

Benchmark the Trends of Spatial Inequality in Megaregions and Explore the Role of High-Speed Rail

RESEARCH AGENDA

1. BACKGROUND

Spatial Inequality denotes the unequal distribution of resources and opportunities (jobs, education, and health services, et al.) over an area of natural and built environment. Among many strategies taken to reduce SI, investing in major transportation infrastructure has been a common one (Kanbur and Venables, 2005).

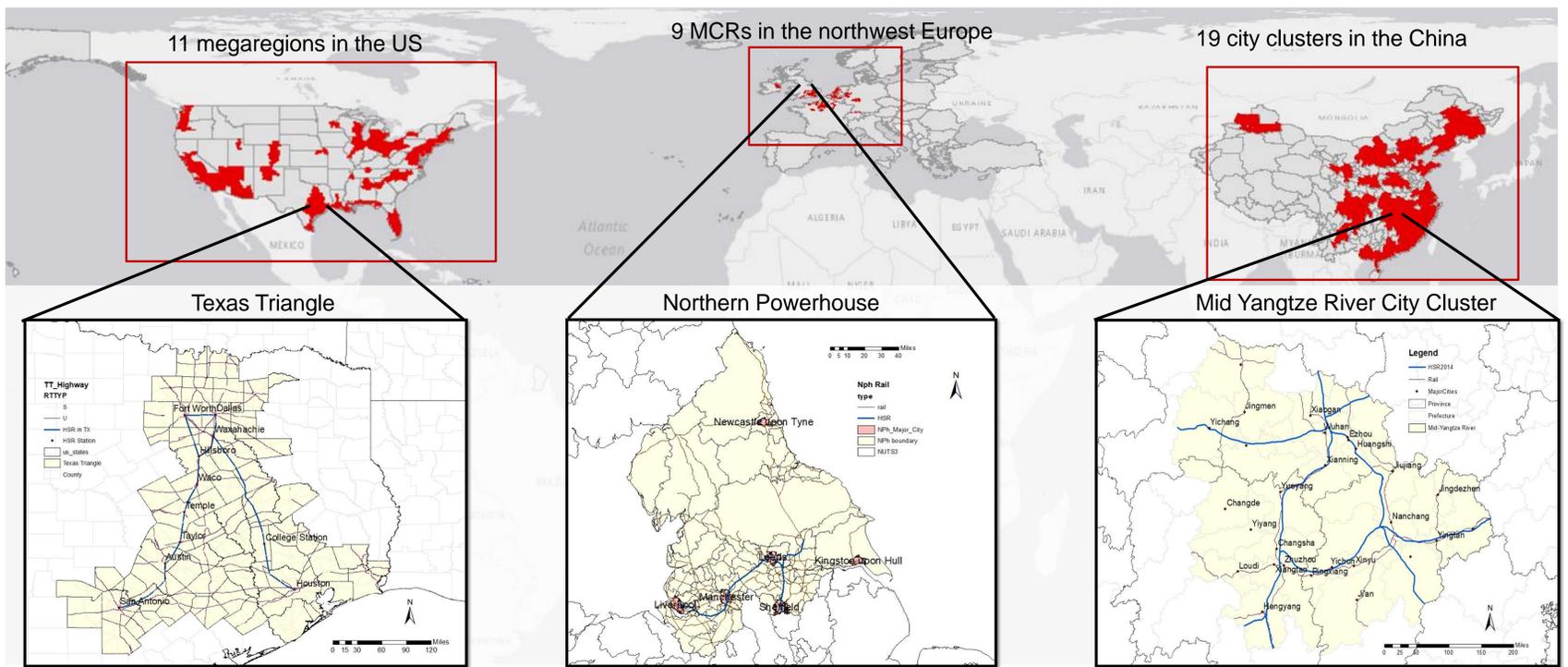
Parallel to the growing interest in reducing SI, there are worldwide attention to the phenomenon of megaregions. This paper benchmarks the SI at megaregion level based on the existing data and literatures.

2. RESEARCH QUESTIONS

- The study aims to benchmark the SI condition and trend of megaregions in multiple continents (38 megaregion comparison)
 - SI measurement based on economic activities
 - Inter-megaregion and intra-continent comparison
- The study explores the effects (revealed or potential) of major transportation investments in reshaping SI of megaregions (3 case study)
 - How High-Speed Rail (built or proposed) affects inequality of accessibility

3. LITERATURE REVIEW

- Theoretical concepts
 - Inverted U-shaped pattern (Kuznets, 1955; Williamson, 1965)
 - Economic convergence (Rey and Montouri, 1998; 2010; Lessmann, 2013)
- Discussions (Kim, 2008, Wei, 2017)
 - Positive and negative effects of SI (Kim, 2008, Wei, 2017)
 - Spatial autocorrelation of inequality
- Empirical studies
 - US income inequality since 1950s (Wei, 1999)
 - China income inequality since 1950s (Fan and Casetti, 1994)



ACHIEVEMENTS

1. Summary of Spatial Inequality Trends in 38 Megaregions

Spatial Comparison: Chinese megaregions show the highest SI among the three continents. Notable, in 2016, the average Gini coefficient of the 19 megaregions' coefficients was reportedly 0.246. In the United States, the 11 megaregion average reported a Gini index value of 0.106. the average Gini for EU's fell in between at a value of 0.158.

Temporal Comparison: In China, 14 of 19 city-clusters experienced a decline in income inequality from 2006 to 2016. The three-year data from 2013 to 2016 showed all but one mega-city regions in Europe showed improvement in income SI. In the United States, the picture shows a trend opposite to those in China and Europe: eight of the 11 megaregions saw rising income inequality from 2010 to 2016.

