Belt and Road initiative impact on bilateral trade flows: evidence from 123 partner countries through a Panel Egls Model

Impacto de la iniciativa de la Franja y la Ruta en los flujos comerciales bilaterales: evidencia de 123 países socios a traves de un Modelo Panel Egls

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Abstract

This study aims to assess Belt and Road Initiative (BRI) impact on bilateral trade between China and the partner countries. Thus, a Panel EGLS gravity model on data of 123 countries from 2012 to 2019 has been elaborated including standard gravity model variables as geographical and socio-cultural distance, local income. This model has been enhanced by introducing a dummy variable representing the membership of the partner country in the BRI and/or in WTO.

Results show that standard gravity variables have their usual effects, a negative impact of distance while local incomes and sharing a common language have a positive effect. WTO membership has a positive impact too on bilateral trade between the considered countries. BRI also has a positive impact on bilateral trade between China and partner countries, hence its benefits for both. This positive impact is higher in BRI main

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road's regions, Middle East, Europe, South and East Asia, while it lower in other regions as Latin America and North Africa.

Keywords: BRI – China – Bilateral Trade – Gravity model – Panel EGLS.

Resumen

Este estudio tiene como objetivo evaluar el impacto de la Iniciativa de la Franja y la Ruta (IFR) sobre el comercio bilateral entre China y los países socios. Por lo tanto, se ha elaborado un modelo de gravedad Panel EGLS con datos de 123 países de 2012 a 2019 que incluye variables del modelo de gravedad estándar como la distancia geográfica y sociocultural, el ingreso local. Este modelo se ha mejorado mediante la introducción de una variable ficticia que representa la membresía del país socio en el IFR y/o en la OMC.

Los resultados muestran que las variables de gravedad estándar tienen sus efectos habituales, un impacto negativo de la distancia, mientras que los ingresos locales y el hecho de compartir un idioma común tienen un efecto positivo. La pertenencia a la OMC también tiene un impacto positivo en el comercio bilateral entre los países considerados. La Iniciativa de la Franja y la Ruta también tiene un impacto positivo en el comercio bilateral entre China y los países socios, de ahí sus beneficios para ambos. Este impacto positivo es más fuerte en las regiones de las rutas principales, Medio Oriente, Europa, el Sur y Este de Asia, mientras que es menor en otras regiones como América Latina y el Norte de África.

Palabras clave: IFR – China – comercio bilateral – modelo de gravedad – Panel EGLS.

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1.- INTRODUCTION

The Belt and Road Initiative BRI, the New Silk Road or One Belt One Ring, is an important element in China's process of opening up to the world, motivated by social, political and economic reasons. Namely, financial and social integration, policy coordination and harmonization, barrier-free trade, promotion of transportation connectivity. Hence, it concerns stimulating the western regions and advancing China's strategic and geopolitical objectives (Russel & Berger, 2020). Constituting a large-scale project, it was initiated in 2013 by Chinese President Xi Jinping, representing the largest long-term investment project of transportation, pipeline, and telecommunication infrastructure, aimed at improving land and sea trade routes between China, Europe, the Middle East, and East Africa (Mengzi, 2019).

Indeed, the initiative mainly addresses the infrastructure construction plans connectivity and technical standards between countries along the Belt and Road (Chao & Hu, 2018). It also promotes the creation of a regional infrastructure network, and the establishment of an exchange and communication system, the coordination of strategies and policies for economic development and regional cooperation (Yiwei, 2017). This involves barrier-free trade, including the improvement of investment and trade facilitation, the elimination of barriers to investment and trade in relation to the regulations imposed by the WTO.

Furthermore, one of the main points of the initiative is the concept of the 21st Century's Maritime Silk Road, which aims to revolutionize high seas trade from Southeast Asia through Africa to Europe, and to put participating countries on the path of economic development through infrastructure develo-

pment along the coastline (Cai, 2017). Even if the importance of high-speed railroads and highways is undeniable, maritime transport still plays a primary role in terms of goods transport volumes. Therefore, on a global scale, the Maritime Silk Road is even more important than the "economic belt" encompassing the continents (Koboevic, Kurtela, & Vujicic, 2018).

Indeed, along the Belt, roads, rail links, dry ports, and industrial zones are being developed. On the roadside, seaports and their connections to overland trade routes are being renewed. The initiative work to connect more than 60 countries through physical, commercial, cultural and other links. These countries have a combined population of about 4.4 billion, representing 60% of the world's population (Oliveira, Murton, Rippa, Harlan, & Yang, 2020), 30% of the world's GDP and 40% of world trade.

