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GDAŃSK UNIVERSITY OF TECHNOLOGY

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THE IMPACT OF CHINA'S ONE-BELT ONE-ROAD INITIATIVE ON INTERNATIONAL TRADE AND GLOBAL VALUE CHAINS

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Abstract

This study examines the potential effects of China's "One-Belt One-Road" initiative (OBOR) on trade flows and global value chain connections. The empirical analysis is based on the augmented gravity model of international trade, which comprises 186 reporters and 199 partners in the period 2000-2018. We also estimate the gravity model for involvement in global value chains (domestic and foreign value added in exports and the value contributed by a partner to a reporter's exports). OBOR proves to be positively correlated with international trade and global value chains (GVC), while some of the corridors seem to be more beneficial than others (e.g. China-Pakistan, China-Mongolia-Russian Federation, and Bangladesh-China-India-Myanmar).

JEL: F13, F14, C23

Keywords: One-belt one-road, China, gravity trade models, global value chains

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1. INTRODUCTION

The “One-Belt One-Road” initiative (OBOR) was proposed by the Chinese government towards the end of 2013 to strengthen policy coordination, infrastructure connectivity, unimpeded trade, financial integration, and connections among people across countries along the Silk Road Economic Belt and the Maritime Silk Road (Office of the Leading Group for Promoting the Belt and Road Initiative, 2019). Formally, the 65 participating economies are located along six routes, or corridors (OECD, 2018).¹ The list of countries together with an illustration of the corridors is presented in Figure A1 and Table A1.

Since China is now considered the “world’s factory,” with intense engagement in international trade (accounting for 13.94% of global exports in 2018²), the expectation is that the OBOR strategy should increase trade between the participating countries (Yu et al., 2020). However, OBOR is not a traditional trade agreement like ACFTA but a plan for cooperation, involving among other things enhancement of investments, the establishment of an Asian Infrastructure Investment Bank, international settlement in RMB, and promotion of Chinese overseas direct investments (Huang, 2016). OBOR is thus also expected to have an impact on the participants’ engagement in global value chains (Ge et al., 2020). Considering that ASEAN was the first organization to respond to China's OBOR strategy and that the ACFTA established with China is also the most influential and longest-standing of China's free trade areas (established in 2002), it is not surprising that most research on the impact of Chinese participation in trade cooperation concentrates on the ASEAN region (Yang and Martizen-Zarzoso, 2014; Zhang and Wang, 2015; Foo et al, 2019). Yang and Martinez-Zarzoso (2014) examine the impact of the ACFTA on exports, focusing on trade creation and diversion effects in different sectors; Zhang & Wang (2015) consider the trade potential of China's exports to the ASEAN countries, while Foo et al. (2019) explore the potential effects of OBOR on trade flows, again restricting the scope to ASEAN countries and focusing on gross bilateral trade.

However, since OBOR is likely to affect not only the Chinese economy *per se* but all the participants and even the world economy, it will also create possibilities for global cooperation (Flint and Zhu, 2019 p. 95). So the perspective here is global, and the empirical analysis is not limited to China’s partners. The study goes beyond traditional trade analysis, taking account not only of gross trade but also of value added (based on decomposition of Wang et al, 2013) and value contributed by partners to the reporting country’s exports (based on Casella et al, 2019 methodology).

¹ Here we consider 65 countries as OBOR participants. But as of the end of January 2020, 138 countries and 30 international organizations had joined by signing cooperation documents with China to build OBOR jointly. (“Countries that have signed cooperation documents on co-construction of OBOR with China”, 2020)

² Own compilation based on the UN Comtrade database extracted through WITS

Our research objectives are: (1) to examine the impact of OBOR on global trade flows; (2) to analyze the impact of the various OBOR corridors on bilateral trade; and (3) to investigate the impact of the Belt and Road initiative on value-added trade and global value chains.

Our empirical analysis uses the augmented gravity model of international trade to examine 186 reporters and 199 partners from 2000 to 2018. The analysis applies either to exports or to imports, depending on the limits of the trade data.³ In any case, we posit that the impact of OBOR can differ according to the direction of trade.

The paper is structured as follows. Section 2 reviews the empirical literature dedicated to ACFTA and OBOR. Section 3 presents the data together with descriptive statistics showing trade trends. The empirical analysis, based on augmented gravity models, is shown in Section 4. Section 5 presents some extensions, and Section 6 concludes. We would like to emphasize that the analysis is accompanied with the data and STATA codes of all steps, which can help further research on this or related topics.⁴

We find that economics of scale, WTO, ASEAN, ACFTA, and the One Belt One Road initiative are all positively and significantly correlated with bilateral trade. Further, membership of WTO, ASEAN or ACFTA has a greater impact on bilateral trade than OBOR. As far as global value chains are concerned, we confirm that domestic and foreign value added in exports and value contributed by one country to another's total exports are positively influenced by OBOR. In addition, some OBOR corridors seem to be particularly beneficial (e.g. China-Pakistan, China-Mongolia-Russia, and Bangladesh-China-India-Myanmar).

2. THE LITERATURE: EMPIRICAL GRAVITY STUDIES ON ACFTA AND OBOR

The interest in China's participation in international trade is not new, and hardly surprising given the country's trade potential and extraordinary economic development, especially since it gained WTO membership. Further, China has become active in instituting cooperation with its trading partners, signing 17 free trade agreements as of December 2019, including ACFTA, CEPA, ChAFTA, ECFA, etc. (China Free Trade Zone Service Network, 2020). Chiefly because ACFTA has the longest history and the greatest influence, most researchers study the impact of this agreement on trade in the ASEAN countries and China. Representative works include Roberts

³ We decided to keep original data on exports and imports (not mirror data), which can differ in number of observations and values. For example China's exports to Poland in 2018 amounted to 2.09e+07 (thousand dollars), while Poland's imports from China came to 3.10e+07 (thousand dollars). The number of observations for exports was 371,361 and for imports 426,375. True, mirror statistics can solve a number of data problems, but they do not reflect the exact reality (<https://unstats.un.org/unsd/tradekb/Knowledgebase/50290/Mirrors-statistics>).

