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Infrastructure policy in the USA–Mexico border: Evaluation and policy perspectives

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ABSTRACT

This paper presents a case study of road infrastructure and its impact on accessibility and industrial productivity on the USA–Mexico border. The paper focuses on the analysis of three networks of projects that were presented in Protego (2007), a report prepared for the 35th US-Mexico Border Governors Conference in 2007. These projects comprise a series of local and interregional roads located in the western, central, and eastern areas of the border region. The analytical work uses the North American Road System Model (NARS), a GIS application to assess the effect of the infrastructure improvements on accessibility at different geographic scales. The impact of these accessibility gains on industrial productivity is also estimated. The results of the paper confirm the importance of road infrastructure in this region. They indicate that the productivity gains that can attributed to accessibility improvements are large enough to pay for the cost of new infrastructure during the life span of the project.

1. Introduction

This paper presents an evaluation of the road infrastructure needs and its impact on accessibility and industrial productivity on the USA–Mexico border. It is based on an integrated analytical tool that in-corporates the results of previous research on the linkage between road infrastructure and the economy in Mexico. In particular, we follow the work by Duran-Fernandez and Santos (2014a) who assessed different *attraction-accessibility measures* (AM) based on a GIS model of the North American road network (Duran-Fernandez & Santos, 2014b). Additionally, our framework is based on the results of Duran-Fernandez and Santos (2014c, 2014d), who conducted an econometric analysis and found a significant relationship between accessibility and the average product of labour (APL) in the manufacturing sector under different geographic scales.

The analytical framework that this paper proposes allows us to understand the effects of road infrastructure –in terms of its physical attributes-over Mexico's interregional, regional, and international accessibility. Moreover, it enables the prospective evaluation of road infrastructure projects in Mexico. We present an application of a toolkit for the evaluation of the effects of a major road infrastructure proposal for the USA–Mexico border region. The projects we evaluate are part of the transport infrastructure section of the report *Competitiveness and Areas of Opportunity in the Border Region* (Protego, 2007).[1] The report was published in 2007 and presented at the 35th Border Governors Conference, a permanent mechanism for the bilateral cooperation and coordination of public policy between the state governments of the USA–Mexico border.

The evaluation toolkit has three modules: the first module is based on the North American GIS road network model (Duran-Fernandez & Santos, 2014b), the second module is based on the AMs for North America (Duran-Fernandez & Santos, 2014a), and the third module is based on the econometric analysis of the

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[1] Work on the report *Competitiveness and Areas of Opportunity in the Border Region* was carried out between August and September 2007, as part of a summer internship programme with Protego-Evercore in Mexico City and the State Government of Sonora, host of the 35th Border Governors Conference. The author was responsible for the development of the methodology and the selection of the projects that were included in the final report. The final report was published as a policy document at the Border Governors Conference in October 2007. The author acknowledges the support of Protego-Evercore Partners, in particular Dr Pedro Aspe, Dr Fernando Aportela, and the Public Finance and Infrastructure Division.

spillovers of accessibility on the APL of the manufacturing sector in Mexico (Duran-Fernandez & Santos, 2014c). The first module translates modifications of the physical attributes of road infrastructure into improvements in travel times and a rearrangement of optimal routes (defined as the route that minimises travel times between any two points *i* and *j*), at local, regional, and international level. The second module estimates the effects of time savings on accessibility. The third module extrapolates the results of the econometric analysis to estimate how accessibility improvements are translated into economic benefits for the manufacturing sector in Mexico.

The USA–Mexico border is a dynamic region with a remarkable economic potential. The border states[2] have an extension of 920,761.9 sq km, with a population over 80 million. If the border states of Mexico and the USA were a country, it would be the fifth largest economy in the world. It is a strategic region for the Mexican economy due to the fact that it constitutes the most important link between Mexico and the USA market. Moreover, it has been one of the fastest growing areas in Mexico since the liberalisation of trade in the mid 1980s, and one the most important engines of economic growth for the whole country.

Having said that, transport infrastructure in the border area is not optimal, as it presents serious bottlenecks on the links between the Mexican and American road systems. This problem arises because neither the USA nor the Mexican road network was designed to handle the traffic flows that the commercial integration between these countries has generated since the NAFTA signature. In this context, the infrastructure proposal that we evaluate represents a serious attempt to identify the infrastructure needs of the region. Therefore, the evaluation provides important lessons that can be easily extrapolated to infrastructure policy in the rest of the country.

