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Major transport infrastructure investment and regional economic development – An accessibility-based approach

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ABSTRACT

Territorial cohesion and improvement of accessibility can be considered the main goals that are at the core of the EU Cohesion Policy. Yet, while there exists an abundant literature on the impact of transport infrastructure investment on the overall accessibility level, very few studies try to verify the possible link between accessibility and regional economic development. This issue seems to be particularly interesting in the case of the EU's New Member States that have experienced a big push to develop their transportation networks in the last decade. Hence, in the present paper we apply the potential accessibility indicator for Poland in order to verify the general productivity effects of major transport infrastructure investments between 2004 and 2014. We find that accessibility improvement seems to be weakly but positively correlated with growth in regional employment. However, the impact on the growth of regional production is not statistically significant. We also find that, once nonlinearity is assumed, accessibility improvement does not have a statistically significant impact on urban areas. At the same time it is in fact negatively correlated with output growth in the case of rural areas.

1. Introduction

Transport infrastructure investment has for long been one of the main tools applied within broadly defined regional development policies. In the case of the European Union a consultation procedure for transport infrastructure investment had already been introduced in 1966. Still, the first comprehensive three-year infrastructure investment programme was launched in 1990 and this was followed by the creation of the Trans-European Networks (TENs) in 1993 (e.g., Stasinopoulos, 1995).

Traditionally, investment in the road network has been the largest component of this kind of expenditure. Between 1995 and 2013 over 60% of transport infrastructure investment in the EU28 was devoted to roads.[1] In terms of financial resources the investment in road infrastructure amounted 66 billion euro over this period. Out of this 76% was spent on the TEN-T network that covers motorways and express roads.

Since joining the EU, Poland has experienced a big push to improve its transportation networks. Particular emphasis was put on the development of motorways and express roads. In 2004 the motorway network was basically non-existent as there were less than 500 km of separate, unconnected sections of motorway. Ten years later, a network of 3000 km of high-speed roads connects most of the main metropolitan areas in Poland. The vast majority of the new motorways and express roads have been constructed with the assistance of European funding (48 projects in total). EU support accounts for around 68% of overall project costs (e.g., Rosik et al., 2015). Fig. 1 presents the location of the roads that were constructed, highlighting those co-financed by EU funds.[2]

Undoubtedly, the development of the road network in Poland has led to an unprecedented improvement in accessibility although the regional impact is uneven. According to Rosik et al. (2015), the intraregional accessibility level has changed from 0% in Opolskie voivodeship up to 25% in Śląskie voivodeship. The question is, however, whether the investment in major transport infrastructure projects really fosters long term regional economic growth. Unfortunately, no clear-cut answer can be found in the literature. Most existing papers analyse the short-term impact of transport infrastructure investment based on the

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[1] See European Union Road Federation (2016).

[2] The detailed list of all road investments in the period 2004–2015 may be consulted in (Komornicki et al. 2013).

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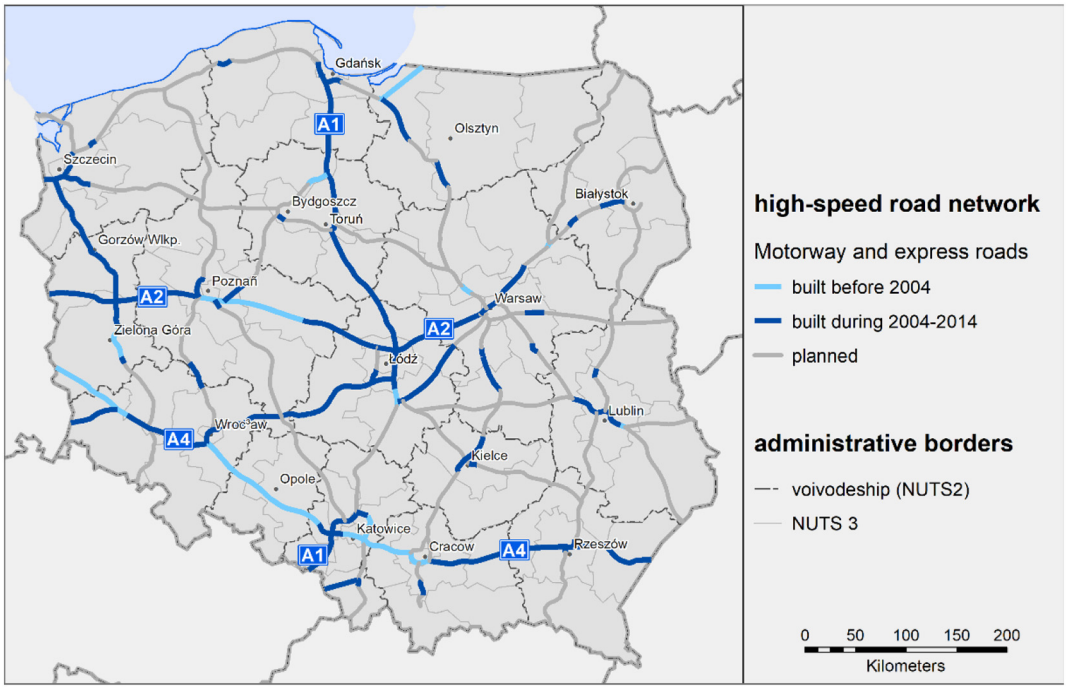