⁴ The data and Stata codes are available as Supplementary materials: https://zie.pg.edu.pl/opus_gvc/data-sources

(2004), Yang and Martinez-Zarzoso (2014), Sheng, Tang and Xu (2014), Zhang and Wang (2015), and Jiang and Huo (2015).

A pioneering study of ACFTA (Roberts 2004) confirmed that the gravity model is a good fit with trade flows within ACFTA. Subsequent research on ACFTA has mostly focused on trade creation and trade potential. Yang and Martinez-Zarzoso (2014) employ a multinomial PML approach to examine the impact of the ACFTA on exports, with particular emphasis on trade creation and diversion in different sectors. They show that ACFTA played a significant role in trade creation and the exports of sectors such as agriculture and major manufacturing. Given the global division of production and the increase in trade in intermediate products, Sheng, Tang and Xu (2014) analyze the effect of ACFTA on trade patterns between China and ASEAN from the perspective of components trade, estimating that ACFTA substantially stimulates trade between China and ASEAN. The ASEAN countries especially have close industrial linkages with China, so the positive effect is greater there. In addition to verifying the significant, positive effect of ACFTA on bilateral trade between China and the ASEAN countries, Jiang and Huo (2015) find that the export creation effect of China on ASEAN is more evident than the import creation effect, and the overall trade creation effect is decreasing. Zhang and Wang (2015) used a new economic mass proxy instead of GDP to analyze the trade potential of China's exports to ASEAN owing to the large share of intermediates in their trade. They use their results to divide the ASEAN countries into three types: huge potential (Brunei, Indonesia, Cambodia, Myanmar), still not fully developed potential (Philippines, Thailand, Vietnam) and fully developed but needing to recreate potential (Singapore).

As the OBOR initiative was first proposed in 2013 and is not a specific trade agreement like ACFTA but a cooperation strategy that needs time to deepen, not many empirical studies have yet examined its impact on trade.⁵ Interest in the topic has naturally grown along with the constant progress of OBOR in recent years. Among the more recent studies, Guo et al. (2017) demonstrate the positive correlation between participation in OBOR and China's oil imports; Ma et al. (2017) find that the OBOR strategy plays a major role in bilateral trade in agricultural products between China and Central Asia, and Foo et al. (2019) employ a gravity model to appraise the influence of OBOR on trade between ASEAN nations and China, concluding that the effect is positive and significant. More recently still, Yu L. et al. (2020) find that the initiative promotes China's export potential with the OBOR participants. They calculate China's export potential index for 73 trading partners in 2008-2016 and, using a difference-in-difference approach, compare the index for the

⁵ OBOR is assessed in the quantitative literature not only in terms of trade flows but also investment. Chinese overseas direct investments due to OBOR are examined by Du and Zhang (2018), transportation infrastructure by Yang et al. (2020), transportation routes by Wen et al. (2019), and general welfare by Zhai (2018).

B&R countries (treatment group) with that for the world's top 30 trading countries (control group) before and after the start of the initiative. Similarly, Yu C. et al. (2020) calculate a trade preference index between China and its partners, finding that it has risen faster for the OBOR than for the other countries. Finally, Liu et al. (2020) estimate the gravity model for China and 99 trading partners, augmented with variables for cultural and institutional distance. They conclude that distance hinders China's bilateral trade with the Belt and Road countries. Most of these studies, however, bear solely on gross bilateral trade. An exception is Kohl (2019), who uses value-added data in a GVC perspective to analyze the impact of reduction in trading costs (owing mainly to improved infrastructure and free trade agreements) on trade and welfare due to OBOR; European countries turn out to benefit less than other participating countries and China, but in any case OBOR has a greater effect than other free trade areas (RCEP and TPP).

Finally, in a very recent study Ge et al. (2020) analyze the linkage between regional institutions and GVC participation taking into account the possible differences between OBOR and non-OBOR countries. They find that institutions play an important role in GVC participation in both OBOR and non-OBOR countries, but their study is based on a relative few countries – 17 OBOR and 26 non-OBOR – and they do not adopt a bilateral framework but instead calculate a country-specific GVC participation index.

3. DATA AND DESCRIPTIVE STATISTICS

The data for this study is drawn from a variety of sources (see Table A.2 in Appendix). First, data on bilateral trade (gross imports and exports) come from the UN Comtrade database extracted through WITS. We merge this with gravity variables⁶ (including contiguity, bilateral distance, colonial relationship, same country before, common language) from CEPII and each country's current GDP and per capita GDP from the World Bank. Membership in specific regional agreements such as WTO, ASEAN, ACFTA, and OBOR (and which corridor in the latter) is taken from the official websites of these organizations and OECD (2018).⁷ The final dataset contains information on 186 reporting countries and 199 trading partners for the years 2000–2018 (see Table A.3 in Appendix for the descriptive statistics).⁸

Figure 1 presents the import trends of OBOR countries and the import shares of the various corridors. As China is part of all the corridors, we have separated it out as a single part, in order to get a clearer view of the shares of OBOR and the different corridors. Overall, the OBOR countries'