The rest of the paper is organised as follows. Section 2 describes the infrastructure projects evaluated in this paper. Section 3 introduces the methodological aspects of the evaluation toolkit. Section 4 presents the costs of the projects. Section 5 analyses three additional cases to explore further challenges implied by the projects as well as opportunity areas to improve their performance. Finally, Section 6 concludes with some policy recommendations and final remarks.

2. Road infrastructure needs for the border region

The Border Governors Conference is a permanent mechanism for the bilateral cooperation and coordination of public policy between the governments of the USA–Mexico border states. The Conference focuses on shared challenges of the border region for diverse areas such as education, energy, the environment, health, sanitation, security, transport, and water. Representatives from each of the member states meet regularly to analyse these topics in 14 technical committees. Their final objective is to propose policy recommendations for the problems that affect the region. Every year, the executive branches of the state governments sign a joint declaration that represents the commitment of each member to attend the policy recommendations of the committees. The agreements are reached by consensus, ensuring the cooperation and coordination of actions between the different political actors. In strict legal terms, however, the declaration is a non-binding agreement. Given the international character of the summit, representatives of the USA and Mexico federal governments as well as representatives of international organisations, such as the Border Environment Cooperation Commission (BEEC), the North American Development Bank (NADB), and the Inter American Development Bank (IAD), participate in these annual conferences as observers.

In September 2007, the 35th Border Governors Conference presented the report *Competitiveness and Areas of Opportunity in the Border Region*, referred hereon as the *Report*. The *Report* identified six major network projects that, if implemented, would increase the competitiveness of the region. These six projects contain 101 individual public works and 35 investment areas, including areas such as transport infrastructure, water supply, energy, sanitation, healthcare, and education. The selection of these projects followed a micro-level analysis of the infrastructure needs that the population and economic sectors of the border region are facing. For instance, the analysis considered the demand that the current demographic trends of the region will impose on infrastructure in the future. The report also identified the emergence of new industrial clusters, integrated across the region, and the implications that they will have for demand for physical infrastructure.

In the transport sector, the report recommended the execution of 26 major public works of road infrastructure; these works were grouped in three major clusters according to their geographic location. The projects include the construction of new motorways, which would improve the existing linkages between Mexico and the USA, the rehabilitation of the regional road network in both countries, as well as the enhancement of the crossing ports on the international border. In the sections that follow, we present a description of these transport projects. Fig. 1 presents the geographic location of the projects.

2.1. Western region

The projects of the western region are located in the states of Arizona (S204), California (S206), Baja California (S102), and Sonora (S126). The main project in this area is the rehabilitation of an interstate motorway between the regions of Hermosillo (R1098) and Tijuana (R1005). It comprises works in two sections of a road between Sonora (S126) and Baja California (S203) and the construction of a bypass in Mexicali (R1132).

This project is complemented by the widening of three carriageways that would link the enhanced route Mex02 with the I-8 motorway in the USA. These projects are located in Arizona (S204), Baja California (S203), and California (S206).[3] The renewed roads in Mexico would be upgraded to a *Road Type* (RT) A4 in optimal conditions.[4] In the USA, the target is to upgrade the roads to an RT equivalent to a limited access road.[5] The combined length of the road projects in this area is 948 km.

Finally, this set of projects includes improvements in ten crossing ports on the international border. Table 1 presents a

[2] Arizona (S204). Baja California (S102), California (S206), Chihuahua (S108), Coahuila (S205), New Mexico (S235), Nuevo Leon (S119), Sonora (S126), Tamaulipas (S128), and Texas (S248).

[3] Each geo-statistical unit was assigned a unique identification code. The codification follows the following rules: Mexican States: 'S1' followed by two additional digits, USA States: 'S2' followed by two additional digits. Mexican Regions: 'R1' followed by three additional digits, USA Regions: 'R2' followed by three additional digits. Each state and region mentioned in the following sections is followed by its unique identification code. The appendix at the end of the paper includes the maps that show each state and region as well as the Mexican and USA macroregions. The land ports in the USA–Mexico border were assigned a unique identification code: 'POE' followed by two digits.

[4] The classification of roads by Road Type (RT) follows the Statistical Handbook of Transport published by the Mexican Institute of Transport (Mexican Institute of Transport, IMT, 2000). A4: 4-lane paved road, 22 m width; A2: 2-lane paved road, 11 m width; B2: 2-lane paved road, 9 m width; C: 2-lane paved road, 7 m width.

[5] According to the Insurance Institute for Highway Safety (IIHS, 2007) a limited access road is defined as a multilane road with restricted access using exit and entrance ramps rather than intersections.