# Following Roman roads: Travel times in Italy

Vania Licio* Anna Maria Pinna†

January 30, 2024

**Abstract**

This paper analyzes the role of the historical Roman transport network on modern travel times in Italy. Roman roads were constructed by the Romans with a clear design, strong engineering, and the ability to overcome geographical barriers. After 2,000 years, the modern transport infrastructure still relies on them. In Italy the majority of trade takes place overland, and time is a crucial aspect that reflects the efficiency of a transport infrastructure and the accessibility of a region. By exploiting the information at two different territorial levels (grid cells of 1 km square and NUTS4 municipalities), the paper explores whether modern roads and railways constructed following the path of the old Roman road network affect the reduction of travel times - geographical features and distance being equal. Resting on a twofold analysis *within* territorial units and *between* urban centers, this work shows that territories crossed or linked to other areas by the modern transport infrastructure following the path of the old Roman roads have lower travel times today compared to territories where the modern infrastructure disregards the historical routes.

JEL Classification: H54, N73, N93, O18.
Keywords: Roman roads; Infrastructure; Travel times; Italy.

*Corresponding author. DSEA - University of Cagliari and CRENoS. Email: vaniam.licio@unica.it.
†DSEA - University of Cagliari and CRENoS. Email: ampinna@unica.it.

In Italy, the modern transport infrastructure relies on the historical Roman road system. De Benedictis, Licio and Pinna (2023) show that motorways and railways follow the path of the old Roman transport network. On the one hand, the major (consular) and minor historical Roman roads represented the physical starting capital to construct the new transport infrastructure. Roman roads lasted in time because they were paved and the building of the current transport infrastructure could use them as a base. Moreover, they were designed to link the main strategic points of the peninsula: in these terms, modern roads and railways were conceived to retrace the old paths that persisted in time. On the other hand, from a mere methodological point of view, Roman roads represent a valid instrument in the first stage of an instrumental variable approach. Being exogenous and relevant in determining modern roads, the Roman road network meets the two key criteria of an IV strategy.

This paper takes a step forward and investigates the role of the historical Roman transport network on modern travel times in Italy. Travel times are particularly interesting when considering the Italian territory: the majority of trade in Italy takes place overland. Three fourths of intra-EU trade depends on road freight transport, within Italy it is 87%. The time to travel reflects the efficiency of a transport infrastructure and the accessibility of a region. The measure has been also used to capture the ease to trade since it is an important component of transport costs and - in turn - of trade costs. Higher transport costs make more difficult for territories to engage in trade with distant partners. The literature of international trade still underlines the important weight transport costs have in shaping the dynamics of international trade, influencing trade volumes, market access, competitiveness, and economic development.

If the construction of the modern transport infrastructure has benefited from the physical presence of the old Roman roads, this study examines whether to travel modern roads constructed following the path of the historical roads results in shorter travel times today compared to travelling modern roads disregarding the course of the old Roman roads - geographical features and distances being equal.

Apart from very remote and mountainous areas, all the Italian territory is crossed by roads or paths that allow the movement of people and goods and connect places. However, not all areas are crossed and connected by the same type of transport infrastructure: having motorways, primary roads, and railways helps in making travel times shorter. For this reason, the empirical analysis of this work takes into account only the main modern transport infrastruc-

ture. Moreover, the information on Roman roads is processed considering - on the one hand - exclusively the consular roads, and - on the other hand - both major and minor roads. Major Roman roads led directly to Rome if placed in Italy or to Italy if running outside current Italian borders. They were linked to each other, forming a network of military communications, while secondary roads linked military roads to cities and settlements (Bosker et al., 2013).

This work exploits the information at two different territorial levels and rests on two different analyses. On the one hand, the Italian territory is decomposed into small grid cells to examine the role of Roman roads, modern roads, and travel times inside artificial areas of 1 km x 1 km in size and to explore the variability *within* territorial units with different geographies, urban developments, and infrastructural endowments. Grid cells are distinguished between treated and non-treated areas, with eight different treatment levels: 1) empty grid cells; 2) grid cells crossed by only minor Roman roads; 3) grid cells crossed by only major Roman roads; 4) grid cells crossed by both minor and major Roman roads; 5) grid cells crossed only by the main modern transport infrastructure; 6) grid cells crossed by both minor Roman roads and main modern roads; 7) grid cells crossed by both major Roman roads and main modern roads; 8) grid cells crossed by both major and minor Roman roads and main modern transport infrastructure. The *within* analysis adopts as dependent variable a measure of travel times in 2019 that accounts for the time to pass with the motorized transport infrastructure through a grid cell: the minutes needed to cross 1 km of territory using the transport network. Results show that grid cell crossed by the main modern transport infrastructure have lower travel times - geographical features being equal - than other cells. However, when the cell is also intersected by a Roman road, the effect on travel times is bigger in size, suggesting the positive role the historical transport infrastructure has in making the time of travel lower.

On the other hand, NUTS4 municipalities are selected to account for the *between* connectivity: shortest paths in terms of Roman roads and modern transport infrastructure between pairs of Italian administrative centers are used to investigate how much current paths conform to old ones. Italy includes more than 7,900 municipalities. Here we take into account pairs of municipalities that are linked to each other by the supply and the demand of public services (health, education, mobility). Using the definition proposed by Istat, bilateral travel times by car in 2020 (provided by Istat as well) between 7,903 Italian municipalities and their reference municipality (i.e. the nearest municipality that provides at least one of the services mentioned

above) are regressed over different bilateral and by origin and destination explanatory variables. The shortest path in terms of Roman roads and modern transport infrastructure are the main explanatory variables of this *between* analysis. Moreover, for each pair, the two shortest paths are compared by computing how much (in terms of km) the new connectivity follows the old connectivity. Results confirm that those modern trajectories that rest more on the historical ones presents today lower travel times, distance being equal. Roman roads had an important feature from a mere engineering point of view: they were straight and straightness is the major feature that makes the connection between two points (origin and destination) shorter and faster.

Resting on a twofold analysis *within* territorial units and *between* urban centers, this work shows that territories crossed or linked to other areas by modern transport infrastructure following the path of the old Roman roads have lower travel times today compared to territories where modern infrastructure disregards the historical routes.