The volume of trade between China and BRI countries is expected to reach highest levels (Konings, 2018). This is meant to be achieved by trade liberalization between these countries, better resource allocation and market integration, and the full involvement and coordination of the economic policies of the different countries along the road to create a balanced regional space that will benefit all parties (Rolland, 2015). Indeed, this initiative increases significantly transport connections between Asia and Europe, with potential consequences for international trade. It should be noted that trade between the countries involved accounts for more than a quarter of world trade, so better connections and the resulting lower trade costs could have a significant global impact (He, 2019). Thus, halving trade costs among BRI countries could significantly increase global trade for all countries in the region.

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Hence, this paper aims to assess the problematic of the impact of BRI establishment on bilateral trade flows between China and partner countries in the initiative. In order to answer this problem, a Panel data EGLS gravity model has been elaborated based on literature about trade agreement and their effects. The model has been applied to 123 partner countries part of the initiative and covers a period of time from 2012 to 2019.

The novelty in this study, besides taking into account recent years, is that it assesses the real impact of the BRI on bilateral trade instead of expected effects. Other originality is that the research includes 123 partners from all over the world without limit to a restrained region as well as taking into account the effects before and after integrating the initiative for each country and difference of effects between countries and regions.

2.- LITERATURE REVIEW

Belt and Road Initiative, as a trade agreement comprising several parties involves effects on the trade flows. It is more specifically the effects of creation and diversion of trade in relation to Viner's theory (Viner, 1950). He explains that free trade contributes to the well-being by allowing individuals to obtain goods and services from the least expensive source. Although, he adds that the agreements established between neighbour countries, in addition to being creators of trade within the zone, could induce business destruction (Lloyd, 1992).

The creator effect lies in the transfer of production from a high-cost internal source of supply to a lower-cost source belonging to the same agreement group. Furthermore, the destructive effect comes from the transfer of production from a low-cost source of supply located outside the group covered

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by the trade agreement to a high-cost source of supply in a member country of the group. In other words, commercial diversion occurs when commercial activity is diverted from countries outside the trading area to member countries (Harrison, Dalkiran, & Elsey, 2004).

Thus, Bhagwati (2008) suggests that the proliferation of trade agreements implies the appearance of ambiguity due to conflicting rules and commitments following the increase in customs duties and rules of origin due to adherence to several agreements at the same time. Thus, instead of promoting commerce, multiple memberships can lead to higher transaction costs due to a multitude of rules that accumulate.

In the case the Belt and Road Initiative, several studies have addressed the topic of its expect impact on the evolution of trade flows between China and the countries of the road. Most studies (Li, Lu, & Chen, 2020; Mahbub, 2021, among others), expected an increase in export and import flows of China following the among others establishment of the BRI. This increase is estimated by Baniya, Rocha, & Ruta (2019) around 4.1%, adding that these would be much larger for countries most exposed to new infrastructure and integrated into global value chains.

Another study of Foo, Lean, & Salim (2020) explores the potential effects of the initiative on ASEAN countries and China trade flows, using a gravity model from 2000 to 2016. Results of the study have shown that the initiative indeed enhance trade in the considered region. Authors add that BRI policy could be a promising mechanism for trade facilitation in these countries in the years to come (Foo, Lean, & Salim, 2020). Although, these studies are limited to few countries and don't cover recent years where the BRI initiative has expanded most.

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3. METHODS

3.1. Model elaboration

To assess the effect of the Belt and Road BRI initiative on bilateral trade flows between China and the other countries part of the initiative, a panel data gravity model is used. The bilateral trade flows in the original gravity model, elaborated by Tinbergen (1962) and Lindemann (1966), depends on 3 factors; distance between the two countries, origin country income and destination country income both represented by their respective gross domestic product. According to this model, distance has a negative effect on trade while origin and destination countries domestic product, that determines the size of their economies, have a positive effect (Frankel, Stein, & Shang-Jin, 1995).

Later on, this model has been augmented by integrating a positive effect of wealth, represented by GDP per capita instead of GDP, in origin and destination country and the existence of a common frontier (Frankel, Stein, & Shang-Jin, 1995). Other studies have also added a positive effect of sharing a common language between the two countries (Baier & Bergstrand, 2007). Thus, the mathematical formulation of the gravity model is written as follow:

$$TDF = f(Dist, GDPP_i, GDPP_j, Contig, Lang) \tag{1}$$

In its logarithmic form the equation is expressed as:

$$LTDF = C + \alpha_1 LDist + \alpha_2 LGDPP_i + \alpha_3 LGDPP_j + \alpha_4 Contig + \alpha_5 Lang + \varepsilon \tag{2}$$

From this equation we can add a dummy binary variable that takes 0 the years where the country is not part of the BRI and takes 1 from the year where the country becomes part of

the initiative. This approach has been used by Nguyen (2019) to assess the effect of regional trade agreements RTA on bilateral trade. We also add a control variable that represents the effect of World Trade Organisation (WTO) adhesion of the studied countries on bilateral trade as used by Rose (2004), tough we only need one dummy variable that takes 1 if the two countries are part of WTO and 0 if the second country is not, as China is part of the WTO in all the considered period.

