The Impact Of Borders On Road Infrastructure

Throughout the 20th century the world experienced the arrival of new technologies that shattered the way of living of billion humans. In particular the fast development of car industry has redesigned the landscapes and connections between cities. As a result, trade increased drastically in volume and led some countries to enter into an integrated market where borders aren't a hindrance anymore to the free movement of goods. However investment of road infrastructure seems still to be underprovided near the border because it requires agreement and investment from both sides of the border. In this context this raises the question of the impact of the borders on road infrastructures.

A quite broad literature has already investigated that question by using the volume trade as the explained variable to assess the impact of the border on it. The results vary in intensity across studies and geographical area but tend to converge in a significant impact.

The aim of this paper is to perform an econometric study of travel time by car between the main cities of two countries as a function of geographic distance and the border separating them. The volume of trade is not taking into account here and is replaced by the time needed the cross the distance. It will not only allow us to compute the "border effect" but also to identify its causes such as the quality of the roads and the sinuosity of the routes as explained later on. Using the data available on Google Map, the results show that crossing a border between Belgium and Netherlands increases the travel time by approximately 15.5% everything else being equal.

The goal of this paper is also to bring new findings to the topic. The main contribution is to provide precise results of the border effect by taking the routes between cities of only two countries. That could raise the accuracy of the results since only one border is involved in the opposite of the literature. This paper brings also new information by making the distinction between national and linguistic border. Having chosen Belgium permits us to do that subdivision by separating the country between Flanders and Wallonia where their regional language are respectively Dutch and French. The last contribution of this work is the fact that it takes also into account the effect of the traffic. Another distinction has been made here between the time with and without traffic in order to assess if more congestions are created near the border.

Overview of literature

In the literature several studies have covered the topic of the impact of borders on road infrastructures. Since the past 30 years some researches have been done focusing more on the effect on trade rather than the time travel to compute the impact. Transportation costs can be interpreted as a proxy of road infrastructures since the latter has an obvious impact on the former. In fact, transportation costs between two cities depend on cumulative investment in road infrastructures. The reason why there seems to be less investment near the borders could mainly be explained by political reasons. Some researches assume that politicians tend to underprovide infrastructure investment. The politicians or social planners only care about the utility of their domestic agent and therefore they find advantageous to provide less investments in areas that are peripheral to their own legislative territories. Plus the social planners are supposed to behave in a non-cooperative way since both sides need to invest even if

investment in any location can improve the utility of all agents around the world.

That being said it could be judicious to find to what extend is this statement true and to try to quantify it. Indeed, several studies have already provided some figures on this subject.

Some research papers suggest that trade costs are higher when border region are involved. According to Anderson and Van Wincoop (2003) the border between USA and Canada reduces international trade by a factor 4,7 compared to international trade. Another study made by McCallum in 1995 found that the national border between USA and Canada decreases trade by a factor of approximately 20, everything else equal. This shows that not only the results can vary from one study to another but also throughout time since the road infrastructures are evolving.

The border effect is not only observed between two countries but also within a country. A study based on 48 States of USA showed some disparities between and within regions. According to Tarasov and Felbermayr (2013) “a marginal increase in distance hurts significantly more for trade relations that involve only Border States than for trade relations involving only central locations” . That effect was estimated to be around 20% which is quite significant.

Concerning Europe, Nitsch (2000) demonstrated that there are 10 times more international trade than international on average. This conclusion is supported by another paper which also compared the relative volumes of intra versus inter-national trade everything else equal by using the gravity model which enables to control some variables such as the distance, the GDP of each countries, the industries…The results found are quite similar than the previous study made by Nitsch and suggest that in 2002 the countries of the EU traded about 6.5 times more inside the country than a foreign EU country.

Another paper in 2006 determined the border effect in France and Germany by using transportation flows within countries and the international trade. Everything else equal, it turned out that France traded 8 times more with itself than with other EU countries in the year 2002. The effect is less pronounced in Germany where the international trade is 3 times larger than the international one which shows that Germany is better integrated in the EU market than France. Moreover concerning Germany, data’s have been collected from 1998 to 2003 demonstrating that the border effect has not been decreasing during that period.

More recently a study made by the OECD used a different approach. Instead of only computing the cost of transport, they also took the travel time by car between the 10 biggest cities of 22 European countries. With a database of approximately 48000 observations, they evaluated the border effect by taking the time travel by car as the dependent variable and controlling for distance and population of cities. Moreover they also determined the causes of the border effect by making a distinction between the sinuosity and the lower speed which can reflect the quality of the road.

Indeed, they found that the distance by road is 9.7% longer for 2 cities involving a national border than 2 cities being in the same country when fixing the distance (as the crow flies) and some other variables. This means that the road are more sinuous when crossing a border and the results are significant at 1% level. Concerning the speed it has been found that national trips are around 5% shorter (faster) than international ones. In this case the sinuosity wasn’t taken into account here since the time was regressed on the distance by road and the result can be

explained by the quality because it has an incidence on the speed. Thus there seems to be a higher domestic quality of roads. Putting the 2 effects together (sinuosity and speed) we obtain that crossing a border in Europe increase the time travel by car by around 14% everything else being equal. The study has also shown that the size of cities (number of habitants) has a significant but very small impact on the time travel. An increase of 100% of the population would rise the travel time by less than 1%. In this case the impact is negative and quite negligible.

Some other papers have briefly contributed to the literature without entering too much into details. It has been found that although a new road infrastructure was built in the border areas between Spain and Portugal in the last decade, it appears that some road links are still missing and as a consequence the development impact in those regions are affected, which brings one more proof of the lack of infrastructure investment near the borders.

Other observations have been made between France and Spain. In fact traveling from Bordeaux to Toulouse takes 2 hours by either road or train. Concerning the travel from Toulouse to Barcelona which is only 50 km longer it takes 4 hours by road and 6 hours by train. It can be seen that adding a border increases the time travel relative to the distance which can be interpreted as a sort of underinvestment on road links between the 2 countries.

To conclude, many studies have been made about that topic and they seem to be a convergence of the results. Indeed, all of them have reported a significant and negative impact of the border.