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The Economic Impact of High-Speed Rail on Rural and Inner Urban Areas Economy: The Case Study of HSR Naples-Bari in South of Italy

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ABSTRACT: High-speed rail (HSR) has revolutionized global transportation by providing fast, reliable, and efficient city-to-city travel. While its urban benefits are well-documented, the potential advantages for rural development are often overlooked. The high-speed rail project on the Naples-Bari route in Southern Italy aims to connect the urban centers of Naples in Campania and Bari in Apulia, traversing inland and rural areas. Initiated in 2016 and planned for completion in 2028, this project is anticipated to deliver numerous benefits. The purpose of this research is to examine the largely overlooked high-speed rail (HSR) in Southern Italy from an economic and territorial perspective and to determine whether it can sustainably promote rural development in the areas along the railway line. This study examines whether the HSR line will enhance economic activities, strengthen industries, and improve spatial accessibility in rural areas. Using a 2020 dataset covering 25 municipalities along the railway line, including those with stations and construction sites projected to open by 2024, three regression models were employed to estimate potential improvements in income and employment. The findings indicate mixed results: access time to airports improves, decreasing by 7%, while access to ports does not see similar benefits. Income shows a positive correlation with HSR, increasing with population growth around stations, suggesting a trend towards urban agglomeration. However, the study underscores that HSR is not universally beneficial for rural economies and that supportive development networks are crucial. Policies should adopt short-term strategies to strengthen future HSR projects and prepare for the anticipated surge in mass tourism to rural areas.

Keywords: HSR; Italy; Naples Bari; Economic; Rural; Transportation; Social modelling

1. Introduction

Research has focused on how transportation investment affects growth in studies on intra-urban transit stations that improve access to job areas inside a metro area. Communities nearest to intercity transit hubs hope to benefit the most from regional integration, as High-Speed Rail (HSR) provides access to markets in other cities, and infrastructure can improve the financial performance of local businesses and individuals. Among the various impacts of HSR, numerous modifications have been reported. Investment in transportation infrastructure has frequently resulted in a reshuffling of urban land uses and land price trends as access has changed. The relationship between large-scale infrastructure projects, such as HSR, and rural development is multifaceted, involving economic, social, and environmental dimensions.

Regarding rural areas, empirical evidence on the role of HSR shows common aspects such as the impacts of HSR service provision on the region's spatial development being multilevel. Improved infrastructure can attract investment into rural areas, fostering the development of new industries, tourism, and real estate projects. This influx of investment subsequently boosts local economies and increases property values. Additionally, such infrastructure projects are associated with greater urban expansion and dispersion at the county or district level, as well as increased rural patch size and complexity at the local level. This dual effect enhances both urban and rural development, promoting a balanced and integrated regional growth. Large infrastructure projects like HSR enhance connectivity between rural and urban areas, providing rural businesses access to larger markets. This can lead to increased sales, new business opportunities, and overall economic growth [1–3].

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The departure frequency of HSR trains and proximity to HSR stations were found to affect the magnitude of the impact of HSR service provision on regional spatial development. HSR influences population dynamics, potentially leading to population decline in underdeveloped areas, affects demographic patterns, particularly in rural areas, and contributes to economic disparities, enhancing urban prosperity potentially at the expense of rural regions. The construction and operation of infrastructure projects create jobs, both directly and indirectly. These projects require a significant workforce during the construction phase and ongoing employment for maintenance and operations [4,5].

Constructing HSR lines requires careful planning to minimize environmental impact. Integrating conservation measures can protect habitats and promote sustainable land use. In China, the HSR network has spurred rural development by connecting these areas to urban centers, boosting economic growth, tourism, and quality of life. Spain's HSR network and Japan's Shinkansen have similarly enhanced connectivity, leading to economic benefits and increased property values. Rural areas, distinct from metropolitan regions, also experience unique development patterns influenced by infrastructure. HSR presents opportunities for economic revitalization and sustainable tourism. Italy's recent expansion of HSR has linked growth to real estate and improved urban connectivity. Strategic station placement is crucial for maximizing HSR benefits, with well-connected stations driving urban development and property values. HSR enhances regional integration and boosts accessibility, potentially transforming rural areas by linking them to urban centers and supporting sustainable travel and economic growth [6–16].

The HSR line is a strategic infrastructure project for Southern Italy, a region currently lacking in robust infrastructural connectivity. This article aims to investigate the role of high-speed rail (HSR) in the internal areas of Southern Italy by examining its territorial and economic impact following the RQ "*The development of HSR infrastructure in South-Italy can affect positively local economic expansion?*". Additionally, it seeks to understand how these impacts will evolve over time, both before and after the HSR construction, and whether these impacts will align with findings from other studies in the literature. The primary contribution of this article is to address the existing gap in the literature concerning the impacts of HSR on territorial and economic development, specifically through the lens of this innovative and strategic Italian project. Although other research has examined HSR in internal areas, few studies have been conducted within the context of Italy. Given that the HSR project is still under construction, this research aims to provide a solid framework for further studies once the project becomes operational. This paper is structured in 5 parts: Section 1 is the introduction, Section 2 is the Literature review, Section 3 is focused on the case study and the methodology. The results are discussed in Section 4, and in Section 5 the conclusions with recommendations for further studies.

2. Literature Review

High-speed railways (HSR) are crucial for economic development in both rural and urban areas, enhancing connectivity, economic growth, urbanization, and regional development. HSR significantly shortens travel times between cities, improving access to markets and services and facilitating labor mobility and commercial activity. Examples like Japan's Shinkansen and France's HSR highlight HSR's impact on urban connectivity and economic vibrancy. In rural areas, HSR reduces isolation by connecting them to metropolitan centers, boosting local economies, attracting investment, and enhancing quality of life. Additionally, HSR raises property values and stimulates real estate development, as seen with Spain's HSR network, which has spurred economic growth in connected urban areas [16–20].

Several studies have examined the impact of high-speed rail (HSR) on rural areas in the UK. Refs. [21,22]'s study evaluated the economic and social impacts of HSR in Southeast England, highlighting the potential benefits for rural areas through improved accessibility and economic opportunities; Ref. [23] focused on the UK's network founding that the HSR can lead to significant changes in land use and property values, affecting both urban and rural regions. In rural areas, HSR can create jobs during construction and operation, attract new industries and tourism, and improve agricultural productivity through better market access. Studies on the impact of HSR in rural France show mixed results. HSR can boost local economies by creating jobs and enhancing accessibility, as seen with the HSR line between Tours and Bordeaux, which created around 14,000 jobs. Improved connectivity can attract businesses and tourists, increasing local activity and property development. However, benefits are often greater near major urban centers, while remote rural areas may see less growth. HSR can exacerbate regional disparities, with connected areas thriving while others lag. Additionally, HSR may centralize economic benefits in larger cities, potentially reducing rural vitality. Despite these challenges, HSR can promote regional integration, stimulate urban growth, and enhance rural-urban connections, contributing to more balanced regional development [24–33].

Evidence on the impact of high-speed rail (HSR) on rural areas in Spain reveal a mix of positive and negative effects. HSR projects have significantly improved connectivity, leading to enhanced economic activities, increased

property values, and tourism in connected rural areas. For example, regions around HSR stations have experienced urban growth and development opportunities, benefiting from improved accessibility to major cities like Madrid and Barcelona. Studies examining the impact of high-speed rail (HSR) on rural areas in Eastern Europe have shown various effects. In these regions, HSR has significantly improved connectivity, leading to economic benefits such as job creation and increased local investment. The enhanced accessibility can stimulate local economies by attracting businesses and tourists, thereby increasing property values and overall economic activity. In countries like Poland and Hungary, HSR has been a mixed blessing. While cities with HSR stations have seen economic revitalization and increased investments, rural areas without direct HSR connections have not experienced the same level of growth. Policymakers in these regions are working to balance the benefits of HSR by investing in complementary infrastructure and ensuring broader regional development [7–9]. However, the impact is not uniformly positive. While some rural areas benefit significantly, others may face challenges such as increased regional disparities and potential depopulation as economic activities concentrate around HSR-connected regions. Moreover, the construction phase of HSR projects can bring temporary economic boosts but may also disrupt local industries and labour markets. Overall, while HSR can foster regional development and improve economic conditions in connected rural areas, careful planning and policy measures are necessary to ensure balanced growth and mitigate negative impacts on less connected regions.

Regarding the Italian HSR (Naples-Bari) "Na-Ba", the HSR can favour or contribute to already existing phenomena, such as depopulation or urbanization of cities. The benefits of HSR on economic and urban development are clear, including reduced waiting times, increased commuting efficiency, and enhanced connectivity between southern and northern Italy [15]. These phenomena have impacted the cities along the future Naples-Bari HSR, causing depopulation and heavy gentrification, with the risk of accelerating the processes of urban ghostification [33]. Considering these potential disadvantages could result in unplanned negative impacts on the growth of high-speed rail in some rural areas, potentially leading to the emergence of ghost towns [33].

HSR can balance compatibility and equality by affecting how transportation and development benefits are distributed among different areas and groups. Improved accessibility from HSR boosts network efficiency and may influence demand for various transportation options. The development of HSR can alter network usage patterns and impact both urban and rural regions by enhancing social fairness and accessibility. However, the effects of HSR can be complex, potentially leading to significant urban development and regeneration. Evaluating transportation equity involves assessing changes in accessibility distribution. While some argue that accessibility analysis is underutilized, it remains a crucial planning tool. The HSR should enhance connectivity not only between cities but also to rural areas, promoting tourism and real estate growth while potentially reducing CO_2 and greenhouse gas emissions [34–41]. Transportation infrastructure, including HSR, is more cost-effective and environmentally friendly than road transport, benefiting regions like Avellino and Benevento. HSR can drive regional economic growth by lowering costs and reducing spatial barriers. Research shows HSR can improve energy efficiency, reduce emissions, and address regional economic disparities. Although HSR is costly, it offers significant advantages such as reduced travel times, environmental benefits, and decreased traffic congestion. HSR's ability to lower CO_2 emissions and pollution contributes to improved urban air quality [42–45].

The gaps in literature emphasize the necessity of thorough investigations to completely comprehend the wider economic implications of HSR and to guide policy choices meant to promote equitable growth [45,46]. Ref. [47] investigated the effect of HSR on the income disparity between urban and rural areas has not been well studied, and the findings have not always been trustworthy. using data from HSR stop frequency statistics and city panel studies conducted at the prefecture level. Their findings indicate that HSR frequently helps close the wealth gap that exists between rural and urban areas. The impact of high-speed rail (HSR) deployment on income disparity between urban and suburban areas has been evaluated from the perspective of labor mobility, employing a difference-in-differences (DID) strategy to analyze this effect [48]. The study's findings reveal that the deployment of high-speed rail (HSR) significantly facilitated worker relocation, which in turn helped to reduce the wage gap between urban and rural areas. These results underscore the crucial role of HSR in fostering economic integration and diminishing regional income disparities. By enhancing labor mobility and improving accessibility, HSR enables workers to access a broader range of employment opportunities, thereby contributing to a more balanced income distribution across different regions. According to [49], the effects of HSR on the economy varied depending on the city. The researchers looked at its effect on the wealth gap between urban and rural areas at different city scales. The income gap between rural and urban communities has significantly increased because of the country's high-speed train network [50].

