High-Speed Railway New Town Planning Constrains Later Urban Industrialisation: Evidence from Electricity Consumption

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The multi-staged impact of the high-speed railway site-specific complementary policymaking on urban industrialisation remains subject to controversy. This preliminary report examines whether HSR new town planning constrains urban industrialisation with electricity consumption as a proxy for industrial activities. Employing the data of cities in the Yangtze Delta region and the DiD approach, the preliminary regressions estimate the effect of HSR new town policy on urban electricity usage. Our findings indicate a 15% to 20% significant decline in electricity consumption in cities with arranged HSR new town developments, particularly in smaller cities. The preliminary report challenges the assumption that HSR infrastructure inherently facilitates urban growth and calls for more attention to mitigating the negative externalities of transport infrastructure.

The expanding high-speed railway (HSR) networks are reconstituting China's regional development and urban economic geography. The HSR new town planning—building new towns with newly built infrastructures around HSR stations—has evolved as a development policy to enhance connectivity, attract investment, and stimulate economic growth. However, notwithstanding the prospective growth, the unforeseen consequences of HSR new town arrangement on existing urban industrial structures remain insufficiently clarified. New town planning might redirect industrial activities away along the HSR networks and constrain the later industrialisation in the newly built towns.

Analysing electricity usage changes, a proxy for industrial activities, the preliminary results uncover the effect of HSR new town planning on later urban industrialisation. The

data of Yangtze Delta cities empirically reveals that new town planning significantly cuts down urban electricity consumption, suggesting a constraint in the industrialisation of emerging urbanised areas. The constraint is particularly significant in smaller cities, where the new town construction appears to substitute industrial activities rather than facilitate economic vitality.

Our findings challenge the assumption that HSR infrastructure inherently facilitates economic growth and evince that, given the increasing regional development inequalities, it may instead incur spatial economic restructuring that constrains later industrialisation. The research contributes to the contested discourse on transport infrastructure in urban economic transformation, highlighting the urgency for a nuanced policy approach to the heterogeneous effects of HSR town planning across different city sizes and economic contexts.

Table 1. *HSR New Town Planning on Electricity Consumption*

	(1)	(2)
VARIABLES	Electricity Consumption	
HSR New Town	-0.1537***	-0.1548***
	(-4.966)	(-4.845)
Controls	N	Y
FE	District #Year	District #Year
Observations	2,592	2,592
Adjusted R^2	0.9722	0.9725
Within R^2	0.0071	0.0188

Notes: ***, **, and * significant at 1%, 5%, and 10% respectively. Controls include city statistics: geographic size, fixed asset investment, foreign direct investment, financial spending, and government spending. Robust standard errors are clustered at the province-year level. Hereinafter the same.

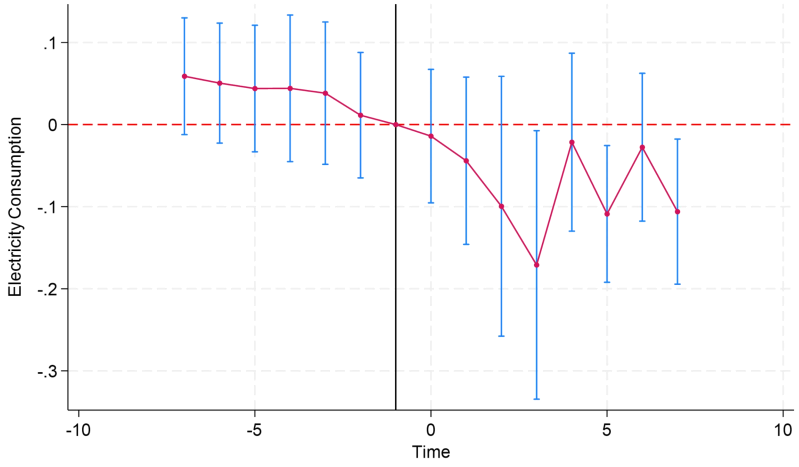

Figure 1. *Parallel Trends Checks*

Table 1 illustrates the statistically significant negative effect of HSR town planning on urban electricity consumption. This negativity indicates that the cities with arranged new town developments experience a 15% (-0.15) reduction in electricity usage. HSR new town policy may constrain urban industrialisation by diverting industrial activities away from these later urban-industrialised areas.

Table 2. *HSR New Town Planning in Heterogeneous Cities on Electricity Consumption*

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
VARIABLES	Electricity Consumption								
	Binary Dummy			Ordinal Dummy					
HSR New	-0.1870***	-0.0073	-0.1973***	-0.2957***	-0.1019***	-0.1315***	-0.1221**	0.0502	0.1064***
Town	(-4.568)	(-0.184)	(-6.608)	(-5.450)	(-2.832)	(-4.119)	(-2.504)	(1.129)	(3.134)
#City	0.0993*			0.0467***					
Population Size	(1.867)			(3.158)					
Controls	Y	Y	Y	Y	Y	Y	Y	Y	Y
FE	District #Year	District #Year	District #Year	District #Year	District #Year	District #Year	District #Year	District #Year	District #Year
Observations	2,592	1,188	1,402	2,592	558	407	493	624	501
Adjusted R^2	0.9727	0.9779	0.9723	0.9726	0.9700	0.9863	0.9671	0.9827	0.9676
Within R^2	0.0271	0.0697	0.0495	0.0224	0.0746	0.158	0.193	0.142	0.108

When disaggregating the effect by city population size, Table 2 reveals a contrast. In smaller cities, the estimated impact of HSR town planning is more effective, with coefficients close to -0.2 (-20%, see Column 3), whereas that in bigger cities appears negligible and insignificant (Column 2). The interaction terms between HSR new town planning and city population size dummy further corroborate this contrast. The constraint on electricity use is relatively significant in cities with smaller industrial economies and population sizes. Smaller cities are more vulnerable to the HSR-induced economic diversion and substitution effects since such newly built nodes may pull away labour and capital from later urbanised cities to earlier industrial hubs, suppressing the initially arranged agglomeration of industrial activities. Although HSR is often a catalyst for regional integration and economic growth, our evidence demonstrates that such development policy instead restructures urban economies in ways that ironically invite industrial outmigration, particularly from smaller cities without very solid economic resilience.

The findings spotlight a paradoxical HSR-driven development planning. Though HSR

new towns are designed to enhance connectivity and economic growth, they court unforeseen negative spillovers on existing urban industries in smaller cities. The constraint on electricity consumption acts as a quantitative reflection of structural change, delineating the possible deindustrialisation effects accompanying HSR-facilitated urban expansion. This reflection calls for more nuanced evaluations of HSR policy, ensuring our future urban planning accounts for the differential influences on cities of varying sizes and economic structures.