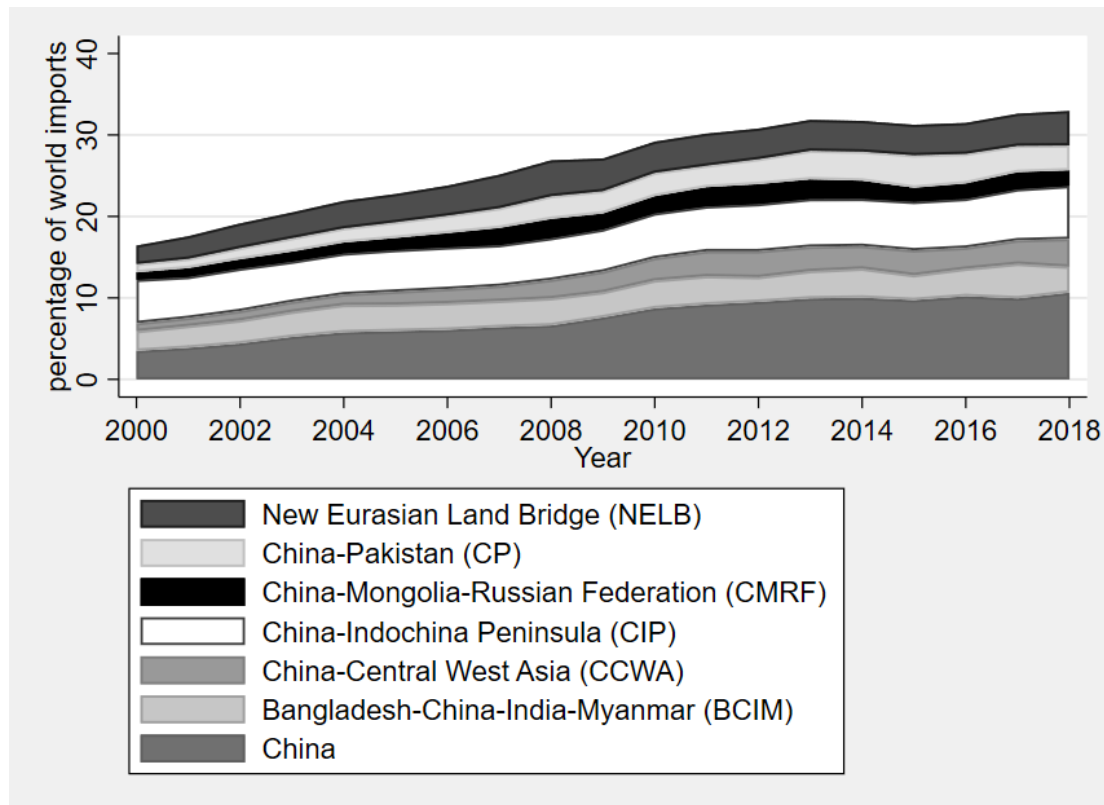
⁶ Gravity variables are not time-varying, so we extended the data from 2015 to 2018 based on CEPII.

⁷ WTO data were taken from CEPII (2000-2015) and the WTO website (2016-2018). For ACFTA, we set 2002, when the plan began to be phased in, as the turning point based on the ASEAN–China Free Trade Area Business Portal and following Zhang and Wang (2015).

⁸ The database and the STATA codes for all calculations are available in the Supplementary material.

share of global imports nearly doubled from 16.99% at the turn of the century to 34.41% in 2018, but this was primarily because China's share of world import rose from 3.51% to 10.66%. By corridor, China Indochina Peninsula (CIP) accounts for the largest proportion (6.50%), which explains why research has tended to concentrate on the ASEAN countries. By growth rate, however, China-Central West Asia (CCWA), China-Pakistan (CP) and China-Mongolia-Russian Federation (CMRF), all increased by more than 100%, and CCWA and CP tripled (from 1.03% to 3.05% and 0.98% to 3.42%, respectively). Figure 2 offers a similar illustration of the changes in exports. The OBOR countries' share of world exports increased from 20.75% in 2000 to 37.94% in 2018, thanks in part to the sharp rise in China's share from 4.31% to 13.94%. China-Indochina Peninsula (CIP) still has the largest portion (6.97%). Looking at growth rates, those turned in by China's central and western regions and the new Eurasian Continental Bridge are over 100%.

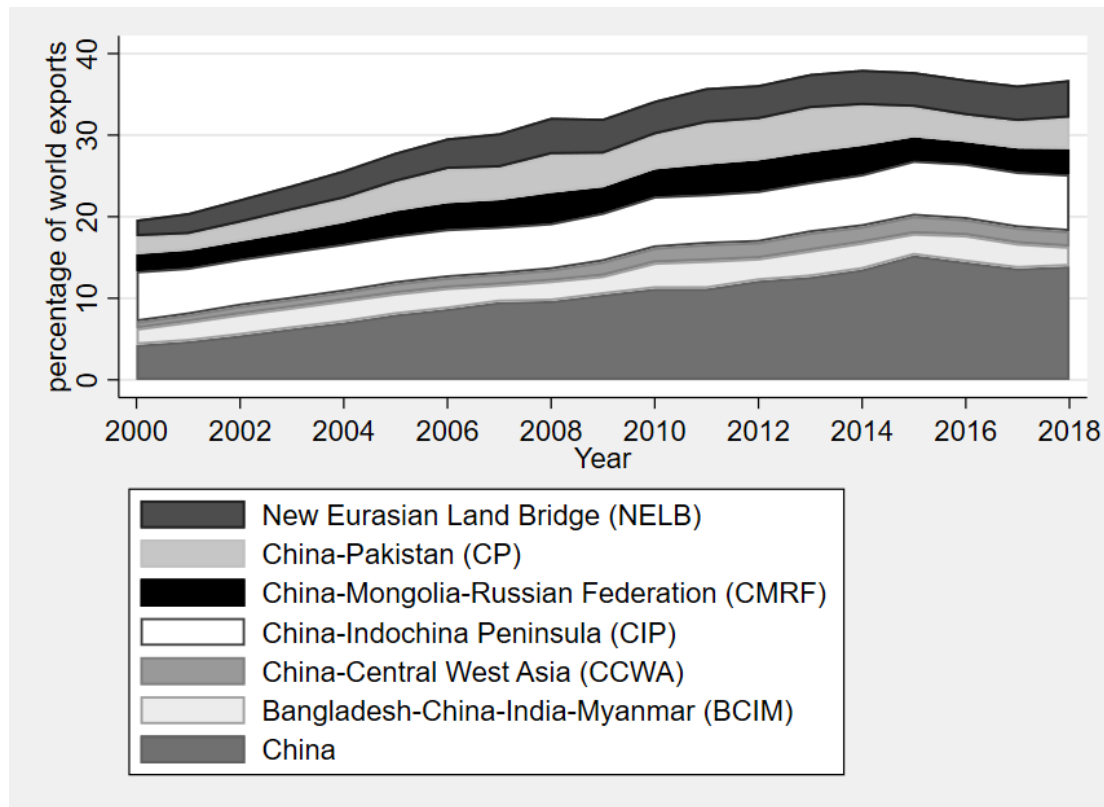
Figure 1. Share of economic corridors in world imports



Note: Since China is member of all the corridors, it is marked separately.