HSR has been shown to enhance regional specialization, facilitate trade, and increase land values. However, it may negatively impact agriculture by reducing arable land and exacerbate regional disparities. While HSR can boost Gross

Domestic Product GDP per capita, it does not always accelerate growth rates and may worsen economic inequality by favoring developed areas. Research suggests HSR encourages migration from rural to urban areas, leading to rural depopulation and increased regional inequality. HSR tends to increase urban income while decreasing rural income, widening the economic gap [51–55]. To address these issues, it is crucial to evaluate HSR's economic benefits, improve urban-rural transport, and support rural development. Although HSR can gradually reduce income disparity by fostering economic growth in rural areas, its effects are uneven, often concentrating population and economic activity in already prosperous regions [24,56–62].

Concerning this study, we can conclude that the main gaps between HSR and rural development cover different aspects of the empirical studies. From a methodological perspective, there is a lack of comprehensive data and longitudinal studies, as suggested by [63,64]. Insufficient long-term data have been found in many studies on the impact of HSR on rural development. Because of this, evaluating the long-term impacts of HSR on land use patterns, demography, and rural economies is challenging. While some studies highlight the potential for HSR to reduce income disparities by facilitating labor mobility, there is limited research on how effectively HSR addresses socioeconomic inequalities in rural areas [65]. Ref. [66] stated that there is a lack of standardized metrics to evaluate the impact of HSR across different rural contexts. This inconsistency hinders the ability to compare findings across different studies and prevents the derivation of generalizable conclusions. Developing sustainable urban transport requires comprehensive policies, urban planning, and behavioral shifts to mitigate climate change. Existing research emphasizes HSR's benefits for urban areas but often underestimates its potential for revitalizing rural regions. This gap highlights the need for focused studies on HSR's rural impacts [67,68]. The social impacts of HSR, such as its effects on community cohesion, access to services, and quality of life in rural areas, are not thoroughly explored. Most studies focus on economic indicators, overlooking broader social implications [69]. On the environmental side, we noted a lack of comprehensive studies examining the environmental impacts of HSR on rural landscapes, including effects on local ecosystems, agricultural land, and biodiversity [69]. Moreover, research on how HSR can contribute to sustainable rural development is sparse. Few studies explore the integration of HSR with sustainable practices and policies to enhance rural resilience and environmental sustainability [70].

3. Materials and Method

3.1. The Case Study

In Italy, high-speed rail was planned in the early 2000s and has undergone numerous interventions and developments [13], but remains mainly present in the large metropolitan areas, and on the Tyrrhenian coastal area, mainly connecting northern Italy, while in the south, the only connection currently present is Naples and Rome. Further stations have been added, but these are not true high-speed stations ("Ferrovia dello Stato Italiano" (RFI)' "Great Stations" project, known in Italy as "Grandi stazioni"), but rather medium-sized stations at which the two transport operators (RFI and Italo—"Nuovo Trasporti Viaggiatori" (NTV)) provide passenger transport services. High speed has increased in Italy in the past few years [28]. There is a link between this growth and the real estate market, as evidenced by the 2010 opening of the Italo "NTV" railway line and the RFI project of "Major Stations" [15]. Many countries have examined the effects of high-speed rail on their territory, but little research has been done on the relationship between HSR and inland/rural areas, except for China and Japan [30] infrastructure also commonly contributes to social instability and inequality [31]. Projects also modify accessibility, upsetting multimodality. Railway lines can therefore have complicated positive and negative effects that are related to the most recent concerns in the literature, and one must be aware of this.

In the Italian case (Figure 1), HSR could favour transits between the three regions of Apulia, Campania and Lazio, connecting three important poles: the city of Bari, which gathers the southern basin, the city of Naples as the main town of the Campania region, and the city of Rome, the regional capital of the Lazio region and the capital of Italy. At present, the existing connections are between Rome and Naples (service provided by "RFI" Rete Ferrovia Italiana and Italo "NTV" Viaggiatori), with a frequency of every 20 min in the main bands and one train per hour. After the 2014, with the increasing of the HSR network, Bari is connected to Turin (in Northern Italy) via Naples and Rome, with a service provided by NTV Italo, but with few runs and making the journey complicated due to the long time.

Figure 1. HSR in South Italy, tracciato da Naples a Bari. Source: Ilsole24Ore.

The connection between Naples and the inland cities of Avellino and Benevento, impacted by the Naples-Bari high-speed rail project, is crucial. Avellino, home to the University of Salerno, and Benevento, with the University of Sannio, are both tourist and industrial hubs. They offer attractions like historical sites, trekking, and local food and wine, but are mostly accessible by car, complicating commutes and travel to Naples or Campania's airport. Currently, high-speed rail connects Rome and Naples frequently, with limited and complex service to Bari. Improved rail connections could enhance access between Apulia, Campania, and Lazio, reducing road traffic and boosting travel efficiency. High-speed trains can also encourage tourist movements to inland areas by providing convenient access to the stations along the future high-speed rail line that will connect urban centers with rural areas as Figures 1 and 2.

Figure 2. HSR Line maps, elaboration of author.

Italy's rural areas are still complicated to analyze for several reasons. As pointed out by [10], there is a possibility that the spatial development of rural areas took place in an unorganized manner due to the possibility that the population in these areas had a lower level of knowledge regarding the conservation and protection of the environment, resulting in ecologically significant ecosystems on the outskirts of cities becoming fragmented and destroyed [29]. The lack of transport and waste treatment facilities in remote locations has made the regulation and communal disposal of pollutants problematic [30]. The expansion of residential areas often happens before the establishment of such infrastructure. The Naples-Bari HSR project is a major infrastructure development in Italy, integrating high-speed rail with existing lines through the new Naples "Afragola" station. Key upgrades include one new stop, three additional stations, a new computerized central control in Naples, and improvements to the Naples-Cancello line. The project will add 121 km of double-track, 25 new routes, 11 tunnels, and 14 new stations. Currently operational are the Vitulano-Benevento-Apice, Cervaro-Bovino, and Foggia Bretella sections. Some sections are funded but not yet under construction. Initiated in 2004 and revived in 2012 under the "Sblocca Italia" act, this HSR line is a national priority under the TEN-T network, aiming to increase capacity, reduce travel times, and improve regional accessibility (Figures 2 and 3).

The cities involved on the Naples-Bari [1] route are those on these sections:

- Itinerary NA-BA, 1st section: Variation to the Naples-Cancello line;
- Route NA-BA, Track Doubling Cancello-Benevento, 1st functional lot Cancello-Frasso Telesino;
- Track-doubling Frasso Telesino—Vitulano;
- Apice—Orsara double-doubling;
- Bovino-Orsara;
- Cervaro—Bovino;
- Rehabilitation of freight route Naples—Bari (in Foggia city);
- Foggia Cervaro station;
- Speeding-up Adriatica: technological enhancement Foggia-Bari-Brindisi.

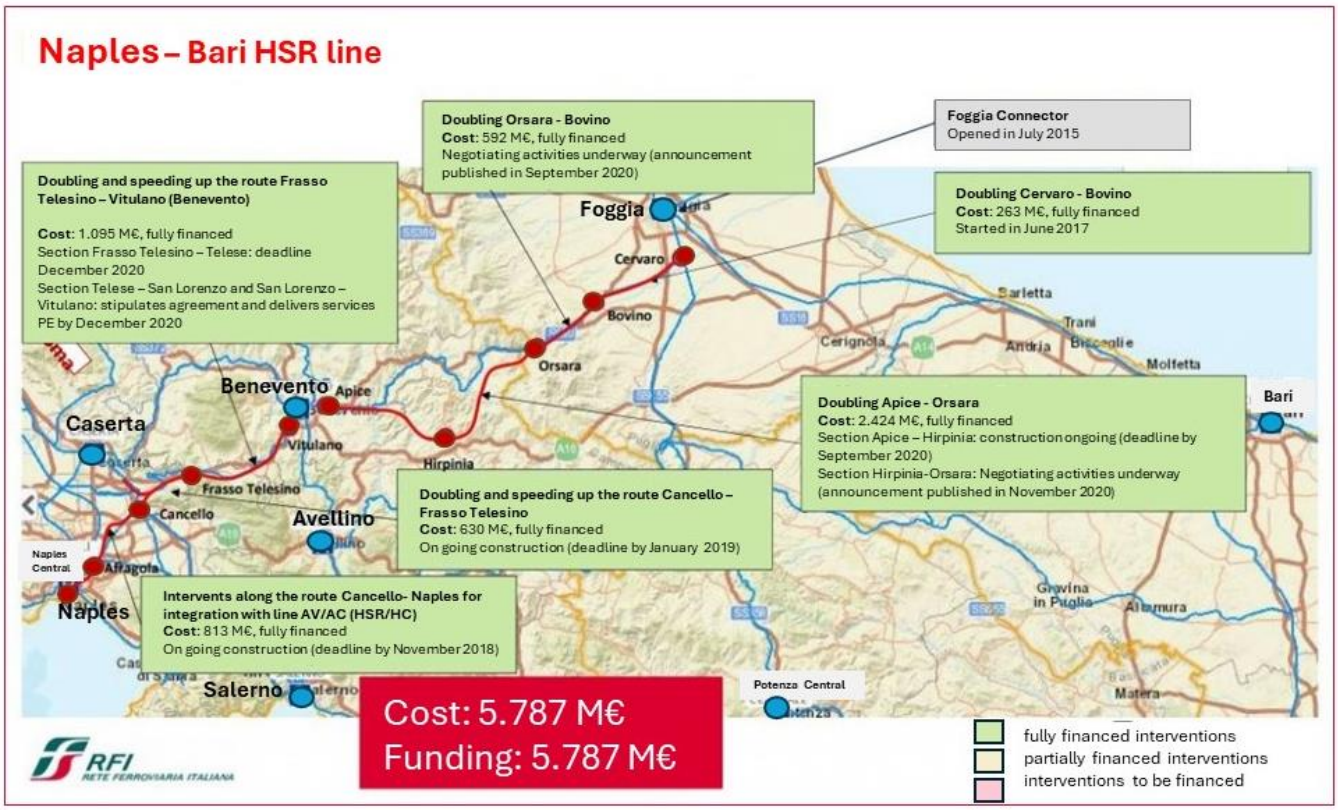

Figure 3. The project Naples-Bari. Source: RFI, elaboration of authors.

The Naples-Bari HSR project will enhance the "Scandinavia—Mediterranean" Core Corridor by improving the railway connection between Naples and Bari. The journey time will be reduced from four hours to two hours, and the Rome-Bari connection will be cut to three hours. The project aims to improve accessibility, reduce CO_2 emissions, and shift freight traffic from road to rail, supporting EU goals for 2030 and 2050. It will also remove level crossings, minimize network interference, and facilitate the redevelopment of railway areas. Environmental monitoring will be conducted throughout the project, with results reported to the Ministry of the Environment. Key components include doubling and upgrading various line sections, with significant tunneling and the construction of new stations. The anticipated goals and benefits include: (i) cutting travel times from 3 h and 54 min to approximately 3 h; (ii) increasing capacity from 4 to 10 trains/h on routes subject to doubling; (iii) improving accessibility at the Irpinia interchange hub; (iv) modifying performance to allow freight trains up to 750 m in length and capable of transporting high-cube containers and semi-trailers (combined traffic code P/C80) without weight restrictions for axis. The study area covers the region between Naples, Avellino, and Bari, focusing on local emissions and potential reductions from the HSR line. The project costs between $6 and $100 million, with $4 million financed, $500 million pending approval, and $3.5 million already operational. By 2019, the Naples-Bari section will be fully tendered, with completion expected by 2026, reducing travel times to two hours between Bari and Naples and three hours to Rome. The "Hirpinia-Orsara" project, costing $1.3 billion, includes a 27-km tunnel through the Appennino, requiring 2900 labour days over eight years. This tunnel will enable travel at speeds up to 250 km/h, connecting the Avellino city and a new Hirpinia station in 35 to 40

min. A massive technological undertaking (one of the world's ten longest railway tunnels) for which a straightforward addition will bring the project's completion date to 2030 [2].

