factors in mitigating the effects of infrastructure on growth.

While China is somewhat extreme in its regulation of the movement of labor and capital, mobility remains limited in many developing countries as well. For example, Duflo (2005) found that in Indonesia, the effect of education on growth and welfare was limited because capital did not flow in regions that had more educated workers. These results suggest that addressing those issues at the same time as investing in infrastructure may be necessary to make sure the investment in infrastructure leads to higher growth.

Further Readings

Two classical texts set out the opposing views on the effects of transportation access on economic growth: Christopher I. Savage's *An economic history of transport*, and Robert Fogel's *Railroads and American Economic Growth: Essays in Econometric History*.

More recently: Michaels (2008) studies highway construction in 1950s US; Donaldson (2010), railroad in 19th century India; and Keller and Shiue (2008), railroads in Germany. These papers examine infrastructure and market integration, finding infrastructure leads to price convergence and convergence of factor prices. Atack et al. (2009) examines effect of US railroads on urbanization and population growth, finding a strong effect on urbanization but a small effect on population growth.

About the authors

Abhijit Banerjee was educated at the University of Calcutta, Jawaharlal Nehru University and Harvard University, where he received his Ph.D in 1988. He is currently the Ford Foundation International Professor of Economics at MIT. In 2003 he founded the Abdul Latif Jameel Poverty Action Lab, along with Esther Duflo and Sendhil Mullainathan and remains one of the directors. He is a past president of the Bureau for the Research in the Economic Analysis of Development, a Research Associate of the NBER, a CEPR research fellow, International Research Fellow of the Kiel Institute, a fellow of the American Academy of Arts and Sciences and the Econometric Society and has been a Guggenheim Fellow and an Alfred P. Sloan Fellow.

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