Source: own elaboration based on data from UN Comtrade database extracted through WITS.

Figure 2. Share of economic corridors in world exports

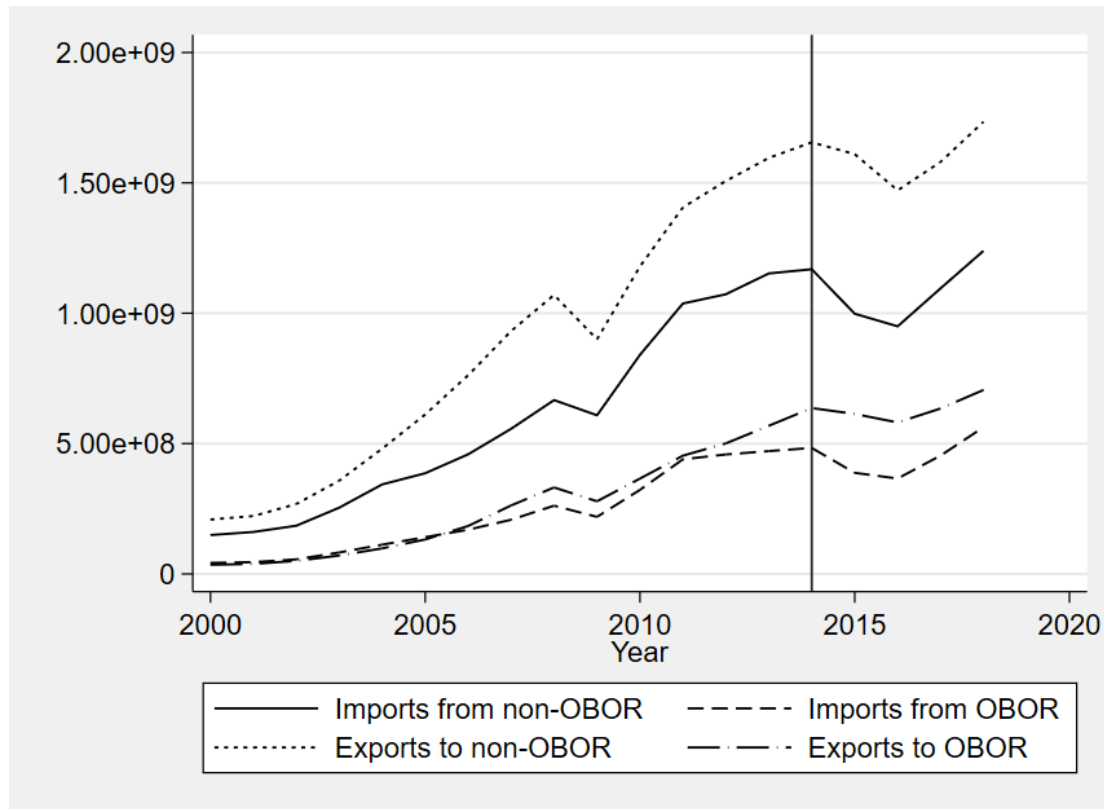


Note: Since China is the member of all corridors it is marked separately.

Source: own elaboration based on data from UN Comtrade database extracted through WITS.

Next, we examined trends in trade between China and OBOR and non-OBOR countries. Generally, both imports and exports increased rapidly and regularly between 2000 and 2018, except for a handful of years (2009, 2015 and 2016). However, in absolute terms the imports and exports of China and the OBOR countries are considerably smaller than those of non-OBOR countries. After the official implementation of the OBOR strategy in late 2013, the gap between Chinese imports and exports vis-à-vis the OBOR countries narrowed, while that vis-à-vis the non-OBOR countries remained broadly unchanged.

Figure 3. China's imports and exports vis-à-vis OBOR and non-OBOR countries: 2000-2018 (thousands of USD)



Note: The composition of non-OBOR countries is not constant over time. Missing countries and periods: Aruba (2006); Faeroe Islands (2000-2005); San Marino (2005-2006); Turks and Caicos Isl. (2002); Tuvalu (2000-2001). Source: own elaboration based on UN Comtrade database extracted through WITS.

Our empirical analysis will consider not only on gross trade but also different measures of value added. The value-added export data are extracted from the ADB-MRIO2018 database in UIBE GVC Indicators, which decompose gross bilateral trade into 16 parts based on backward linkage (Wang et al., 2013). Specifically, in the gravity equation we use domestic value added in exports (DVA) and foreign value added in exports (FVA) as alternative dependent variables. Data from ADB-MRIO2018 are bilateral trade data for 61 countries for 2000 and yearly in 2010-2017. Alternatively, as a measure of GVC we utilize the value contributed by a partner country in the reporter's total exports, from the UNCTAD-Eora Global Value Chain Database, which covers 178 reporters and 178 partners for 2000-2018. The GVC measures are merged with gravity data and data on GDP and GDP per capita (see Table A.3 in Appendix for the descriptive statistics).

4. EMPIRICAL ANALYSIS

4.1. The gravity model of international trade

In our empirical analysis, we employ the gravity model, widely used since Tinbergen (1964); for the theoretical foundation, see Anderson (1979). This model correlates bilateral trade directly with the respective economic size (GDP) of the reporter and partner countries and inversely with the distance between them.

The general formula of the gravity model can be written as:

$$X_{rpt} = \alpha Y_{rt}^{\beta_1} Y_{pt}^{\beta_2} Dist_{rp}^{\beta_3} \quad (1)$$

and usually expressed in log-log form:

$$\ln X_{rpt} = \alpha + \beta_1 \ln Y_{rt} + \beta_2 \ln Y_{pt} + \beta_3 \ln Dist_{rp} + \epsilon_{rpt} \quad (2)$$

where: r stands for the reporter country, p for the partner country and t for time.