3.2. The Methodology

3.2.1. The Methodological Approach

Analyzing the correlation between spatial variables can lead to problems and limitations of the model to robust results. On this aspect, many scholars are concerned about the causal relationship between the construction of transport infrastructures and regional economic growth. Data characteristics often cause problems during analyzes caused by endogenous problems in causal inference, and various methods emerge in the literature to improve the rigor of empirical analysis, such as the simultaneous equation method [55], the instrumental variables method [71,72], difference-in-differences (DID) model, or propensity score matching with the difference-in-differences method (PSM-DID) based on exogenous policies [57–69], hedonic pricing theory [15] or geometrically weighted prices. Due to the unavailability of a panel dataset of this study, utilizing data from 2020, we decided not to apply a Synthetic Difference-in-Differences (SDID) approach, raising concerns about potential bias and endogeneity. The primary objective of this research is to evaluate the current effects of the high-speed rail (HSR) line on the region while it is still under construction. Consequently, we employed variables that are not strongly spatial to assess the socio-territorial impact, particularly regarding accessibility between the station, urban center, and production-work systems. The construction phase already demands substantial energy, manpower, and resources, indicating that HSR can influence the territory even during its construction phase. Moreover, contrary to what is presented in the project, there is no extensive network under construction between the stations and the urban center or other key areas. Therefore, we believe that studying long-distance accessibility will enhance the railway system by reducing the reliance on cars to reach the station. This focus on station-city accessibility aims to understand the competition between train and car for both short and long distances.

The overview of the methodology employed in this study is illustrated in Figure 4 and is divided into six steps.

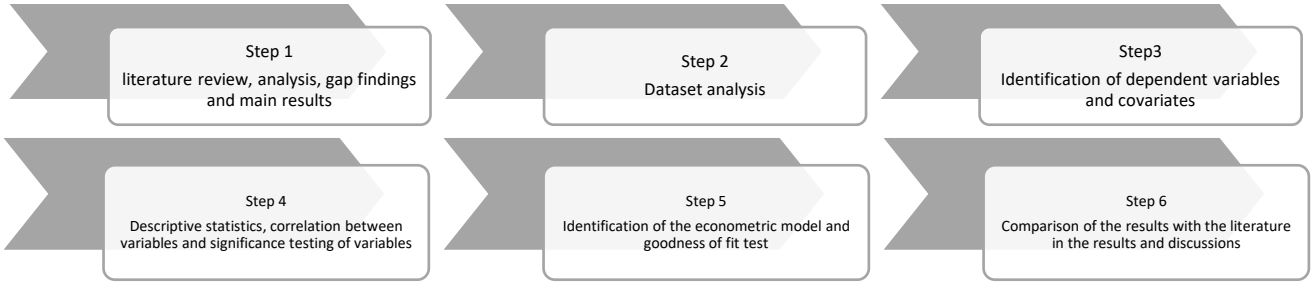

Figure 4. The methodological approach, elaboration of authors.

The first step covers a comprehensive literature review (see Section 2), comparing findings, models, and variables used in previous studies on the impact of high-speed rail (HSR) on regional economic development. The existing body of research highlights several key impacts:

1. Enhanced Accessibility and Connectivity: Studies by [26,54,64], Refs. [73,74] emphasize that HSR reduces travel times and increases connectivity between urban centers and peripheral regions, creating a space-time compression effect. This is seen as a catalyst for economic integration and development.
2. Economic Growth: Research by [34–75] suggests that HSR can stimulate local economies by attracting businesses, boosting tourism, and enhancing labour mobility. These studies show a positive correlation between HSR infrastructure and regional economic expansion.
3. Urban Development and Land Use: Refs. [76,77] explored the impacts of HSR on urban development, noting that it often leads to increased land values and urban regeneration around stations.
4. Environmental Benefits: Studies by [78] highlights the environmental advantages of HSR, such as reduced carbon emissions and lower energy consumption compared to other modes of transport like cars and planes.
5. Social Equity: Ref. [79] discuss the potential social equity issues related to HSR, such as the risk of displacement and gentrification around new HSR stations.

The second, third, and fourth steps are closely interconnected and are detailed in Section 3.2.1. In the second step (Section 3.2), we conduct an in-depth analysis of the dataset, examining the available variables to understand their characteristics and relationships. The focus is on identifying the dependent variables and covariates relevant to our study

on the impact of High-Speed Rail (HSR) on regional economic development. The dataset used in this study includes variables related to economic performance, transportation infrastructure, and demographic characteristics. Our primary focus is on variables that influence the effects of HSR construction on regional economic development. We utilized the 2020 dataset for the following reasons: although construction on the line began in 2016, the primary executive phases were completed by 2020, making it a comprehensive reference point in terms of project acquisition, contract completion, and financing. Moreover, including a dataset spanning from 2016 to 2024 could yield inconsistent results due to disruptions caused by COVID-19 and related construction activities between 2020 and 2022. The main variables analyzed from the 2020 dataset are positively correlated and significant, providing a robust foundation for our analysis.

In the third step, we concentrated on identifying the key variables necessary for analyzing the impact of HSR on regional economic development. The dependent variables selected were economic growth (measured as GDP per capita) and income disparity (measured using the Gini Coefficient), as they directly reflect economic performance and equity within the regions affected by HSR. To understand the influences on these outcomes, we identified several covariates: travel time reduction, which captures the direct benefits of HSR; employment rate, an indicator of labor market health; accessibility index, which measures how HSR enhances connectivity; population density, reflecting urbanization levels; investment in infrastructure, showing additional economic inputs; commuter statistics, providing insight into mobility patterns; and environmental impact, indicating changes in sustainability metrics. This comprehensive identification of variables enables us to control for various factors affecting economic growth and income disparity, ensuring a thorough analysis of HSR's effects.

The fourth step described the statistics descriptive in Table 1. Also, we conducted some main important test. The first is to test the normality of the sample data that is essential for several reasons. First, many statistical methods, including regression analysis, assume that the variables involved follow a normal distribution. This assumption underlies the validity of parametric tests, influencing the accuracy of hypothesis testing and confidence intervals. If the data deviates significantly from normality, the results of these tests may be unreliable, potentially leading to incorrect conclusions about the relationships between variables. By testing for normality, we can determine if transformations or non-parametric methods are needed to ensure robust and accurate analysis.

Secondly, the correlation between variables is crucial for understanding the relationships and potential dependencies among them. Correlation measures the strength and direction of a linear relationship between two variables. By examining these correlations, we can identify which variables are significantly related and how they might influence each other. For instance, a strong positive correlation between employment rate and economic growth would suggest that regions with higher employment levels tend to experience greater economic expansion. Understanding these relationships helps in constructing more accurate regression models, as it allows us to account for multicollinearity and better interpret the influence of each covariate on the dependent variables. Additionally, it aids in the identification of key drivers of economic outcomes and in the formulation of targeted policy interventions to maximize the benefits of HSR. Additionally, we performed tests on the significance of the variables (the Spearman's Rank and the Shapiro-Wilk test).

The steps 5 and 6 of our analysis are detailed in the following Sections 3.3 and 4. To analyze the impact of high-speed rail (HSR) on regional economic development, we identified two econometric models related to the two main dependent variables. To investigate economic growth, the first model was developed to measure how the construction of HSR impacts local economic growth by improving connectivity, employment, and infrastructure. Specifically, we aimed to understand the influence of the presence of an HSR station on GDP per capita. For income growth, we developed the second model to measure how HSR infrastructure increases income per capita by enhancing accessibility and economic opportunities, and to understand the role of income inequality (Gini Coefficient) in this relationship. Based on the research questions and the characteristics of the variables, we employed two different models for different dependent variables. Finally, we tested the robustness of our results by analyzing McFadden's pseudo-R^2, comparing our results with those found in the literature to evaluate differences in impact. We also performed residual analysis to check for normality and homoscedasticity, ensuring that residuals followed a normal distribution and had constant variance across levels of the independent variables [3]. This approach provided confidence in the validity of our findings and their contribution to the existing body of research [80,81].

3.2.2. Dataset and Variables

The study analyzed the impact of the railway line on 25 cities, including Benevento, Foggia, Avellino, and Bari, using data from ISTAT (Italian National Statistics Institute). It focused on two aspects of rural development: mobility and economic productivity. Mobility analysis acts as an early indicator for future development, highlighting issues like

increased traffic and pollution due to reliance on private vehicles. The study assessed how the high-speed rail network would affect accessibility and economic growth in metropolitan and inland areas. Accessibility impacts quality of life and business productivity, influencing political strategies and territorial planning. The general concept that connects all the different measurements is that a point/place is the most accessible and easiest to reach. This implies that the basic measure for calculating an accessibility index is the distance between origin and destination, which also measures the value of the cost of the trip. The accessibility and mobility indicators concern the entire national contest, the transport infrastructures considered are 258 railway stations with active passenger service where there is long-distance railway traffic; 2842 accesses to the motorway network; 35 airports for commercial services; 54 statistical ports with passenger traffic, distances are measured in terms of travel time on a TOM TOM road graph. The types of accessibility provided by the dataset [82–86] are:

- Cost to closest: Measures the cost required, expressed in terms of minimum travel time, for at least one destination among the selected ones to be reached from a given origin;
- Accessibility/Proximity Cluster: A municipality (generically an area) may be more or less accessible either because it is less or more difficult to reach an infrastructure or because there is no infrastructure nearby. The two situations might imply different policy interventions: investment in improving the road network to reach the infrastructure in the first case, investment in building the infrastructure in the second;
- Gravity model accessibility index: It introduces an element of infrastructure differentiation by considering the amount of services offered by the infrastructure itself. This model defines accessibility as the potential of opportunities, introducing into the analysis also a behavioural aspect of the choices made.

For the economic sector, we analyzed studies ranging from [60–66], focusing on the number of businesses situated around the infrastructure route and the Gini index [4] and with the socio-economic indicators of the cities (employment rate, income per capita).

These studies provide crucial insights into the effects of infrastructure projects, such as high-speed rail (HSR), on local economies and income distribution. Our analysis involved assessing the density and distribution of businesses in proximity to the HSR line, which serves as an indicator of economic activity and development. Furthermore, we utilized the Gini index to evaluate income inequality within the affected regions. By correlating these economic variables with the development of HSR infrastructure, we aim to elucidate both the direct economic benefits and the broader socioeconomic impacts.

This comprehensive approach ensures a detailed understanding of how HSR projects can influence local and regional economic landscapes, fostering growth and potentially mitigating income disparities. These findings underscore the multifaceted economic implications of high-speed rail, reinforcing its significance in promoting sustainable economic development.

We used the 2020 dataset to capture the initial phases of the high-speed rail infrastructure project. The construction phase began in 2016, with completion expected between 2026 and 2028. Our focus at this stage is to monitor the pre-construction impacts of the railway line.