Fig. 1. Newly constructed motorways and express roads between 2004 and 2014.
Source: Authors' preparation.

value of the projects realised. Yet, while there exists an abundant literature on the impact of transport infrastructure investment on the overall accessibility level, very few papers try to verify the possible link between accessibility and regional economic development. In this sense the productivity related impact of road construction has hardly been analysed.

In the present paper we aim to fill in the gap that exists in the literature and focus on the longer-term impact of transport infrastructure investment on regional development. Hence, we apply the potential accessibility indicator for Poland in order to verify the general productivity effects of major transport infrastructure investment between 2004 and 2014. We also assess the impact of the latter on regional employment growth. To confirm the robustness of our findings we analyse both NUTS3 regions and LAU1 areal units.[3] The application of the data on LAU1 areal units also allows us to search for possible differences between urban and rural areas.

The remainder of the paper is organised as follows. Section 2 reviews prior literature on the impact of transport infrastructure investment on regional economic development. Section 4 covers the research methodology and description of the data. Section 5 presents the results of the empirical analysis. Finally, section A offers some concluding remarks.

2. Literature review

There are three main approaches that try to assess the relationship between transport infrastructure investment and regional economic development. Cost-Benefit Analysis (CBA) is probably the most widely used of the three potential approaches. As claimed by Lakshmanan (2011) this analytical approach is microeconomic – it focuses on improvements in the productivity of individual firms due to transport infrastructure investments. As a result, CBA studies are usually both limited in scope and partial in nature. However, two different streams of economic modelling try to deal with the above problems and capture the broader economic benefits of transport infrastructure investment.

The first one, pioneered by Aschauer (1989), considers the general productivity effects of infrastructure. Usually, it simply treats transport infrastructure as an additional production factor in a neoclassical production function. Many papers were published using this approach, however, the results are rather ambiguous. Here, controversies arise in terms of the definition of public infrastructure, data used (time series, cross-section, panel data), econometric specifications (e.g. problems concerning dynamic, co-integration and causality) or spatial aggregation (regional versus national data). Also, the interpretation of results can be difficult due to the fact that short-term expenditure effects are confounded with long-run productivity effects (e.g. Sturm et al., 1999).

The second stream of research links transportation networks and computable general equilibrium (CGE) models. This includes papers by Bröcker (1998), Kim et al. (2004), Haddad and Hewings (2005), Haddad et al. (2011) or Sakamoto (2012)[4] among others. For instance, Elshahawany et al. (2016) assess the macroeconomic impact of the planned Development Corridor on national and regional economies, applying an interregional CGE model for Egypt. They find that while all of the regions improve their accessibility (as measured in travel time savings) the impact on regional GDP growth rate varies. On average, the most positive impact (both in the long and the short run) is found for regions with the largest accessibility improvement. On the other hand, some areas would grow at slower pace as a result of planned infrastructure investment even though they would gain in terms of accessibility. Kim (1998) employs the CGE model to assess the effects of transportation investment on the Korean economy. He finds that an increase in transport infrastructure leads to a direct increment of output in the short run. The most effective is investment in airports, followed by roads, railways and seaports. Yet, in the long run, road infrastructure seems to be the one that has most effect on output, followed by investment in railways. Kim (1998) argues also that there exists a

[3] The nomenclature of territorial units for statistics (NUTS) subdivides the economic territory of the European Union into regions at three different levels (higher NUTS numbers refers to lower levels of territorial aggregation). LAU1 areal units were formerly known as NUTS4 regions.

[4] For a detailed review of computable general equilibrium analysis in transportation economics see Bröcker (2004).