**Abstract of the paper "High-Speed Railways and the Geography of Innovation: Evidence from France"**

This paper examines the impact of travel time reductions induced by the expansion of high-speed railways (HSR) in France on inventor collaborations, measured through co-patents. While the literature emphasizes the central role of face-to-face interactions and knowledge spillovers in innovation, few studies analyze how HSR—which specifically facilitates the mobility of people—affects the geography of innovation. Our study is the first to explore this question in a European context.

We construct a novel dataset tracking railway travel times between 1980 and 2020, matched with geolocated European patent data (1980–2010). To identify the causal effect of travel time reductions, we exploit the staggered roll-out of HSR lines. The opening schedule of these lines is highly uncertain: even when planned, construction can be delayed due to financial constraints or local opposition. This variability introduces quasi-random variation in connectivity between labor market areas, allowing us to treat travel time reductions as an exogenous shock to long-distance interactions between inventors. We also control for area-specific temporal dynamics to account for differences in the probability of being connected to the HSR network.

We estimate a gravity model using a Poisson Pseudo-Maximum Likelihood (PPML) approach with fixed effects, leveraging within-pair temporal variation. Our results show that a median 12% reduction in travel time increases co-patents between areas by approximately 2.6%. The effect is strongest for intermediate distances (100–400 km), where travel times remain reasonable for frequent interactions. It is also stronger for urban and economically developed areas, suggesting that HSR primarily strengthens collaborations between already innovative regions.

We find that the increase in co-patents due to reduced travel times comes from both new and pre-existing collaborations, but mainly benefits the most productive inventors, measured by the number of citations received by their previous patents. Hence, HSR appears particularly beneficial for inventors for whom the potential gain from innovation justifies the cost of distance: they choose to collaborate with distant partners only if the expected gain in expertise or creativity outweighs the travel cost.

This effect, concentrated among the most innovative inventors, translates into more ambitious innovations. These innovations have broader scope, measured by the number of patent claims, and are more multidisciplinary, reflected by the diversity of technological fields covered. Our results suggest that HSR facilitates connections between distant inventors with differentiated expertise, which enhances invention quality. These skills, however, remain sufficiently related, as shown by our analysis of inventors' technological vectors derived from their past patents. HSR thus appears to facilitate the combination of complementary yet related skills, allowing inventors to share a common technological language and creating a conducive environment for creativity.

These dynamics illustrate how high-speed rail acts as a shock to the network of newly accessible collaborators while also contributing to increased innovation inequalities between and within regions. Our results contribute to the literature on infrastructure and innovation, spatial disparities, and methodologies for reconstructing transport networks. They also relate to the literature on "lock-in effects," where limited access to local skills can constrain innovation, whereas expanding networks of contacts encourages the emergence of new productive combinations.