3.2.3. The Choice of Variables and Testing

The dependent variables represent the primary outcomes we aim to measure in response to the construction of HSR. These variables are critical for testing our hypotheses regarding the economic and social impacts of HSR. In Table 1 the descriptive statistics of variable is reported.

The socio-economic variables include the Gini index, employment rate, per capita income, and population. Accessibility is measured using several indicators: Time Access Road (which measures the time required to access the main road), and Accessibility 3 and 4 (which represent the time needed to reach airports and port areas, respectively). The variables Cluster Accessibility to Railway Network, Cluster Road Network, Cluster Airport, and Cluster Access Port Areas describe accessibility by cluster to capture local effects rather than just point-in-time measures. The final variables indicate accessibility indices for reaching port areas, airports, railway stations, and major roads.

Table 1. Summary of statistics of variables, elaboration of authors.

Variables List	Obs	Mean	Std.dev	Min	Max
Gini index	26	0.19	0.01	0.17	0.24
Employement	26	24.75	1707.51	0	42.2
Income per capita	26	15,441.92	3314.30	11,600	25,546
Surface km^2	26	6181.08	9777.01	7835.38	5092.54
Population (inhab.)	26	68,424.08	186,275.4	350	921,142
HSR rail stations	26	0.27	0.45	0	1
Opening HSR work site	26	0.38	0.49	0	1
Number of industrial area	24	9791.66	8875.85	2	35
Journey time station (pax)	26	2285.29	133.38	5084.34	4913.89
Time access road	26	196.36	9251.87	5458.81	3372.78
Time Accessibility airport	26	5619.77	2377.07	184.62	9283.53
Time Accessibility ports	26	6070.22	2141.17	760.54	8887.60
Cluster accessibility to railway network	26	1453.84	0.49	1.1	2.2
Cluster road network	26	1723.07	0.53	1.1	2.2
Cluster Airport	26	1734.61	0.54	1.1	2.2
Cluster Access port areas	26	1184.61	0.27	1.1	2.1
Access to railway station	26	4270.78	6226.66	0.036	222.96
Access to road network	26	3555.89	1868.89	1408.69	7388.80
Access to Airport	26	3945.59	4092.80	0.37	1408.57
Access to ports (pax)	26	450.05	118.67	0.00	5876.92

According to the economic sector we focused on the first variable "HSR station" and the second variable is "Income per capita".

The first variable aims to measure the effect of the HSR on the local economy, as this variable directly reflects the economic performance and growth of the regions impacted by HSR, making it a key indicator of local economic expansion.

The Income per capita measures the degree of income within the region, assessing changes in income disparity helps us understand the impact of HSR on economic equity, particularly whether it helps bridge the income gap between urban and rural areas.

Covariates are the independent variables that may influence the rural development according to research question. These factors are essential to control for in our analysis to isolate the effect of HSR on economic growth and income disparity. The variables that we have choose, according to the literature, are (a) travel time reduction to measure the reduction in travel time between key locations due to the HSR. The Travel time reduction is a direct consequence of HSR, enhancing connectivity and potentially stimulating economic activity and integration; (b) the employment rate is the percentage of the working-age population that is employed. Employment levels can significantly influence economic growth and income distribution, making it a crucial covariate; (c) the accessibility index is a measure of how accessible key urban centers are from surrounding areas. This variable represents the improved accessibility due to HSR can impact economic opportunities and regional cohesion; (d) population density is the number of people per square kilometer. Population density reflects urbanization levels, which can affect economic dynamics and the distribution of income; (e) investment in infrastructure is the amount of public and private investment in infrastructure, excluding HSR. This variable describe when the infrastructure investments drive economic growth, and controlling for this ensures that we isolate the impact of HSR; (f) the commuter statistics are the number of people commuting between different regions, including the mode of transport. The commuting patterns can influence local economies and labor markets, making it important to consider in our analysis; (g) the environmental impact measures changes in carbon emissions and other environmental indicators pre- and post-HSR. The environmental factors can indirectly affect economic growth and quality of life, which in turn can influence economic metrics.

We carried out test to analyze normality of the dataset, and we found that the variables Employment and income per capita, they are normally distributed. The dependent variables are for model 1: HSR Rail (Stations) and Opening HSR work site before 2020.

3.3. The Econometric Modelling

3.3.1. The Choice of Hypothesis

Research presents diverse perspectives on the impact of high-speed rail (HSR) on regional economic development. Most scholars agree that HSR enhances accessibility, creating a space-time compression effect that facilitates the flow

of spatial elements and significantly impacts urban economic growth. Therefore, it is essential to determine how to reliably and scientifically assess the effect of HSR construction on regional economic development. Based on previous studies, this research proposes the following hypotheses (H1 and H2) to evaluate if "The development of HSR infrastructure is positively correlated with local economic expansion".

The rationale behind H1 and H2 is grounded in the following discussion: if the high-speed rail (HSR) positively impacts the region, we can measure it in this case study in several ways: (a) its effect on the territorial fabric, (b) its effect on workers, and (c) improvements in transportation from/to stations and urban centers. Promoting sustainable travel is a key requirement for both Italy and Europe. The Naples-Bari line, financed in part by Recovery plan "PNRR" funds, aims to reduce car dependency. Furthermore, as mentioned in Section 3.1, ensuring accessibility for workers along the railway in inland areas is crucial.

The HSR systems significantly reduce travel times between regions, making it easier for individuals in rural or less accessible areas to reach urban centers. This improved connectivity allows residents from lower-income or rural regions to access a broader range of economic opportunities, including higher-paying jobs that are concentrated in urban areas. Over time, the economic benefits of HSR typically accumulate. These benefits can include increased property values, enhanced business opportunities, and improved regional connectivity. As the HSR network matures, its impact on regional economic growth and productivity becomes more pronounced.

By linking economically disparate regions, HSR fosters greater economic integration. Individuals can commute longer distances for work, which can help reduce regional disparities by increasing the labor pool available to businesses in urban centers and providing rural residents with access to diverse employment options. Studies show that regions connected by HSR experience a reduction in travel times, which facilitates more frequent and efficient commuting and enhances overall mobility [34].

H1: The Construction of High-Speed Rail (HSR) Induces a Temporal Accumulation Effect.

The construction of HSR significantly reduces travel times between the Naples and Bari poles and the surrounding municipalities. This temporal accumulation effect enhances connectivity, making it more feasible for workers to commute and for businesses to operate across greater distances. Consequently, this fosters economic integration and development in these regions. The improved accessibility facilitates the flow of goods and services and promotes regional cohesion by bridging the gap between urban and rural areas [87,88].

H2: The Construction of High-Speed Rail (HSR) Impacts the Income Gap.

By enhancing accessibility and proximity, HSR infrastructure development facilitates easier and faster travel between regions, potentially leading to more equitable economic opportunities. Improved connectivity makes it feasible for individuals from lower-income rural areas to access higher-paying jobs in urban centers, thus reducing the income disparity. Additionally, increased accessibility can attract businesses to rural areas, fostering local economic growth and development. These factors combined contribute to narrowing the income gap and promoting regional economic integration [56,89].

3.3.2. The Regression Models

Evaluating the impacts of High-Speed Rail (HSR) on regional economic growth involves a theoretical framework that integrates concepts from transport economics, regional development theory, and urban planning. According to classical economic theory, transportation infrastructure enhances productivity and economic growth by reducing transportation costs and improving market access. HSR, by offering faster and more reliable transport, is expected to stimulate economic activities by linking regions more effectively. The improved accessibility brought by HSR often results in increased clustering of economic activities in connected regions, fostering regional economic development, the enhancing the ease with which people and goods can move between locations. To evaluate the accessibility and the spatial effects of HSR, we consider also the Spatial Interaction Models. These models, such as the Gravity Model, are used to estimate how changes in transportation infrastructure affect economic interactions between regions. HSR can alter the spatial distribution of economic activities by reducing travel times and expanding the effective catchment area of economic centers [90–93].

The models are designed based on the theory that improved transportation infrastructure, such as HSR, can lead to economic growth by enhancing connectivity, reducing travel times, and increasing accessibility to job markets and business opportunities. This, in turn, can impact local economic conditions, including income levels and regional disparities. The choice of variables is aligned with the objective to isolate the impact of HSR from other economic and

socio-economic factors. By including control variables like employment rate, Gini index, and industrialization, the models aim to provide a comprehensive understanding of how HSR influences economic and social outcomes. The use of binary and continuous outcome variables, along with appropriate regression techniques, ensures that the analysis captures both the presence of HSR infrastructure and its quantitative effects on economic and social variables [56,75,87,88].

Based on the characteristics of the variables, we employed two different regression models to study H1 and H2 Model 1 to examines the relationship between HSR construction and local economic expansion; Model 2 to investigates the impact of HSR construction on income disparity and accessibility:

Model 1 aims to estimate the direct effects of the HSR on the development of the local economy as follows:

$$\ln(Y_{it}) = \beta_0 + \beta_1 \mathrm{HSR}_{it} + \beta_{12} X_{it} + \mu_{it} + \varepsilon_{it} \quad (1)$$

The model 2 is designed as the Equation (2):

$$Y_{it} = \beta_0 + \beta_1 \mathrm{HSR}_{it} + \beta_{12} X_{it} + \mu_{it} + \varepsilon_{it} \quad (2)$$

We treat the variable "HSR station" as a binary indicator (0 for no station open, 1 for station open) for the year 2020 across all 25 cities. This classification accounts for the fact that the Naples-Cancello and Telese sections of the HSR began construction in 2016. In Model 1, the dependent variable Y_{it} represents the binary status of whether a high-speed rail station is present in city i at time t. The covariates X_{it} include control factors such as the employment rate, the Gini index, industrialization levels in the area, and travel times between stations, as well as the time needed to reach airports and ports.

Model 2 examines whether the presence of HSR affects per capita income. Here, the dependent variable Y_{it} is the income level in city i at time t, while the independent variables X_{it} include socio-economic factors such as the Gini index, population, accessibility, and economic clustering. Since Y_{it} conforms to a normal distribution, a linear model is appropriate for this analysis. Model 2 also assesses the potential impacts of HSR on accessibility to local work systems and transportation hubs (ports and airports), using the "Opening HSR work site" variable to indicate the presence of construction sites from 2016 to 2020.

The evidence in the literature supports the idea that HSR construction has significant effects on local economic expansion, income disparity, and accessibility. Research demonstrates that HSR can stimulate economic growth, reduce income disparities by improving access to better job opportunities, and enhance regional connectivity. These findings provide a solid foundation for understanding the broader impacts of HSR infrastructure on regional development and socio-economic integration.

4. Results and Discussion

4.1. Spatial Effects of HSR

The ex-ante study (at present) on the 2020 state highlights a state of the art on the potential for growth and vulnerability. Surprisingly, the Gini index is high for internal regions (except for Naples which is the regional capital), while it is high for Bari. Along the line of the new HSR we note that the municipalities involved have a high Gini index (Figure 5).

