

Title of Dissertation: Study on the Impacts of Transport Infrastructure on Economic Development  
in China

(中国における交通インフラの経済発展への影響に関する研究)

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Since 1980s, China has been transiting into a market-based economy from planned economy. The government policies favored the east coastal areas with privileges in export and import, natural resources etc. As a result, the development gap between the east part and mid-west part regions emerged and has been widening. The government's policy stimulus to cope with this problem turns out to be not effective. Transport infrastructure investment is also seen as a way to trigger the development of inland regions. From the 1990s, the investment in infrastructure has been reasserted as a national policy priority. As a result China has been spending huge amount of annual budget on transport infrastructures. And this trend is still going on with the steady support of the national plan. But still the infrastructure distribution shares a similar pattern as economic growth that east coastal areas have higher infrastructure density and quality.

Considering the rising concern on equity issues, a re-examine over the past development is quite necessary. It is important to think over whether this massive construction trend can be justified as an engine for effective and balanced growth, which is the primary motivation of this research.

Though there is much empirical evidence of a parallel relation between transport infrastructure and economic growth both in developing countries and developed countries, it is widely confirmed that transport infrastructure acts only as a necessary condition for the growth to occur. The causality between the two is controversial especially the mutual causality, which will lead to bias in many analyses. With respect to the magnitude of the impacts of transport infrastructure on economic growth, first generation researchers derived unrealistic large values while after the defects in their methods corrected, moderate positive values are derived by a majority of researchers. It is pointed out the impacts could differ greatly in different regions. Also the transport infrastructure in one region may have influence on other regions.

Based on the review of China related studies as well as studies abroad, three research proposals are made. First is to testify the causality that transport infrastructure has promoting impact on economic development and to estimate the significance of the impact in China. Second is to testify the regional differences of the impacts and to find explanations for it. Third is to evaluate the spatial economic impacts of transport infrastructure to see whether it promotes a balanced regional development.

A survey on the frequently used methodologies in previous research is made. The merits, demerits and data requirement are summarized. And based on the data availability in China, the research methodologies are chosen for each research proposal.

A VAR method is adopted to test the causality between transport infrastructure and economic growth. It is found that there is a causal link most likely from transport infrastructure to the economic growth but not a reverse one, which minimizes the possibility of estimate bias in production function model due to mutual causality.

A production function model is used to estimate the magnitude of the impacts. It takes into account labor input, transport infrastructure capital input and other capital stock input under the assumption of constant return to scale. The model is applied to national level and also regional level. The results show positive and moderate output elasticity of infrastructure on economic growth on both national and regional level. It indicates that in China the transport infrastructure has been playing an important role in promoting economic development. The results on regional level show that the contribution of transport infrastructure to economic growth is high in coastal regions, central region and northeast region but low in inland regions. Given that the transport infrastructure is mostly financed locally, a larger impact may lead to a virtuous circle between local economic growth and infrastructure supply, which may indirectly widen the gap between regions. It is also concluded that the diversity in the magnitude of the impacts is due to regional geographic condition and development status. For regions advanced in development, there is diminishing return of transport infrastructure capital with respect to its share in total gross capital stock while for regions that are lagged behind in development, there is increasing return of transport infrastructure capital. This shows the possibility of promoting economic growth in less developed regions through transport infrastructure investment. The geographic condition turns out to be a crucial factor influencing the impacts of transport infrastructure. The impacts for inland regions with poor geographic condition are much smaller than other regions.

A SCGE model is established to capture the spatial impacts of the transport infrastructure. The model divides China into 8 regions, each including 3 production sectors and 1 representative household sector. Domestic income transfer and overseas import and export are all considered exogenous. The transport cost between each pair of regions follows an iceberg assumption. And the transport infrastructure improvement is reflected through transport cost reduction. The cost reduction is calculated based on current cost and distance change in future transport network scenario. As to the transport network, the expressway network of last national plan is set as the current network while the latest national expressway network plan is set as the future scenario. The railway transport is also taken into account but is assumed to be fixed. The simulation result shows that the total welfare gain is positive for every region. Moreover, the benefit of southwest is the biggest and the less developed inland areas generally benefit more from the completion of the network than the east developed areas. This indicates that the expressway network contributes to the balanced regional growth. However, the absolute amount of the benefits is very small. The reason for this lie in the rough assumption with respect the transport cost due to the limitation of data.

As a conclusion, a summary of the empirical findings with regard to the research proposals is made, indicating the contributions and originalities. Finally possible modifications to the present research and future work directions are suggested as well as the urgent need for research database construction in China.