Can HSR services increase regional economic integration? Evidences from the Italian case

Mario Tartaglia (1), Leonardo Piccini(2)

(1) Ferrovie dello Stato Italiane, Italy; (2) IRPET- Regional Institute for Economic Planning of Tuscany, Italy

12th September 2023
Structure

- Introduction and motivation of the work
- Literature review
- Data and methodology
- Results
- Conclusion and future developments
Framework and motivation

- HSR investments have been analyzed in terms of their impacts on regional and local growth.
- But less attention has been devoted to their effect on pairwise regional economic integration.
- The research question is: if and to what extent does the implementation of HSR services affect trade flows between regions?
  We use Italian regions as case studies in the period 2008-2019 (pre-covid).
Literature review

- While extensive studies have provided a wide range of evaluations of HSR on the socioeconomic impact, primarily from an ex-post perspective, it remains unclear how reliable the evaluation outcomes were, given the variety of data, method and research framework being adopted (Cheng & Chen, 2021)

- Contrary to the expectations, ex-post and ex-ante cost-benefit analyses for major existing and planned high-speed rail (HSR) lines in Europe show that most of the lines underperform socioeconomically due to cost overruns as well as demand overestimations (Meyer de Freitas & Blum, 2023)

- In Italy, the success of HSR has increased the inequalities between the areas benefitting from it and other areas of the country excluded (Cascetta et al. 2020).
Data & methodology

- HSR services: O/D Matrix with information on distance, time number of services (both direct and with connection) between HSR stations in Italy (2008 and 2019). Source: FS Group

- Economic integration: Multi Regional Input Output table for the Italian regions (20 regions, 43 sectors) developed by IRPET

- Methodology: gravity model which includes HSR connections

\[ T_{ij} = f(GDPi + POPj + dist_{ij} + HSRconn_{ij}) \]

- We use 2 different specifications of HSRconn_{ij} (direct connections and with change) and three different settings (Trade 2012 and connections 2008, Trade 2019 and connections 2008, Trade 2019 and connections var. 2019/2008)
Evolution of AV services in Italy
## Results (I)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>(Intercept)</td>
<td>2.39E+02</td>
<td>3.00E+02</td>
<td>0.796</td>
</tr>
<tr>
<td>GDP origin</td>
<td>2.07E-03</td>
<td>1.32E-03</td>
<td>1.567</td>
</tr>
<tr>
<td>Distance (road)</td>
<td>-7.17E-04</td>
<td>3.37E-04</td>
<td>-2.127</td>
</tr>
<tr>
<td>Direct connections</td>
<td>3.25E+01</td>
<td>3.23E+00</td>
<td>10.049</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>(Intercept)</td>
<td>3.52E+02</td>
<td>3.09E+02</td>
<td>1.14</td>
<td></td>
<td>1.96E+02</td>
<td>2.78E+02</td>
<td>0.705</td>
<td></td>
<td>4.04E+02</td>
<td>2.61E+02</td>
<td>1.546</td>
<td></td>
</tr>
<tr>
<td>GDP origin</td>
<td>1.76E-03</td>
<td>1.36E-03</td>
<td>1.292</td>
<td></td>
<td>2.13E-03</td>
<td>1.17E-03</td>
<td>1.826</td>
<td></td>
<td>2.52E-03</td>
<td>1.12E-03</td>
<td>2.253</td>
<td>*</td>
</tr>
<tr>
<td>POP destination</td>
<td>3.84E-04</td>
<td>4.82E-05</td>
<td>7.971</td>
<td>***</td>
<td>3.60E-04</td>
<td>4.30E-05</td>
<td>8.375</td>
<td>***</td>
<td>3.00E-04</td>
<td>4.24E-05</td>
<td>7.078</td>
<td>***</td>
</tr>
<tr>
<td>Distance (road)</td>
<td>-1.09E-03</td>
<td>3.41E-04</td>
<td>-3.2</td>
<td>**</td>
<td>-6.69E-04</td>
<td>3.08E-04</td>
<td>-2.173</td>
<td>*</td>
<td>-7.25E-04</td>
<td>2.92E-04</td>
<td>-2.482</td>
<td>*</td>
</tr>
<tr>
<td>Indirect connections</td>
<td>1.09E+01</td>
<td>1.29E+00</td>
<td>8.464</td>
<td>***</td>
<td>1.01E+01</td>
<td>1.17E+00</td>
<td>8.643</td>
<td>***</td>
<td>3.94E+01</td>
<td>3.70E+00</td>
<td>10.657</td>
<td>***</td>
</tr>
</tbody>
</table>
Trade flows by sector
Results (II)
Conclusions

✓ Growth of HSR connections between regions led to an increase in connectivity between Italian regions over the last decade.

✓ Positive effect of HSR connections on overall inter-regional trade, robust over different model specifications.

✓ If we look at macro-sectors, positive effect is more relevant in more "tradable" sectors (manufacture, business services, retail, agriculture), while local services (social services, constructions, accommodation) are not affected.
Future developments

- Analyse economic integration in a multidimensional framework (es. tourist flows, investments, labour migration, etc)
- Extend the analysis to EU regions (NUTS 2 level). Problem: lack of reliable interregional trade data
- Insert more pairwise control variables as determinants of bilaterale trade flows
- Treat the problem in a counterfactual setting (e.g. diff in diff)
Thanks for your attention!

Any questions?