X_{rpt} is trade between country r and p , i.e. exports of r to p in year t ;

Y_{rt} is GDP of country r in year t ;

Y_{pt} is GDP of country p in year t ;

$Dist_{rp}$ – geographical distance between country r and country p ;

ϵ_{rpt} - error term.

We estimate the augmented version of gravity model in the form:

$$\begin{aligned} \ln X_{rpt} = & \alpha + \beta_1 \ln GDP_{rt} + \beta_2 \ln GDP_{pt} + \beta_3 \ln GDPpc_{rt} + \beta_4 \ln GDPpc_{pt} + \beta_5 \ln Dist_{rp} + \\ & \beta_6 Lang_{rp} + \beta_7 Contig_{rp} + \beta_8 Colony_{rp} + \\ & \beta_9 Smctry_{rp} + \beta_{10} WTO_{rpt} + \beta_{11} ASEAN_{rp} + \beta_{12} ACFTA_{rpt} + \beta_{13} OBOR_{rpt} + \epsilon_{rpt} \end{aligned} \quad (3)$$

where:

$\ln X_{rpt}$ is log of exports of r to p or imports of r from p (1000 US\$) in year t ;

$\ln GDP_{rt}$ is log of reporter's GDP (current US\$) in year t ;

$\ln GDP_{pt}$ is log of partner's GDP (current US\$) in year t ;

$\ln GDPpc_{rt}$ is log of reporter's GDP per capita (current US\$);

$\ln GDPpc_{pt}$ is log of partner's GDP per capita (current US\$);

$\ln Dist_{rp}$ is log of distance between capitals (km);

$Lang_{rp}$ – Dummy taking value 1 if reporter and partner have common official or primary language, 0 otherwise;

$Contig_{rp}$ – Dummy taking value 1 if the two countries have a common border, 0 otherwise;

$Colony_{rp}$ – Dummy taking value 1 for countries that were ever in a colonial relationship, 0 otherwise;

$Smctry_{rp}$ – Dummy taking value 1 if the two countries were united in the past, 0 otherwise;

WTO_{rpt} – Dummy taking value 1 if reporter and partner are GATT/WTO members, 0 otherwise;
 $ASEAN_{rp}$ – Dummy taking value 1 if reporter and partner are ASEAN members, 0 otherwise;
 $ACFTA_{rpt}$ – Dummy taking value 1 if reporter and partner are ACFTA members, 0 otherwise.
 $OBOR_{rpt}$ – Dummy taking value 1 if reporter and partner are both members of OBOR, 0 otherwise.

Estimating gravity models presents a number of challenges, which we seek to overcome following best practices (see e.g. Head and Mayer, 2014; Yotov et al. 2016). Specifically, we address the problem of multilateral resistances by incorporating either directional (exporter and importer) fixed effects, as suggested by Feenstra (2016), or exporter-time and importer-time fixed effects, as recommended by Olivero and Yotov (2012). The problem of zero trade flows is addressed by applying the Poisson Pseudo Maximum Likelihood estimator (PPML) as recommended in the relevant literature (Santos Silva and Tenreyro, 2006). PPML should also solve the problem of the heteroscedasticity of trade data (Yotov et al. 2016). Additionally, as recommended by Yang & Martinez-Zarzoso (2014), time fixed effects are included so as to take account of macroeconomic background, i.e. cyclical effects. Next, Shepherd (2016) warns that severely underestimated standard error would arise by failing to take account of clusters (country pairs) in data with multiple levels of aggregation (bilateral trade data): he suggests distance as the clustering variable, because it is unique to each country pair and is the same for both directions of trade. Finally, we take the endogeneity of trade policy into account by incorporating country-pair fixed effects (Yotov et al. 2016). Of course, fixed effects can absorb other variables; for instance, the exporter-time and importer-time fixed effects (FE) will also absorb the size variables and all other observable and unobservable country characteristics, which vary across time, while the set of pair fixed effects will absorb all bilateral time-invariant covariates (e.g. distance). Consequently, we start with the OLS estimator, then panel FE, and finally apply a PPML estimator that deals with the zeros while controlling for multiple fixed effects (FE-PPML) (Correia et al., 2020).

4.2. The Results

4.2.1. Gross trade

First, we estimate eq. (3), where the dependent variable is either gross exports or gross imports, presenting the results obtained with OLS and FE estimators for the augmented model (Table 1). Most of the obtained coefficients are as predicted by the theory, with a positive correlation between bilateral trade and reporter's and partner's GDP (size measure) and a negative correlation with distance. The coefficients for the gravity variables indicate that countries with a common official language, contiguity, with a present or past colonial relationship, or once having been the same country have more bilateral trade. Similarly, countries that are members of WTO trade more. Since

the empirical work on China's cooperation in international trade to date has focused especially on the ASEAN countries, we add two variables to the model, namely ASEAN and ACFTA, but we fail to get consistent results with our three estimation methods. Finally, we can interpret the OBOR coefficient, which for most of the specifications is positive and statistically significant. The trade volume effect triggered by OBOR is not trivial; $\beta=0.206$ indicates that participating countries' bilateral imports are 20.6% greater; and exports are 21.6% greater ($[\exp(\beta)-1] \times 100\%$).