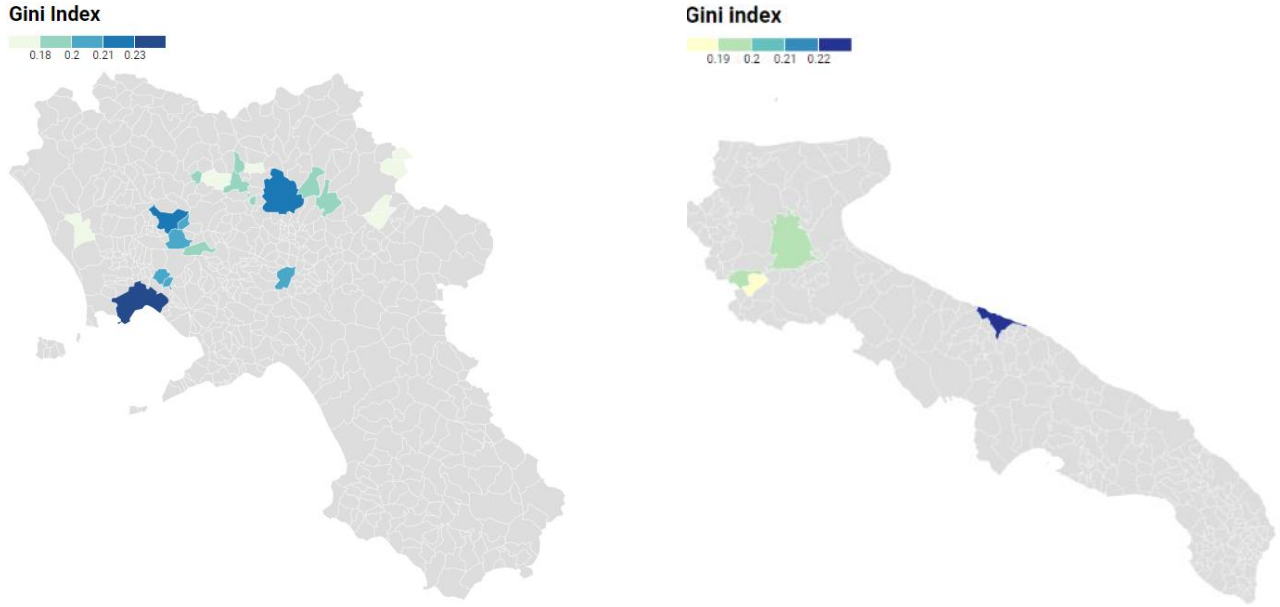

Figure 5. Gini index in Campania region (**left**) and Puglia region (**right**), elaboration of authors.

In Figure 6, however, we have represented the change in the employment rate, which is higher in the internal municipalities compared to the capital. This is not strange in 2020, while the employment rate today has also increased in Naples. It is interesting to note that the provinces of rural areas have a strong industrial vocation (Figure 6) and that they also present a notable employment rate.

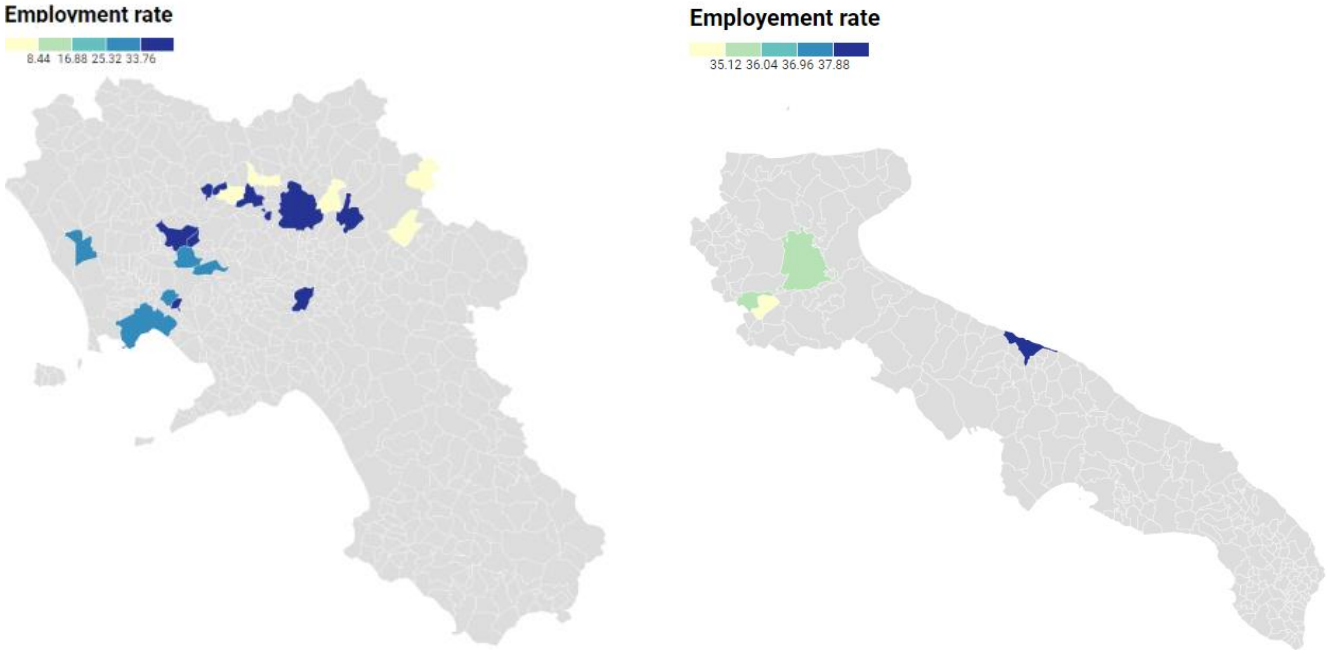

Figure 6. Employment rate in Campania region (**left**) and Puglia region (**right**), elaboration of authors.

In Figure 7 the number of industrial areas present is numerous in internal and rural areas (between Benevento and Foggia) while less for the areas outside the railway line (in yellow). Bari, although the regional capital, does not have a significant number of industrial companies.

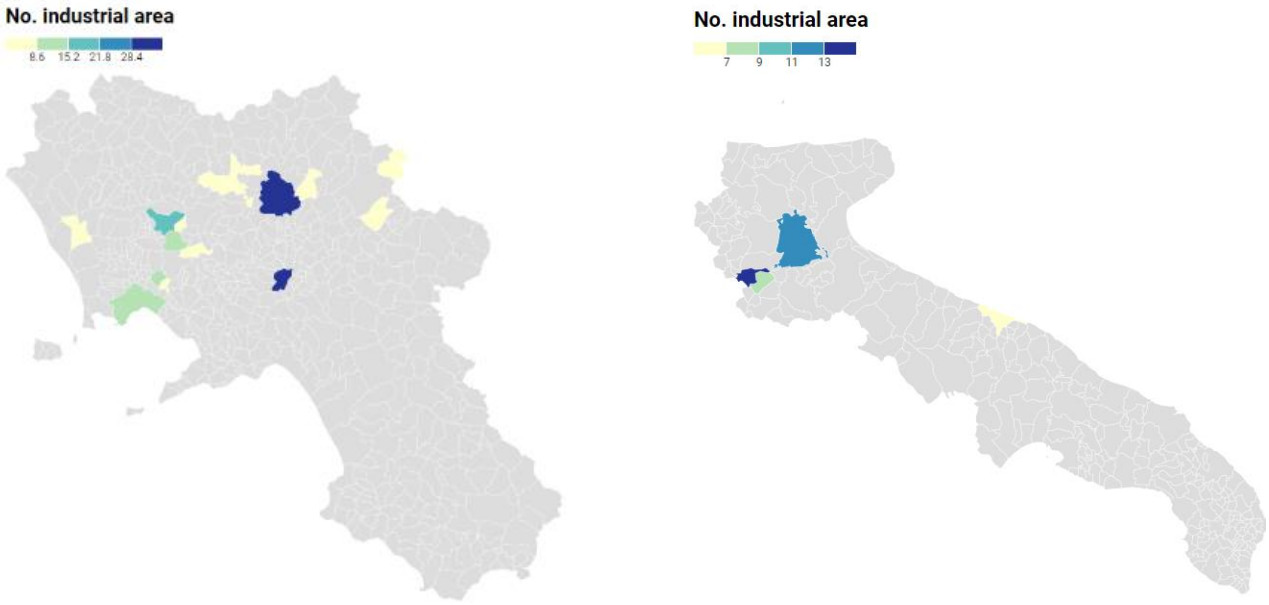

Figure 7. No. of industrial area along the HSR rail between Campania region (**left**) and Puglia region (**right**), elaboration of authors.

4.2. Impacts of HSR on the Economic Growth and Accessibility Indicators

The results obtained from econometric modelling have been grouped in Tables 2–4 and are summarized below the results are in line with the hypothesis (positive impacts on the economy) and for the current economic condition, but on the other hand it presents some interesting insights. Firstly, the Gini index is not significant for any dependent variable and is not influenced either by station opening or employement.

Table 2. Results of Model 1.

Dependent Variables	**Covariates**			**R^2**	**Cons**
	Railway Stations with Active Passenger Service	**Airports**	**Ports Areas with Passenger Service**		
HSR rail stations	0.10 (0.11)	0.10 (0.05) *	−0.17 (0.09) *	0.45	1.66 (2.44)

Note: Coefficient reported and st. dev in brackets (). * Low significant, ** medium significant, *** highly significant), "-" n.a.

In the first model, the presence of high-speed rail (HSR) stations (in construction since 2016) within the investigated communities in 2020 is primarily significant for travel durations to ports and airports. While the impact on airport access is positive, suggesting improved connectivity, the impact on ports is negative, indicating increased travel times. This negative effect is likely due to construction delays, as not all stations are operational immediately, complicating access to port areas. This preliminary finding suggests that, initially, HSR construction may inadvertently increase travel times to ports due to incomplete infrastructure, highlighting the need for careful project management and phased completion strategies to mitigate such issues.

Table 3. Results of Model 2.

Dependent Variables	**Covariates**					**R^2**	**Cons**
	Pop.	**HSR Rail by 2021**	**Opening HSR Work Site before 2020**	**Access to Road Network**	**Cluster Airport**		
Income	0.01 (0.00) **	3262.98 (1271.90) *	−2063.55 (1271.90) *	−1533.36 (798.78) *	-	0.67	14.37 (2688) ***
Employement	−0.00 (0.00)	1494.24 (7219.02) *	-	-	−1968.05 (678.53) ***	0.49	59 (61) **

Legend: Coefficient reported and st. dev in brackets (). * Low significant, ** medium significant, *** highly significant), "-" n.a.

Table 4. Results of Model 2 of the clustering variables.

Dependent Variables	Covariates				R^2	Cons
	Access to Railway Station	Accesst to Road Network	Access to Airport	Access to Port Areas		
HSR rail stations	−0.00 (0.09)	0.02 (0.03)	−0.22 (0.20)	0.80 (0.07)	0.58	−1416.41 (1.09)
Opening HSR work site	−0.02 (0.09)	−0.01 (0.03)	−0.02 (0.38)	0.27 (0.35)*	0.47	−0.071 (1.15)

Legend: Coefficient reported and st. dev in brackets (). * Low significant, ** medium significant, *** highly significant), "-" n.a.