	US Megaregions			China City Clusters			
	2010	2016	Change	2006	2016	Change	
Southern CA	0.100	0.156	56.0%	Yangtze Delta River	0.408	0.438	7.4%
Northern CA	0.194	0.249	28.4%	Capital Zone	0.293	0.286	-2.4%
Piedmont Atlantic	0.225	0.221	-1.8%	Pearl River Delta	0.469	0.496	5.8%
Great Lakes	0.163	0.187	14.7%	Mid-Yangtze River	0.164	0.161	-1.8%
Sun Corridor	0.102	0.185	81.4%	Chengyu	0.337	0.337	0.0%
Front Range	0.166	0.303	82.5%	Hachang	0.248	0.284	14.5%
Gulf Coast	0.182	0.239	31.3%	West Shore	0.253	0.266	5.1%
Texas Triangle	0.167	0.205	22.8%	Central Plains	0.286	0.284	-0.7%
Florida	0.138	0.211	52.9%	Guangzhong Pl.	0.244	0.246	0.8%
Cascadia	0.170	0.190	11.8%	Lanxi	0.301	0.280	-7.0%
Northeast	0.225	0.246	9.3%	Hubaoeyu	0.223	0.108	-51.6%
Average	0.167	0.217	30.6%	Beibu Gulf	0.382	0.273	-28.5%
North west European MCRs				Shandong Pen.	0.226	0.386	70.8%
Central Belgium	0.090	0.111	23.3%	Central Qian	0.328	0.375	14.3%
South East England	0.167	0.490	193.4%	Ningxia	0.126	0.091	-27.8%
Rhine-Main	0.137	0.188	37.2%	Central South of Qian	0.314	0.276	-12.1%
RhineRuhr	0.093	0.128	37.6%	Central Shanxi	0.111	0.086	-22.5%
Paris Region	0.159*	0.176	10.7%	North Foot of Tianshan	0.226	0.227	0.4%
Greater Dublin	0.100	0.102	2.0%	Central of Dian	0.208	0.208	0.0%
The Randstad	0.056*	0.106	89.3%	Average	0.271	0.269	-0.8%
Average	0.115	0.186	62.2%				

Table 1. Spatial Inequality Change in 38 Megaregions in North West Europe, US and China

2. Summary of Accessibility Inequality Affected by HSR

What matters in the change of accessibility inequality?

Existing mobility conditions

- In European countries with long history of rail-based mobility services, the rail upgrade offers an incremental improvement commensurate to magnitude of accessibility inequality
- In the US where personal mobility is high based on car ownership, HSR offers mobility improvement to particular market segments
- In China where personal mobility has been relatively low, HSR led to a major mobility elevation while shrunk the inequality gap

Scale of rail network extension

- Polarization and corridor concentration dominate when HSR services occur in a few number of cities and regional corridors.
- As multiple corridors form a network, HSR's role to reduce spatial inequality will expand.

3. Conclusions

Megaregions offer a new spatial approach to address inequality issues. Megaregions across jurisdictional, or multi-national boundaries in the European case. A megaregional approach to SI helps uncover the disparity between fast growing, affluent core cities, and the by-passed, underperforming communities in the region.

HSR elevates mobility by reducing travel times. Yet its role in reducing spatial inequality is contingent on the geographic coverage of HSR network, the pre-existing level of mobility of the served region, and the integration with other transportation systems to reach non-HSR locations.

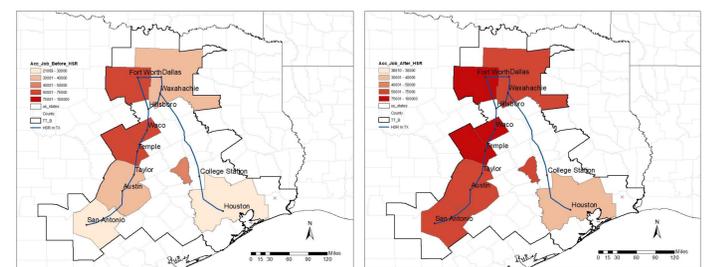


Figure 1. Accessibility of Employment Before and After HSR in Texas Triangle

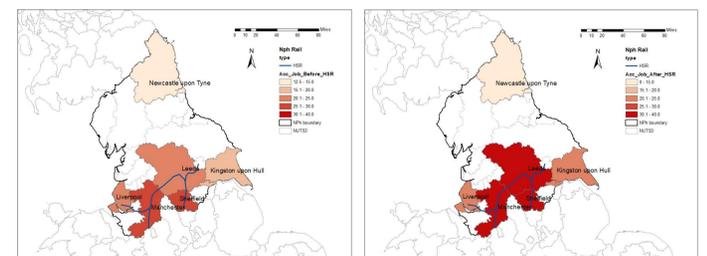


Figure 2. Accessibility of Employment Before and After HSR in Northern Powerhouse

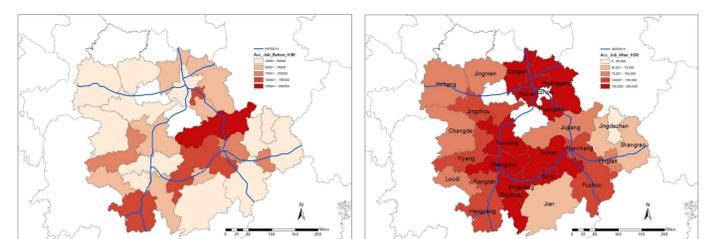


Figure 3. Accessibility of Employment Before and After HSR in Mid-Yangtze River