Table 1. Estimation results of the gravity model:
WTO, ASEAN, ACFTA and OBOR among independent variables, OLS/FE

	lnimports			lnexports		
	OLS	OLS	FE	OLS	OLS	FE
	(1)	(2)	(3)	(4)	(5)	(6)
lnGDP _{rt}	1.032*** [0.007]	1.216*** [0.065]	1.332*** [0.064]	1.272*** [0.008]	0.364*** [0.076]	0.598*** [0.072]
lnGDP _{pt}	1.187*** [0.007]	0.196** [0.079]	0.262*** [0.077]	0.865*** [0.007]	0.778*** [0.062]	0.761*** [0.057]
lnGDPpc _{rt}	-0.016* [0.009]	-0.567*** [0.069]	-0.541*** [0.067]	0.005 [0.011]	0.053 [0.079]	-0.098 [0.075]
lnGDPpc _{pt}	0.145*** [0.009]	0.064 [0.081]	0.107 [0.079]	0.034*** [0.010]	-0.262*** [0.065]	-0.123** [0.059]
lnDist _{rp}	-1.273*** [0.019]	-1.593*** [0.022]		-1.359*** [0.020]	-1.738*** [0.022]	
Lang _{rp}	1.024*** [0.042]	0.964*** [0.041]		0.861*** [0.044]	0.879*** [0.043]	
Contig _{rp}	0.584*** [0.128]	0.368*** [0.135]		0.847*** [0.120]	0.525*** [0.132]	
Colony _{rp}	0.748*** [0.112]	0.776*** [0.124]		0.760*** [0.115]	0.839*** [0.121]	
Smctry _{rp}	1.409*** [0.181]	1.062*** [0.170]		1.266*** [0.172]	1.021*** [0.168]	
WTO _{rpt}	0.563*** [0.032]	0.229*** [0.043]	0.069** [0.029]	0.519*** [0.033]	0.257*** [0.043]	0.047* [0.028]
ASEAN _{rp}	0.672** [0.282]	-0.253 [0.329]		0.672** [0.291]	-0.092 [0.298]	
ACFTA _{rpt}	0.774*** [0.147]	-0.559** [0.273]	0.086 [0.111]	0.778*** [0.168]	-0.526** [0.242]	-0.107 [0.067]
OBOR _{rpt}	0.077* [0.047]	0.202*** [0.034]	0.206*** [0.027]	-0.029 [0.047]	0.224*** [0.034]	0.216*** [0.026]
year	yes	yes	yes	yes	yes	yes
Reporter effects		yes			yes	
Partner effects		yes			yes	

Cluster (Dist)	yes	yes	yes	yes	yes	yes
N	406281	406281	406281	350634	350634	350634
R2	0.66	0.74	0.11	0.63	0.73	0.14

Notes: FE: fixed effects estimations when panel id=Reporter x Partner, * p<0.10, ** p<0.05, *** p<0.01

Source: own compilation

To deal with the problem of zero trade, we use the fast Poisson estimation with high-dimensional fixed effect (Correia et al., 2020). The results are shown in Table 2. For OBOR and WTO, they are similar to those in Table 1 with the first three fixed effects. However, the results for WTO and OBOR are not significant when time-varying country and country-pair fixed effects are both applied. In the light of the resulting coefficients (Columns 3 and 7 in Table 2), we can say that if both countries are members of OBOR their bilateral imports are higher by \$413 higher and exports by \$417 ($\exp(\beta) \times 1000$). For ASEAN and ACFTA, unlike the previous estimations, this one confirms that they play a significant positive role in promoting trade between the partners, and the effect is greater than for OBOR.

Table 2. Estimation results of the gravity model, WTO, ASEAN, ACFTA and OBOR among independent variables, fast Poisson estimation under high-dimensional fixed effect

	imports				exports			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
WTO _{rpt}	0.336***	0.249***	1.528***	0.184***	0.335***	0.216***	1.743***	0.079
	[0.049]	[0.041]	[0.257]	[0.060]	[0.057]	[0.044]	[0.232]	[0.067]
ASEAN _{rp}	1.339***		1.386***		1.517***		1.577***	
	[0.189]		[0.183]		[0.206]		[0.197]	
ACFTA _{rpt}	0.614***	0.445***	0.600***	0.067	0.808***	0.382**	0.795***	0.008
	[0.144]	[0.139]	[0.140]	[0.074]	[0.149]	[0.149]	[0.141]	[0.063]
OBOR _{rpt}	0.487***	0.259***	0.413***	0.017	0.505***	0.261***	0.417***	0.002
	[0.072]	[0.036]	[0.114]	[0.028]	[0.081]	[0.040]	[0.127]	[0.027]
year	yes	yes			yes	yes		
Reporter effects	yes				yes			
Partner effects	yes				yes			
Reporter#year effects			yes	yes			yes	yes
Partner#year effects			yes	yes			yes	yes
Reporter#Partner effects		yes		yes		yes		yes
Cluster	yes	yes	yes	yes	yes	yes	yes	yes
N	426375	424458	426374	424457	371361	368376	371361	368376

Notes: * p<0.10, ** p<0.05, *** p<0.01

Source: own compilation

4.2.2. Global value chains

Tables 3 and 4 show the results of the estimation of the same regressions, but with the additional dependent variable of domestic value added (DVA) obtained from ABD-MRIO2018 and

available for 61 countries in 2000, and then annually for 2010-2017. The coefficients of the most of the gravity variables are consistent with the traditional theory: negative correlation on distance, positive on common language, adjacency, and colonial relationship. However, the coefficients for GDP are not robust, possibly because that dataset is not continuous, lacking in particular the period 2001-2009, which saw a notable acceleration in global trade and economic growth. Finally, although the amount of domestic value-added are relatively small compared with total trade, the results for OBOR and WTO are generally significant and positive. On the other hand, ASEAN and ACFTA do not yield clear and significant results by OLS or FE estimation methods, but most of the results under PPML are positive and statistically significant (Table 4).

Next we replace domestic with foreign value added as dependent variable. The results remain similar; the coefficient we are most interested in, OBOR, is positive and statistically significant in the case of the PPML model with reporter-year and partner-year fixed effects.