Hence, the final equation is expressed as follow:

$$LTDF = C + \alpha_1 LDist + \alpha_2 LGDPP_i + \alpha_3 LGDPP_j + \alpha_4 Contig + \alpha_5 Lang + \alpha_4 WTO + \alpha_5 OBOR + \varepsilon \tag{3}$$

3.2. Data

Endogenous variable, bilateral trade flows in constant US dollars, is represented by TDF while exogenous variables include; Dist represent the distance between the two countries expressed in kilometres and is expected to have a negative effect while GDPPi and GDPPj represent, respectively, gross domestic product per capita, in constant US dollars, for china and the country part of BRI the two are expected to have a positive effect on bilateral trade (Frankel, Stein, & Shang-Jin, 1995).

Several dummy variables are included into the models. Contig takes the value of 1 in case of sharing a common frontier (contiguous), zero otherwise. Lang for sharing a common language, taking 1 if the two countries have a common first or secondary language, zero otherwise. WTO is a variable assessing that the two countries are members of WTO, taking value of 1, and zero to the reference group. Altogether, these variables are expected to have a positive effect over the dependent variable. Finally, the interest variable BRI stating that the second country

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is part of the BRI initiative, taking value of 1 in this case and zero otherwise, is expected to have a positive effect on bilateral trade flows.

Data covers a period of time from 2012, a year before the date of first country adhesion, to 2019 for 123 partner countries making a total of 983 observations. Data used to estimate the econometric model is taken mostly from CEPII database, for gravity variables. Although, bilateral trade data is taken from UN Comtrade database while World Bank's World Development Indicator WDI has been used for the GDPs data.

3.3. Preliminary tests

In order to assess the estimation method, we search first if the model accepts fixed or random effects. Chow test for fixed effects and Hausman test for random time effects were both non inconclusive. Though, Lagrange test for random cross section effects showed a probability less than 5% for the null hypothesis for all the indicators; Breusch-Pagan   value: 3249,47 / p=0,00, Honda value: 57,00 / p=0,00, King-Wu value: 57,00 / p=0,00).

Hence, the estimated model is a Panel EGLS with cross section weights. Estimations are realised using Eviews 12 program.

4. Results and Discussion

The model estimation shows a robust result with an Adjusted R-Squared of 0,87 and an F-Statistic of 980,56 while its probability p=0,00 rejecting the null hypothesis and confirming the relation between the endogenous variable and the exogenous ones. Residual tests shows that they are random as they follow normal law by Jarque-Berra test as the null hypothesis

of normal distribution is accepted (p>5%) and does not show heteroskedasticity problems nor a cross-sectional dependence as by Breusch-Pagan and Pesaran tests (p>5%).

Table 1: EGLS estimation results

Variables	Coefficient	Probability
Constant*	24,60*	0,00*
LDist*	-1,32*	0,00*
LGDPPi*	0,25*	0,05*
LGDPPj*	0,24*	0,00*
Contig	0,05	0,65
Lang*	2,25*	0,00*
WTO*	0,51*	0,00*
BRI*	0,14*	0,00*

Source: Own ellaboration using Eviews 12

As about individual effects, all coefficients are significant and correspond to their theoretical sign besides Contig variable whose coefficient is not significant, p>0,05 accepting null hypothesis, attesting that the existence of a common frontier is not important for the countries part of the BRI initiative in an era of globalization.

Standard gravity model variables confirm the negative effect of distance, coefficient = -1,31, on bilateral trade flows while the GDP per capita of China and the partners countries have a positive effect on them, respectively +0,25 and 0,24, the effect of each country income is close to each other. These results are compliant with the initial results of Lindemann (1966) and Tinbergen (1962). The existence of a common language between the two countries has also a strong positive effect, coefficient=+2,25, as per Baier & Bergstrand (2007) confirming the trade facili-

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tation procured by languages and supports China's language internationalisation strategy pursued in the last decades with the expected effects on its trade.