For airports in Naples and Bari, the introduction of High-Speed Rail (HSR) results in a service improvement of approximately 7.5% for passengers, while access to ports experiences a decrease of 7%. The variable "Opening HSR Work Site Before 2020" does not show significance in Model 1 across any boundary variables. Model 2, as detailed in Tables 3 and 4, explores the impact of HSR on employment and income using both cluster-based and individual accessibility indicators. The cluster-based variables include "Cluster Accessibility to Railway Network", "Cluster Road Network", "Cluster Airport", and "Cluster Access to Port Areas", while the individual accessibility indicators are "Access to Railway Station", "Access to Road Network", "Access to Airport", and "Access to Port Areas". Both employment rates and income levels are significantly associated with the presence of HSR stations. From a social perspective, increased income correlates with population growth in the regions, but the introduction of HSR appears to mitigate this effect. Population growth seems more closely tied to employment opportunities rather than the mere presence of HSR. Surprisingly, accessibility does not improve as anticipated; instead, it results in reduced connectivity to the primary network. The overall effects on the territory are less favourable compared to economic indicators. The clustering of HSR stations negatively impacts employment rates, suggesting that while HSR reduces travel time, it may also create employment imbalances due to ongoing and anticipated construction conditions. Inland areas might face adverse effects without targeted development policies following the HSR's opening. Model 2 also evaluates whether HSR affects accessibility indicators for major networks, passenger stations, airports, and ports. Notably, accessibility to port areas, particularly in Naples and Bari, improves with HSR. However, inland cities requiring further line development do not experience similar benefits. This paradox highlights that while HSR reduces travel times, overall accessibility improves only with the full completion of the HSR line. Although some indicators, such as employment rates and population growth, show positive effects with HSR, improvements in overall accessibility are not apparent. Industrial areas do not significantly influence the local economy. Enhancing connections between municipalities along the HSR line and their surrounding areas will be essential. Ongoing construction impacts the quality of life and mobility habits, with high-speed benefits offset by the complexity of short-haul connections. The total travel time includes both primary rail and secondary urban network travel, increasing travel stress and emphasizing the need to measure such impacts accurately. If these issues are not addressed, the quality of life in Rome and Naples may decline. Figure 8 illustrates the projected income increases relative to 2020 values, demonstrating significant potential growth for municipalities along the high-speed line.

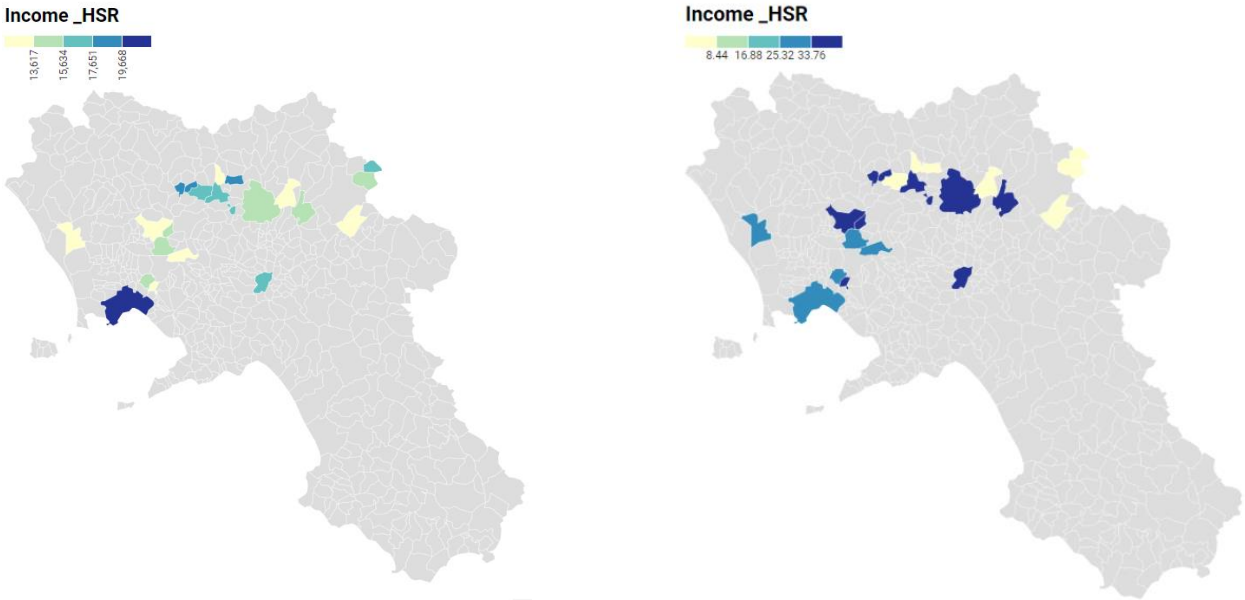

Figure 8. Potential impact of HSR on income in Campania region (**left**) and Puglia (**right**), elaboration of authors.

The differences in accessibility to airports occurred for Apice (going from 60 to 65), for Benevento (from 64 to 68), for Foggia (72 to 78), Paduli (71 to 77), Ponte (70 to 75), Villanova (from 76 to 8) and for Vitulano (75 to 81). The cities of Naples (25 to 26), Bari (18 to 19) are not affected by the HSR, as they already have operational connections. Therefore, HSR can facilitate a better connection between internal cities and key infrastructures. Even in Casalnuovo di Naples there was little impact from the HSR on airport transport (from 20 to 21).

These results offer a further point of view on the effects of the HSR on the southern and internal regions. What emerges is the need to CONSIDER short-distance connections that are not of a tourist nature and that do not begin to create imbalances between rural areas and the quality of life, while sustainable mobility can be useful for traveling to/from work for at HSR stations and with industrial plants reducing driving times. As [13–15], the results show that high-speed rail has different effects on economic growth in different regions and changes with the development of high-speed rail in the region. At the regional level, Shi finds that areas that have formed high-speed rail networks, high-speed rail has compressed space-time distance and promoted exchanges and cooperation between cities, which has had a positive effect. While we have not found positive indications on the clusters. In line with [60], the increase in income (due to an increase in population) is in line with the literature, where an increase in population translates into an increase in labor flow, towards cities and industrial areas. The increase in population relies on rail transport and future LPT capacity between municipalities and HSR lines. In line with [4,39], we think that HSR could increase disparities in access to city ports, reducing the potential for municipalities to gain working independence.

As [46,94], the less than positive outcomes of the HSR network expansion reduces the economic benefits of HSR because the marginal contribution of new HSR lines to economic productivity decreases and there is a crowding out effect caused by excessive agglomeration (around the areas of Naples, Bari) and the future stations around it. This requires planning that accompanies the structure of the railway line as stated by [61], who finds that HSRs make a significant positive contribution to economic growth in large-mega cities. Together with [95], we suggest that each city should reasonably plan its HSR network to promote economic growth and reduce economic disparity by accounting for different resource endowments, especially geographic and population factors. Unlike empirical evidence where the opening of the HSR, the intensity of the HSR service and the cumulative effect of the HSR over time all have a positive impact on regional economic growth through market size, in this historical phase of the Naples-Naples HSR line Bari we are not able to say the same.As one of our findings, ref. [17] also highlighted that a weak relationship between HSR and local development, assessed on the basis of manpower, may reveal an absence of relationship between HSR and the labor market.

4.3. Recommendations and Discussions

The impact of High-Speed Rail (HSR) on rural areas in Italy highlights several crucial factors. While HSR enhances accessibility to key infrastructures like airports, the benefits are more pronounced in towns previously lacking such connections, with minimal impact on well-served cities like Naples and Bari. Effective integration of HSR with local transport networks is essential to avoid imbalances and support local commuting, especially for work-related travel. Regional disparities are a significant concern, as HSR's benefits can be uneven, often favoring urban over rural areas. The relationship between HSR and economic growth is complex, with potential for diminishing returns or crowding out in already agglomerated regions, necessitating targeted development policies to support rural areas. Comprehensive planning should address local needs, mitigate adverse effects, and ensure that HSR contributes positively to regional development and reduces disparities while maintaining sustainability and quality of life.

To enhance accessibility and connectivity through High-Speed Rail (HSR), it is crucial to ensure the full completion of the HSR line to maximize its potential and effectively connect all intended regions. This step addresses the observed paradox where inland areas and regions needing further development do not fully benefit from HSR infrastructure. Complementing this, developing and enhancing short-haul connections between HSR stations and local transportation networks—such as buses and local trains—will alleviate travel stress and optimize overall accessibility by reducing total travel time. Additionally, addressing regional disparities is essential. Targeted development policies and investments in inland areas should be implemented to counteract the adverse effects of HSR construction and ensure equitable economic benefits across all regions. In parallel, creating and supporting employment opportunities in regions affected by HSR construction will help balance employment imbalances caused by the clustering of stations.

Monitoring and mitigating the impacts of construction is also critical. Regular assessments of the construction's effects on the quality of life and mobility habits of local residents will help manage disruptions effectively. Engaging with local communities to provide information and support, and addressing concerns proactively, can reduce potential

frustrations and improve overall community relations. To leverage economic opportunities, the increased accessibility provided by HSR should be used to promote local economic development, attract businesses, and stimulate investment in the regions served by the rail network. Coordinating HSR planning with regional development strategies will help optimize the economic and social benefits of the rail infrastructure, ensuring that all areas realize its potential advantages. Focusing on comprehensive accessibility measures involves implementing and refining accessibility indicators to assess the impact of HSR on various transport nodes, such as stations, airports, and ports. Regularly evaluating and adjusting transportation policies based on empirical data and feedback from affected regions will ensure that policies remain relevant and effective in meeting the evolving needs and maximizing the benefits of HSR.

5. Conclusions

The study shows that HSR construction significantly enhances local economic activity and regional development by improving connectivity between urban centers and surrounding areas. This boosts business opportunities, job creation, and economic integration, helping to narrow the income gap between urban and rural areas by attracting businesses and high-paying jobs to less developed regions. HSR also makes travel easier, reducing times and improving mobility for people and goods. However, the study has limitations: it uses a 2020 dataset, focuses on short-term impacts, and is specific to the Naples-Bari HSR line. Future research should incorporate long-term studies, continuous data collection after construction, and comparative analyses with other HSR projects both within Italy and globally. Additionally, exploring environmental impacts—such as changes in carbon emissions and land use—as well as conducting social impact assessments, will offer a comprehensive understanding of the benefits and challenges associated with High-Speed Rail (HSR). Recognizing the increased pressures on metropolitan cities like Naples and Bari due to the implementation of high-speed rail (HSR) is crucial. Policymakers should adopt strategies to mitigate this burden and enhance the quality of life in these urban centers. Additionally, the impact of HSR on landscape maintenance needs attention, as construction activities and anthropogenic effects are likely to alter the natural environment. Future research should incorporate socio-economic surveys to better understand the impact of HSR on communities, employing measures such as the Gini index, which was not significant in this study. Furthermore, it is recommended that rural development be assessed using sustainability indicators rather than solely performance indicators. This approach will provide a more comprehensive understanding of the long-term effects of HSR on both urban and rural areas, ensuring that infrastructure projects align with broader goals of sustainable development and social equity. Based on the study, several policy recommendations are proposed to leverage the economic and social benefits of high-speed rail (HSR) infrastructure. Policies supporting HSR can help reduce regional disparities and promote balanced economic growth. These insights can guide infrastructure planning to maximize accessibility and integration, boosting regional connectivity and sustainable development. Emphasizing HSR's positive economic impacts can attract investments and support regional development, aligning with sustainable development goals (SDGs) by fostering sustainable transportation, reducing inequalities, and encouraging economic growth. Additionally, HSR can enhance sustainable tourism by improving access to remote areas, thus distributing tourism more evenly and reducing congestion in urban centers. This approach promotes environmental conservation, cultural preservation, and local economic benefits, supporting responsible travel practices and reducing the carbon footprint of tourism [95–97]. This synergy between HSR and sustainable tourism further underscores the multifaceted benefits of investing in high-speed rail infrastructure, aligning with global sustainability initiatives and contributing to a more balanced and equitable regional development [3,17,54,62,98].