Table 3. Estimation results of the gravity model for domestic value added (DVA). WTO, ASEAN, ACFTA and OBOR among independent variables, OLS/FE

	lnDVA		
	OLS	OLS	FE
	(1)	(2)	(3)
lnGDP _{rt}	0.910*** [0.012]	-0.661*** [0.112]	-0.649*** [0.111]
lnGDP _{pt}	0.773*** [0.012]	0.104 [0.118]	0.116 [0.118]
lnGDPpc _{rt}	-0.059** [0.025]	1.573*** [0.119]	1.576*** [0.117]
lnGDPpc _{pt}	0.083*** [0.025]	0.608*** [0.121]	0.611*** [0.120]
lnDist _{rp}	-0.948*** [0.030]	-1.082*** [0.034]	
Lang _{rp}	0.637*** [0.116]	0.278** [0.123]	
Contig _{rp}	0.613*** [0.134]	0.523*** [0.142]	
Colony _{rp}	0.374*** [0.140]	0.493*** [0.144]	
Smctry _{rp}	-0.295 [0.198]	-0.108 [0.190]	
WTO _{rpt}	0.245*** [0.082]	0.032 [0.034]	0.01 [0.029]
ASEAN _{rp}	0.09 [0.259]	-0.115 [0.201]	

ACFTA _{rpt}	0.349**	-0.047	-0.141
	[0.169]	[0.128]	[0.120]
OBOR _{rpt}	-0.316***	0.081**	0.053***
	[0.074]	[0.039]	[0.020]
year	yes	yes	yes
Reporter effects		yes	
Partner effects		yes	
Cluster (Dist)	yes	yes	yes
N	32938	32938	32938
R2	0.8	0.89	0.61

Notes: FE: fixed effects estimations when panel id=Reporter x Partner, * p<0.10, ** p<0.05, *** p<0.01

Source: own compilation

Table 4. Estimation results of the gravity model for domestic value added (DVA). WTO, ASEAN, ACFTA and OBOR among independent variables, fast Poisson estimation under high-dimensional fixed effect

	DVA			
	(1)	(2)	(3)	(4)
WTO _{rpt}	0.258***	0.245***	1.950***	-0.155
	[0.073]	[0.075]	[0.283]	[0.107]
ASEAN _{rp}	0.846***		0.874***	
	[0.203]		[0.201]	
ACFTA _{rpt}	0.583***	0.915***	0.514***	-0.164**
	[0.161]	[0.116]	[0.161]	[0.083]
OBOR _{rpt}	0.323***	0.024	0.383***	-0.035
	[0.100]	[0.043]	[0.141]	[0.033]
year	yes	yes		
Reporter effects	yes			
Partner effects	yes			
Reporter#year effects			yes	yes
Partner#year effects			yes	yes
Reporter#Partner effects		yes		yes
Cluster(Reporter#Partner)	yes	yes	yes	yes
N	32940	32940	32940	32940

Notes: * p<0.10, ** p<0.05, *** p<0.01

Source: own compilation

Table 5. Estimation results of the gravity model for foreign value added (FVA). WTO, ASEAN, ACFTA and OBOR among independent variables, OLS/FE

	lnFVA		
	OLS	OLS	FE
	(1)	(2)	(3)
lnGDP _{rt}	0.788*** [0.014]	-1.374*** [0.127]	-1.374*** [0.127]
lnGDP _{pt}	0.847*** [0.014]	0.474*** [0.122]	0.474*** [0.122]
lnGDPpc _{rt}	0.169*** [0.028]	1.931*** [0.133]	1.936*** [0.132]
lnGDPpc _{pt}	-0.084*** [0.026]	0.327*** [0.126]	0.332*** [0.125]
lnDist _{rp}	-1.066*** [0.032]	-1.155*** [0.035]	
Lang _{rp}	0.599*** [0.121]	0.240** [0.121]	
Contig _{rp}	0.505*** [0.148]	0.484*** [0.153]	
Colony _{rp}	0.335** [0.150]	0.559*** [0.149]	
Smctry _{rp}	-0.233 [0.229]	-0.2 [0.193]	
WTO _{rpt}	0.644*** [0.088]	0.058 [0.038]	0.012 [0.031]
ASEAN _{rp}	0.267 [0.311]	-0.003 [0.184]	
ACFTA _{rpt}	0.177 [0.231]	-0.197 [0.127]	-0.13 [0.128]
OBOR _{rpt}	-0.468*** [0.078]	0.051 [0.040]	0.071*** [0.022]
year	yes	yes	yes
Reporter effects		yes	
Partner effects		yes	
Cluster (Dist)	yes	yes	yes
N	32936	32936	32936
R2	0.77	0.89	0.59

Notes: FE: fixed effects estimations when panel id=Reporter x Partner, * p<0.10, ** p<0.05, *** p<0.01
Source: own compilation

Table 6. Estimation results of the gravity model for foreign value added (FVA). WTO, ASEAN, ACFTA and OBOR among independent variables, fast Poisson estimation under high-dimensional fixed effect

	FVA			
	(1)	(2)	(3)	(4)
WTO _{rpt}	0.380*** [0.077]	0.388*** [0.074]	1.883*** [0.441]	-0.133 [0.139]
ASEAN _{rp}	1.055*** [0.216]		1.067*** [0.215]	
ACFTA _{rpt}	0.714*** [0.178]	0.590*** [0.138]	0.679*** [0.175]	-0.139* [0.084]
OBOR _{rpt}	0.247** [0.108]	0.004 [0.034]	0.310** [0.156]	-0.059** [0.025]
year	yes	yes		
Reporter effects	yes			
Partner effects	yes			
Reporter#year effects			yes	yes
Partner#year effects			yes	yes
Reporter#Partner effects		yes		yes
Cluster (Reporter#Partner)	yes	yes	yes	yes
N	32938	32938	32938	32938

Notes: * p<0.10, ** p<0.05, *** p<0.01

Source: own compilation

Finally, Tables 7 and 8 show the regression results when GVC is measured as value contributed by a partner to reporter's total exports (source UNCTAD), for the years 2000–2018. For the two gravity model standard variables, we get results consistent with the theory: GDP positive and significant, distance negative and significant. Moreover, our other gravity variables (common language, adjacency, same state, colonial relationship) are significantly and positively related to our GVC reference variables ($VC_{p_IN_E_r}$). Finally, dummies for participation in free trade areas are positively and significantly correlated with the GVC measure in most of the specifications. Based on the coefficients for OBOR, when two countries belong to OBOR they contribute more value to each other's total exports.