Estimation results also show that WTO entry for partner country has a significant and positive effect on bilateral trade. This result is consistent with those of Eicher & Henn (2011), among others, confirming that WTO membership for both countries, China being member in all the considered period, promotes a trade-creating effect as found by Larch, Monteiro, Piermartini, & Yotov (2019).

Regarding the BRI variable, the positive and significant coefficient, +0,14, implies that the initiative membership increases the bilateral trade flows between China and partner countries. This finding is close to the observations of Li, Lu, & Chen (2020), even if the empirical model did not include a BRI variable, authors concluded that China's import and export volumes to other countries are increasing, thus gradually surpassing the European and Asian developed economies, while shifting its trade center from the West to the East. Thus, China's position in the BRI trade territory is increasing due to its rapid and stable economic growth and its potential to export commodities to the BRI due to its huge economic scale and population (Li, Lu, & Chen, 2020) as seen per GDP per capita. It should be noted that this initiative has a more significant impact on trade relationship between China and South Asia (Mahbub, 2021) as seen by the distance variable. However, the reduction of transport costs and other facilitations allows BRI partner countries from all continents to benefit from the increased trade flows.

In fact, by studying the gradient of the estimated equation, we can note variations between countries or more notably between regions.

Figure 1: BRI coefficient divergence per region
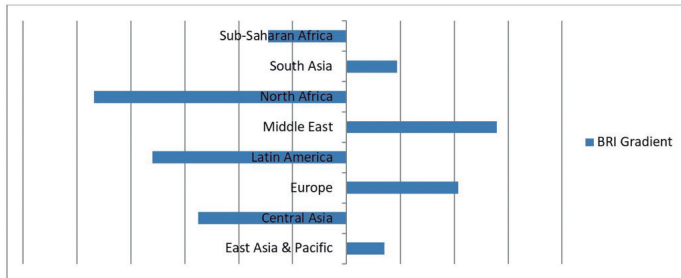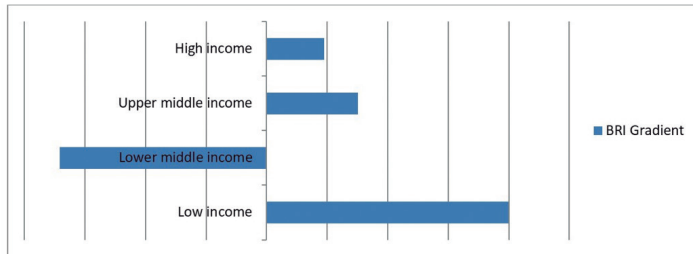
Source: Own elaboration

Figure 1 represents the average gradient from estimated BRI variable coefficient for each region countries. As expected, regions where major silk roads pass through have a higher coefficient, this is the case of Middle East, highest effect, that represent the historical main silk road followed by Europe that represent a main focus of China's trade and finally East Asia and South Asia. The effect in the last two regions is a little lesser than the two firsts as these two regions already were highly integrated with China's commercial before the BRI and had high trade flows with it.

In the other hand, most peripheral regions have a lesser coefficient. North Africa and Latin America have the lowest coefficient as they have not benefited from major BRI infrastructures. Paradoxically, Central Asia and Sub-Saharan Africa also have lower coefficients even though first one is part of one of the principal silk belt and the second one is destination of Maritime Silk Road.

Although, the BRI goals on Central Asia where the initiative were launched from Kazakhstan in 2013, is different and relies less on bilateral trade. This region is considered as the main

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road for China to access other markets, essentially Europe and Middle East. Most projects aim to develop Central Asian countries, especially their transport infrastructures, by massive foreign direct investments, international aids, loans and developing projects (Laruelle, 2018). These changes enhance inter and intra national exchanges in the region as well as helps for creating job opportunities for the concerned countries. Belt countries also receive transfer fee that could exceed 5 billion dollars a year for good passing through them to other markets. Finally, the new infrastructures help these countries to enhance their foreign direct investment attractiveness for other countries and enhance their trade other than with China (Yellinek, 2020).

In the other hand, some literature argues that effects of BRI are strongest after 2 years of participation which correspond to the period on investment and infrastructure implementation (Ma, 2022). These results explain the lower effect in some regions, mostly Sub-Saharan Africa, North Africa and Latin America, where most countries joined the initiative since 2 years or less, from the study period, which is the case of most Sub-Saharan and North African countries besides South Africa and Cameroun, since 2015, Egypt, since 2016, Kenya and Ivory Coast, since 2017. For Latin America for example, this effect is meant to grow stronger in the upcoming years as many infrastructure projects are expected. To reach this, more facilitation are needed from local governments to ensure a win-win trade and cooperation (Carrasco, 2021) and more effort from China's part to overtake historical trade power in the region (Montoya, Lemus, & Kaltenecker, 2020).