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Author Contributions

Conceptualization, I.D.R.; Methodology, I.D.R.; Software, I.D.R.; Validation, I.D.R., A.D.; Formal Analysis, I.D.R.; Investigation, I.D.R.; Resources, I.D.R.; Data Curation, I.D.R.; Writing—Original Draft Preparation, I.D.R.; Writing–Review & Editing, I.D.R., A.D.; Visualization, I.D.R.; Supervision, I.D.R.

Ethics Statement

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Informed Consent Statement

Not applicable.

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Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Footnotes

1. https://www.agenziacoesione.gov.it/lacoesione/le-politiche-di-coesione-in-italia-2014-2020/strumenti-e-programmi/contratti-istituzionali-di-sviluppo/cis-ferroviario-Naples-bari-lecce-taranto/.
2. https://www.fsitaliane.it/content/fsitaliane/it/opere-strategiche/Naples---bari.html.
3. Additionally, we can suggest also to use the Akaike Information Criterion (AIC) and Bayesian Information Criterion (BIC) for model comparison, selecting the most appropriate models for the analysis. In this case, it has not bein applied as pseudo R2 is acceptable.
4. https://www.openpolis.it/numeri/le-disuguaglianze-di-reddito-in-italia-comune-per-comune/.

References

1. Égert B, Koźluk T, Sutherland D. Infrastructure and Growth: Empirical Evidence. In *OECD Economics Department Working Papers No. 685*; OECD Publishing: Paris, France, 2009. doi:10.1787/225682848268.
2. Sathaye J, Najam A, Winkler H. Sustainable Development and Mitigation. In *Climate Change 2007: Mitigation. Contribution of Working Group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*; Metz B, Davidson OR, Bosch PR, Dave R, Meyer LA, Eds; Cambridge University Press: Cambridge, UK; New York, NY, USA, 2007.
3. Hiraishi K. Relationship between high-speed rail and regional development: Lessons from Japanese benchmark cases. In *ADBI Working Paper 958*; Asian Development Bank Institute (ADBI): Tokyo, Japan, 2019. Available online: https://www.adb.org/publications/relationship-high-speed-rail-regional-development-lessons-japanese-benchmark-case (accessed on 29 August 2024).
4. Zhang G, Zheng D, Wu H, Wang J, Li S. Assessing the role of high-speed rail in shaping the spatial patterns of urban and rural development: A case of the Middle Reaches of the Yangtze River, China. *Sci. Total Environ.* **2020**, *704*, 135399. doi:10.1016/j.scitotenv.2019.135399.
5. Kim H, Sultana S. The impacts of high-speed rail extensions on accessibility and spatial equity changes in South Korea from 2004 to 2018. *J. Transp. Geogr.* **2015**, *45*, 48–61. doi:10.1016/j.jtrangeo.2015.04.007.
6. Pagliara F, Wilson A. The state-of-the-art in building residential location models. In *Residential Location Choice*; Pagliara F, Preston J, Simmonds D, Eds.; Springer: Berlin/Heidelberg, Germany, 2010; pp. 1–20.
7. EY. Smart and Affordable Rail Services in the EU: A Socio-Economic and Environmental Study for High-Speed in 2030 and 2050—Technical Report 2. Available online: https://rail-research.europa.eu/publications/smart-and-affordable-rail-services-in-the-eu-a-socio-economic-and-environmental-study-for-high-speed-in-2030-and-2050/ (accessed on 29 August 2024).
8. Gorgulu N, Foster V, Straub S, Vagliasindi M. The Impact of Infrastructure on Development Outcomes: A Qualitative Review of Four Decades of Literature. In *Policy Research Working Papers 10343*; World Bank: Washington, DC, USA, 2023. Available online: http://hdl.handle.net/10986/39515 (accessed on 29 August 2024).
9. Li M, Li H. Impacts of High-Speed Rail on Regional Economic Growth: An Empirical Analysis of the Moderated Mediation Effects. *Transp. Res. Rec.* **2024**, *2678*, 476–492. doi:10.1177/03611981231180207.
10. Zhang H, Li X, Liu X, Chen Y, Ou J, Niu N, et al. Will the development of a High-Speed railway have impacts on land use patterns in China? In *Annals of the American Association of Geographers Policy Research Working Papers* 10343; World Bank: Washington, DC, USA, 2019; Volume 109, pp. 979–1005. doi:10.1080/24694452.2018.1500438.
11. Pagliara F, Mauriello F, Garofalo A. Exploring the interdependences between High Speed Rail systems and tourism: Some evidence from Italy. *Transp. Res. Part A Policy Pract.* **2017**, *106*, 300–308. doi:10.1016/j.tra.2017.09.022.
12. Pagliara F, Mauriello F. Modelling the impact of High Speed Rail on tourists with Geographically Weighted Poisson Regression. *Transp. Res. Part A Policy Pract.* **2020**, *132*, 780–790. doi:10.1016/j.tra.2019.12.025.
13. Pagliara F, Di Ruocco I. How public participation could improve public decisions on rail investments? *Reg. Sci. Policy Pract.* **2018**, *10*, 383–403. doi:10.1111/rsp3.12143.

14. Di Ruocco I, D'Auria A. The "Duomo" metropolitan station in Naples: A case of urban regeneration through public art with a focus on spillover effects on real estate market. In *Proceedings of the International Conference on Silk Road Sustainable Tourism Development and Cultural Heritage*; Springer Nature: Cham, Switzerland, 2021; pp. 85–98. doi:10.1007/978-3-031-31027-0_8.
15. Di Ruocco I, Mauriello F, Pagliara F. The Effects of High-Speed Rail on the Real Estate Market for Residential Use: A Comparison of Medium-Sized and Metropolitan Cities in Italy. In *International Workshop on HSR Socioeconomic Impacts*; Springer Nature: Cham, Switzerland, 2023; pp. 253–279. doi:10.1007/978-3-031-53684-7_12.
16. OECD. Assessing the framework conditions for social innovation in rural areas. In *OECD Local Economic and Employment Development (LEED) Papers*; No. 2024/04; OECD Publishing: Paris, France, 2024. doi:10.1787/74367d76-en.
17. Crozet Y. Regional Development and High Speed Rail in France: Accessibility Gains are not enough. *Rev. Hist. Chem*. **2018**, *48–49*, 419–436. Available online: https://shs.hal.science/halshs-02134416 (accessed on 29 August 2024).
18. Lawrence M, Richard B, Ziming L. China's High-Speed Rail Development. In *International Development in Focus*; World Bank: Washington, DC, USA, 2020. doi:10.1596/978-1-4648-1425-9.
19. Ribalaygua C. Alta velocidad y ciudad: Estrategias de incorporación de las nuevas estaciones periféricas francesas y españolas. *CIU* **2006**, *44*, 20–56.
20. Beria P, Grimaldi R, Debernardi A. High-speed rail effects on local development: The case of the TGV Sud-Est. *Trans. Pol*. **2018**, *19*, 202–212.
21. Preston J, Wall G. The ex-ante and ex-post economic and social impacts of the introduction of high-speed trains in South East England. *Plan. Pract. Res.* **2008**, *23*, 403–422.
22. Tomaney J, Marques P. Evidence, policy, and the politics of regional development: the case of high-speed rail in the United Kingdom. *Environ. Plan. C Gov. Policy* **2013**, *31*, 414–427.
23. Wang Y, Dong W. How China's high-speed rail promote local economy: New evidence from county-level panel data. *Int. Rev. Econ. Finance* **2022**, *80*, 67–81.
24. Garmendia M, Ureña JM, Coronado JM. High speed rail: implication for cities. *Cities* **2011**, *29*, 129–130. doi:10.1016/j.cities.2011.09.001.
25. Bazin S, Beckerich C, Delaplace M. Desserte TGV et villes petites et moyennes, une illustration par le cas du tourisme à Arras. Auray, Charleville-Mézières et Saverne. *Les Cah. Sci. Transp.* **2013**, *63*, 33–62.
26. Vickerman R. Can high-speed rail have a transformative effect on the economy? *Transp. Pol*. **2018**, *62*, 31–37. doi:10.1016/j.tranpol.2017.03.008.
27. Cascetta E, Papola A, Pagliara F, Marzano V. Analysis of mobility impacts of the high speed Rome–Naples rail link using withinday dynamic mode service choice models. *J. Transp. Geogr*. **2011**, *19*, 635–643. doi:10.1016/j.jtrangeo.2010.07.001.
28. Cascetta E, Cartenì A, Henke I, Pagliara F. Economic growth, transport accessibility and regional equity impacts of high-speed railways in Italy: Ten years ex post evaluation and future perspectives. *Transp. Res. Part A Policy Pract.***2020**, *139*, 412–428. doi:10.1016/j.tra.2020.07.008.
29. Cheng YS, Loo BPY, Vickerman R. High-speed rail networks, economic integration and regional specialisation in China and Europe. *Travel Behav. Soc.* **2015**, *2*, 1–14. doi:10.1016/j.tbs.2014.07.002.
30. Chen Z, Xue J, Rose AZ, Haynes KE. The impact of high-speed rail investment on economic and environmental change in China: A dynamic CGE analysis. *Transp. Res. Part A Policy Pract.* **2016**, *92*, 232–245. doi:10.1016/j.tra.2016.08.006.
31. Liang Y, Zhou K, Li X, Zhou Z, Sun W, Zeng J. Effectiveness of high-speed railway on regional economic growth for less developed areas. *J. Transp. Geogr*. **2020**, *82*, 102621. doi:10.1016/j.jtrangeo.2019.102621.
32. Zhu P. Does high-speed rail stimulate urban land growth? Experience from China. *Transp. Res. Part D Transp. Environ.* **2021**, *98*, 102974. doi:10.1016/j.trd.2021.102974.
33. Dong L, Du R, Kahn M, Ratti C, Zheng S. "Ghost cities" versus boom towns: Do China's high-speed rail new towns thrive? *Reg. Sci. Urban Econ.* **2021**, *89*, 103682. doi:10.1016/j.regsciurbeco.2021.103682.
34. Givoni M. Development and Impact of the modern High-speed Train: A review. *Transp. Rev.* **2006**, *26*, 593–611. doi:10.1080/01441640600589319.
35. Ureña JM, Menerault P, Garmendia M. The high-speed rail challenge for big intermediate cities: A national, regional and local perspective. *Cities* **2009**, *26*, 266–279. doi:10.1016/j.cities.2009.07.001.
36. Chen F, Hao X, Chen Z. Can high-speed rail improve health and alleviate health inequality? Evidence from China. *Transp. Pol*. **2021**, *114*, 266–279. doi:10.1016/j.tranpol.2021.10.007.
37. Di Matteo D, Cardinale B. Impact of high-speed rail on income inequalities in Italy. *J. Transp. Geogr*. **2023**, *111*, 103652. doi:10.1016/j.jtrangeo.2023.103652.
38. Gong W, Li VJ. The territorial impact of high-speed rail on urban land development. *Cities* **2022**, *125*, 103581. doi:10.1016/j.cities.2022.103581.
39. Wang YF, Ni PF. Economic growth spillover and spatial optimization of high-speed railway. *China Ind. Econ.* **2016**, *2*, 21–36.
40. Dalkic G, Balaban O, Tuydes-Yaman H, Celikkol-Kocak T. An assessment of the CO_2 emissions reduction in high speed rail lines: Two case studies from Turkey. *J. Clean. Prod.* **2017**, *165*, 746–761. doi:10.1016/j.jclepro.2017.07.045.