Figure 2: BRI coefficient divergence per income level

Source: Own elaboration

The effect difference of integrating the belt and road imitative between countries based onto classification by income level is shown in figure 2. As we can see BRI have a lower effect for lower middle-income countries and a higher effect in high, upper middle-, and low-income countries while it is the strongest in the latest. This result is close to the one of (Ma, 2022) that found, using a difference-in-difference methodology, that BRI enhances growth even more in low-income countries due to benefits from foreign direct investments FDI and trade.

5. Conclusion

This paper aimed to assess Belt and Road Initiative impact on bilateral trade flows between China and 123 partner countries, from all over the world. Literature on BRI showed an expected positive effect driven by transport cost reduction, business facilitation and infrastructure investments. These effects were mostly assessed for regional partners. Empirical tests suggested the use of a panel gravity model using an EGLS model.

Main findings have shown that all standard gravity factors have their usual effects, mainly a negative effect of geographical distance, a positive effect for cultural distance, assessed by

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language variable, and positive impact of domestic incomes. Although, the existence of a common frontier is no more effective in the context of BRI countries, especially in the era of internalization. It has also been demonstrated that access to World Trade Organization for partner countries increases their bilateral trade with China as they undergo more trade facilitations.

Belt and Road Initiative membership enhances bilateral trade between China and its partners part of the initiative. This is mainly, as shown in literature, due to trade facilitations and better transport infrastructures, both land and maritime ones. The increasing bilateral trade between China and partner countries will benefit both to develop their respective economies. These effects have been spotted in most major BRI destinations, namely East Asia, Middle East, Europe and South Asia while the effect is lesser in some important regions for the initiative; Central Asia and Sub-Saharan Africa, for different reasons tough.

Central Asia, start point of the BRI, is considered as a road to other major destinations, and thus its role in the initiative is not as a market for bilateral trade but more for transport logistic and trade facilitation infrastructures. Hence, the huge direct investment and aids from China to this region's countries, which get many benefits such as job opportunities, investment attractiveness and trade facilitations with other countries besides China. Although, these countries will reach a certain level of development that could make them create more benefits as a partner for bilateral trade with China.

As about Sub-Saharan Africa, main destination of the Maritime Silk Road, most of countries in the region joined the initiative since two years or less which explain the lower effect in this study. This effect is expected to rise from year to year

as investment and infrastructures of the project take effect and become productive. At full potential this region will become the road to other African countries and be the base of expansion of BRI in the continent. Therefore, China has all interest, besides the Maritime Road, to develop even more land transport infrastructures in the region to reach periphery countries that represent a huge consumption market.

The lesser effect of BRI has also been spotted for periphery regions as North Africa and Latin America. In the case of this last region many studies proved that economic relations with China have not changed after joining BRI but were just a continuation of existent trend (Jenkins, 2022) (Serano Moreno, Telias, & Urdinez, 2021). This statement confirms the results of this study, low coefficient for Latin American countries, as BRI coefficient assess the difference in trade flows before and after said country join the BRI. Although, this impact is expected to increase over time as opposite to FTA between Latin American countries and China that have a positive effect but decreasing over time confirming even more the necessity to work toward the success of BRI in this region (Lopez & Munoz, 2021). This statement is even more interesting when we know that China plays the role of intermediary in the indirect trade relations between the countries of Latin America and those of Central America and East and Southeast Asia, which is described as a trade network with a core-periphery structure. But is yet less central than the other global trade hubs, USA, EU and South-Eastern-Asia, and seeking for a more important place in global trade (Rojas-Mora, Chávez-Bustamante, & Mondaca-Marino, 2021).

China plays the role of intermediary in the so-called indirect trade relations between the countries of Latin America and the Caribbean and those of central America and East and Southeast Asia, which the authors describe as core and periphery.

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In the same sense, from study findings it has been demonstrated that BRI enhances bilateral trade even more with low-income countries that have usually low productive structure, average logistic infrastructures, and huge consumption markets. These countries represent a great opportunity to expand China's trade in developing countries, especially those that have not yet joined the initiative or still have a lesser role in it.

Finally, as we have seen BRI has great impact in most strategic countries and regions, thus China can exploit even more its economic strength to expand its commercial, economic, and political influence in the international economic system. This could be achieved by more financial and political effort from China, but also needs more cooperation from destination country to ensure bilateral benefits for both parts.

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