41. Wei L, Bu W. Does the High-speed Railway Reduce the Urban-rural Income Gap? In Proceedings of the 2018, the 5th International Conference on Industrial Economics System and Industrial Security Engineering (IEIS), Toronto, ON, Canada, 3–6 August 2018; pp. 1–4. doi:10.1109/IEIS.2018.8598120.
42. He Z, Qinxian B. Does Digital Financial Inclusion Reduce the Urban-Rural Income Gap?—Panel Threshold Regression Analysis Based on China's Provincial Data. *Explor. Econ. Issues* **2018**, *4*, 122–129.
43. Fenglong C, Kangning X, Meichang W. High Speed Railway Development and Urban-Rural Income Inequality: Evidence from Chinese Cities. *Econ. Rev.* **2018**, *2*, 59–73.
44. Yongze Y, Yan P. Does High-Speed Rail Reduce the Urban-Rural Income Disparity—An Interpretation Based on the Perspective of Heterogeneous Labor Mobility. *Chin. Rural Econ.* **2019**, *4*, 79–95.
45. Xinshuo H, Suping H. The Impact of Putting High-Speed Railway into Operation on Urban and Rural Income Gap in Cities of Different Tiers. *Contemp. Econ. Res.* **2021**, *3*, 82–92.
46. Qiang L. Research on the Impact of the Opening of High-Speed Rail on the Urban-Rural Income Gap in the Yangtze River Economic Belt. *J. Nantong Univ.* **2021**, *37*, 32–42.
47. Lin Y. Travel costs and urban specialization patterns: Evidence from China's high speed railway system. *J. Urban Econ.* **2017**, *98*, 98–123. doi:10.1016/j.jue.2016.11.002.
48. Bernard AB, Moxnes A, Saito YU. Production networks, geography, and firm performance. *J. Polit. Econ.* **2019**, *127*, 639–688.
49. Donaldson D, Hornbeck R. Railroads and American Economic Growth: A "Market Access" approach. *Q. J.* Econ. **2016**, *131*, 799–858. doi:10.1093/qje/qjw002.
50. Chi F, Han H. The Impact of High-Speed Rail on Economic Development: A County-Level Analysis. *Land* **2023**, *12*, 874. doi:10.3390/land12040874.
51. Banerjee A, Duflo E, Qian N. On the road: Access to transportation infrastructure and economic growth in China. *J. Dev. Econ.* **2020**, *145*, 102442. doi:10.1016/j.jdeveco.2020.102442.
52. Ahlfeldt GM, Feddersen A. From periphery to core: Economic adjustments to high speed rail. In *IEB Working Paper 2010, 2010/36*; Institut d'Economia de Barcelona: Barcelona, Spain.2010.
53. Qin Y. 'No county left behind?' The distributional impact of high-speed rail upgrades in China. *J. Econ. Geogr.* **2017**, *17*, 489–520. doi:10.1093/jeg/lbw013.
54. Vickerman R. High-speed rail and regional development: The case of intermediate stations. *J. Transp. Geogr.* **2015**, *42*, 157–165. doi:10.1016/j.jtrangeo.2014.06.008.
55. Yoo S, Kumagai J, Kawasaki K, Hong S, Zhang B, Shimamura T, et al. Double-edged trains. *Transp. Policy* **2023**, *133*, 120–133. doi:10.1016/j.tranpol.2023.01.016.
56. Chen Z, Haynes KE. Impact of high-speed rail on regional economic disparity in China. *J. Transp. Geogr*. **2017**, *65*, 80–91. doi:10.1016/j.jtrangeo.2017.08.003.
57. Liu S, Kesteloot C. High-Speed rail and rural livelihood: The Wuhan-Guangzhou line and Qiya Village. *Tijdschr. Econ. Soc. Geogr*. **2015**, *107*, 468–483. doi:10.1111/tesg.12169.
58. Yu F, Lin F, Tang Y, Zhong C. High-speed railway to success? The effects of high-speed rail connection on regional economic development in China. *J. Reg. Sci*. **2019**, *59*, 723–742. doi:10.1111/jors.12420.
59. Yunyun W. Market Access, Population Mobility and Regional Disparity: Evidence from China's High-Speed Railway. *SSRN Elect. J.* **2023**. doi:10.2139/ssrn.4355519.
60. Shi Q. High-speed railway and regional economic growth: An empirical study based on market potential. *Am. J. Ind. Bus. Manag.* **2018**, *8*, 83–102. doi:10.4236/ajibm.2018.81006.
61. Jin M, Lin KC, Shi W, Lee PT, Li KX. Impacts of high-speed railways on economic growth and disparity in China. *Transp. Res. Part A Policy Pract.* **2020**, *138*, 158–171. doi:10.1016/j.tra.2020.05.013.
62. Zhang M, Xue J, Fang K. Assessing the impacts of high-speed rail on regional development: A case study of the Beijing-Shanghai line. *Transp. Res. Part A Policy Pract.* **2018**, *110*, 72–84. doi:10.4236/jtts.2013.32011.
63. Wang L, Zhang S, Sun W, Chen CL. Exploring the physical and mental health of high-speed rail commuters: Suzhou-Shanghai inter-city commuting. *J. Transp. Health* **2020**, *18*, 100902. doi:10.1016/j.jth.2020.100902.
64. Vickerman R. Can high-speed rail have a transformative effect on the economy? *Transp. Policy* **2018**, *62*, 31–37. doi:10.1016/j.tranpol.2017.03.008
65. Li M, Li H, Wang K, Shen S. Dynamic network relationship between transportation and urban economy: A case study of China's high-speed rail as a new transportation technology. *Res. Transp. Econ.* **2023**, *102*, 101360. doi:10.1016/j.retrec.2023.101360.
66. Preston J. High speed rail and rural development: The case of the UK. *J. Transp. Geogr*. **2012**, *22*, 161–170.
67. Hickman R, Banister D. *Transport, Climate Change and the City*, 1st ed.; Routledge: London, UK, 2014.
68. Banister D, Berechman J. *Transport Investment and Economic Development*; Routledge: London, UK, 2000.
69. Pagliara F, Biggiero L. Some evidence on the relationship between social exclusion and high speed rail systems. *Transactions* **2017**, *24*, 17–23. doi:10.1080/1023697x.2016.1263162.

70. Xu H, Nakajima K. Highways and industrial development in the peripheral regions of China. *Pap. Reg. Sci.* **2017**, *96*, 325–357. doi:10.1111/pirs.12198.
71. Breslow NE. Covariance analysis of censored survival data. *Biometrics* **1974**, *30*, 89–99.
72. Greene WH. *Econometric Analysis*, 8th ed.; Prentice Hall: Upper Saddle River, NJ, USA, 2019.
73. Chen CL, Hall P. The impacts of high-speed trains on British economic geography: A study of the UK's InterCity 125/225 and its effects. *J. Transp. Geogr.* **2011**, *19*, 689–704.
74. Albalate D, Bel G. High-speed rail: Lessons for policy makers from experiences abroad. *Pub. Adm. Rev.* **2012**, *72*, 336–349.
75. Banister D, Berechman Y. Transport investment and the promotion of economic growth. *J. Transp. Geogr.* **2001**, *9*, 209–218.
76. Cervero R, Murakami J. Rail and property development in Hong Kong: Experiences and extensions. *Urb. Stud.* **2009**, *46*, 2019–2043. doi:10.1177/0042098009339431.
77. Campos J, De Rus G. Some stylized facts about high-speed rail: A review of HSR experiences around the world. *Transp. Pol.* **2009**, *16*, 19–28.
78. De Rus G, Nombela G. Is investment in high speed rail socially profitable? *J. Transp. Econ. Pol.* **2007**, *41*, 3–23.
79. Ren X, Chen Z, Wang F, Dan T, Wang W, Guo X, et al. Impact of high-speed rail on social equity in China: Evidence from a mode choice survey. *Transp. Res. A Policy Pract.* **2020**, *138*, 422–441. doi:10.1016/j.tra.2020.05.018.
80. Hosmer DW Jr., Lemeshow S, Sturdivant RX. *Applied Logistic Regression*, 3rd ed.; Wiley: New York, NY, USA, 2013.
81. McFadden D. Conditional logit analysis of qualitative choice behavior. In *Frontiers in Econometrics*,1st ed.; Zarembka P, Ed.; Academic Press: New York, NY, USA, 1974; pp. 105–142.
82. Italian Railway Network, RFI. Available online: www.rfi.it (accessed on 29 August 2024).
83. National Civil Aviation Authority, Enac, 2022. Available online: www.enac.it (accessed on 29 August 2024).
84. TOM TOM. 2022. Available online: www.tomtom.it (accessed on 29 August 2024).
85. ISTAT, 2020. Accessibility of Municipalities to the Main Transport Infrastructures. Available online: www.istat.it (accessed on 29 August 2024).
86. ISTAT. Socio-Demographic Statistics. 2022. Available online: www.demo.istat.it/ (accessed on 29 August 2024).
87. Givoni M, Dobruszkes F. A review of ex-post evidence for mode substitution and induced demand following the introduction of high-speed rail. *Transp. Rev.* **2013**, *33*, 720–742.
88. Cervero R, Duncan, M. Neighbourhood composition and residential land prices: Does exclusion raise or lower values? *Urb. Stud.* **2004**, *41*, 299–315. doi:10.1080/0042098032000165262.
89. Liu L, Zhang M. High-speed rail impacts on travel times, accessibility, and economic productivity: A benchmarking analysis in city-cluster regions of China. *J. Transp. Geogr*. **2018**, *73*, 25–40. doi:10.1016/j.jtrangeo.2018.09.013.
90. Wilson AG. The use of entropy maximising models, in the theory of trip distribution, mode split and route split. *J. Transp. Econ. Policy* **1969**, *3*, 108–126.
91. Blanquart C, Koning M. The local economic impacts of high-speed railways: Theories and facts. *Eur. Transp. Res. Rev.* **2017**, *9*, 12.
92. Cheng J, Chen Z. Socioeconomic impact assessments of high-speed rail: A meta-analysis. *Transp. Rev.* **2022**, *42*, 467–502. doi:10.1080/01441647.2021.1979689.
93. Chen G, Silva JDAE. Regional impacts of high-speed rail: A review of methods and models. *Transp. Lett.* **2013**, *5*, 131–143.
94. Ma JT, Liu TY. Does the high-speed rail network improve economic growth? *Pap. Reg. Sci.* **2022**, *101*, 183–209. doi:10.1111/pirs.12641.
95. Pagliara F, Papa E. Urban rail systems investments: An analysis of the impacts on property values and residents' location. *J. Transp. Geogr*. **2011**, *19*, 200–211. doi:10.1016/j.jtrangeo.2010.02.006.
96. Delaplace M, Pagliara F, La Pietra A. Does high-speed rail affect destination choice for tourism purpose? Disneyland Paris and Futuroscope case studies. *Belgeo* **2016**, *3*, 1–23. doi:10.4000/belgeo.18132.
97. Pagliara F, Delaplace M, Vassallo JM. High-Speed trains and tourists: What is the link? Evidence from the French and the Spanish capitals. Proceedings Urban Transport XX—Urban Transport and the Environment in the 21st century. *WIT Trans. Built Environ*. **2014**, *138*, 17–27. doi:10.2495/UT140021.
98. Liu T, Peng R. Globalization, Urbanization and Rural Transformation. *Rural. Reg. Dev.* **2023**, *1*, 10010. doi:10.35534/rrd.2023.10010.