Table 7. Estimation results of the gravity model for value contributed by a partner to reporter's total exports ($VC_{p_IN_E_r}$). WTO, ASEAN, ACFTA and OBOR among independent variables, OLS/FE

	$\ln VC_{p_IN_E_r}$		
	OLS	OLS	FE
	(1)	(2)	(3)
$\ln GDP_{rt}$	0.702*** [0.005]	-0.176*** [0.019]	-0.177*** [0.019]
$\ln GDP_{pt}$	0.754***	0.387***	0.382***

	[0.005]	[0.019]	[0.018]
lnGDPpc _{rt}	0.283***	0.160***	0.170***
	[0.006]	[0.021]	[0.020]
lnGDPpc _{pt}	0.103***	0.124***	0.137***
	[0.005]	[0.021]	[0.020]
lnDist _{rp}	-0.464***	-0.581***	
	[0.016]	[0.013]	
Lang _{rp}	0.178***	0.247***	
	[0.030]	[0.023]	
Contig _{rp}	0.984***	0.734***	
	[0.110]	[0.086]	
Colony _{rp}	0.863***	0.536***	
	[0.097]	[0.085]	
Smctry _{rp}	0.567***	0.651***	
	[0.151]	[0.118]	
WTO _{rpt}	0.186***	0.197***	-0.010*
	[0.019]	[0.016]	[0.006]
ASEAN _{rp}	0.415	0.026	
	[0.477]	[0.247]	
ACFTA _{rpt}	1.121**	0.219	-0.189***
	[0.444]	[0.225]	[0.073]
OBOR _{rpt}	0.080**	0.120***	0.248***
	[0.032]	[0.016]	[0.009]
year	yes	yes	yes
Reporter effects		yes	
Partner effects		yes	
Cluster (Dist)	yes	yes	yes
N	552483	552483	552483
R2	0.78	0.91	0.67

Notes: FE: fixed effect estimations when panel id=Reporter x Partner, * p<0.10, ** p<0.05, *** p<0.01

Source: own compilation

Table 8. Estimation results of the gravity model for value contributed by a partner to reporter's total exports ($VC_{p_IN_E_r}$). WTO, ASEAN, ACFTA and OBOR among independent variables, fast Poisson estimation under the high-dimensional fixed effect

	$VC_{p_IN_E_r}$			
	(1)	(2)	(3)	(4)
WTO _{rpt}	0.262*** [0.029]	0.186*** [0.022]	1.579*** [0.265]	0.133*** [0.047]
ASEAN _{rp}	1.389*** [0.187]		1.414*** [0.186]	
ACFTA _{rpt}	0.670*** [0.139]	0.347*** [0.066]	0.702*** [0.138]	0.055** [0.024]
OBOR _{rpt}	0.381*** [0.062]	0.280*** [0.044]	0.228*** [0.083]	-0.026 [0.026]
year	yes	yes		
Reporter effects	yes			
Partner effects	yes			
Reporter#year effects			yes	yes
Partner#year effects			yes	yes
Reporter#Partner effects		yes		yes
Cluster (Reporter#Partner)	yes	yes	yes	yes
N	598614	598614	598614	598614

Notes: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Source: own compilation

5. EXTENSIONS AND ROBUSTNESS

As an extension to the analysis, we check whether certain OBOR corridors are more important than others for the international trade relationship. The results are presented in Table 9, which considers only the PPMLHDFE estimations (the OLS/FE estimations are in the Supplementary materials, Table S1). The table shows a summary, namely parameters of each corridor obtained via different regressions, the corridors being included not simultaneously but one by one. The additional right-hand-side variables include WTO, ASEAN and ACFTA (not shown in the results), which are all statistically significant and positive. As to the various corridors, for both imports and exports there were consistent, positive, and significant results for China-Central West Asia (CCWA), China-Mongolia-Russian Federation (CMRF) and China-Pakistan (CP). Considering that CCWA and CMRF are located on the routes of the China Railway Express, which is regarded as the symbol of OBOR in promoting trade connectivity, we suspect that the railway itself is one of main reasons for promoting trade growth of countries along the line. CP is promoted as among the model OBOR projects owing to the traditional friendly relations between China and Pakistan. Major achievements have been made in infrastructure and energy facilities. (Engro Thar Coal Power Project, Gwadar Port, Karakoram Highway, Lahore Metro, etc.)

In addition, for Bangladesh-China-India-Myanmar (BCIM) and China-Indochina Peninsula

(CIP), most of the coefficients are positive and significant, and the few that are negative are not significant. Finally, for the New Eurasian Land Bridge (NELB) the results are not so clear. Combined with the actual construction progress of each economic corridor, we believe this is because the trade routes along the line have not fully realized certain facilities (the China Myanmar railway, the Boten–Vientiane railway, and others).⁹

Table 9. Estimation results of the gravity model, various economic corridors among independent variables, fast Poisson estimation under the high-dimensional fixed effect

	imports				exports			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
BCIM_{rpt}	0.488**	0.578***	0.038	-0.065	0.894***	0.614***	0.436*	-0.054
	[0.201]	[0.155]	[0.198]	[0.150]	[0.254]	[0.100]	[0.261]	[0.117]
CCWA_{rpt}	0.426**	0.404***	0.142	0.155**	0.531**	0.387***	0.229	0.09
	[0.189]	[0.090]	[0.211]	[0.066]	[0.207]	[0.057]	[0.230]	[0.067]
CIP _{rpt}	0.280***	0.320***	-0.043	-0.059	0.300***	0.348***	-0.073	-0.013
	[0.086]	[0.087]	[0.084]	[0.050]	[0.094]	[0.095]	[0.102]	[0.043]
CMRF_{rpt}	0.521**	0.088	0.562**	0.132**	0.667***	0.085	0.711***	0.170***
	[0.227]	[0.064]	[0.230]	[0.056]	[0.245]	[0.064]	[0.255]	[0.053]
CP_{rpt}	0.710***	0.412***	0.496***	0.231***	0.794***	0.409***	0.478**	0.097
	[0.166]	[0.085]	[0.185]	[0.064]	[0.201]	[0.098]	[0.209]	[0.081]
NELB _{rpt}	0.252	0.235***	-0.005	-0.044	0.295	0.168**	0.009	-0.107**
	[0.191]	[0.073]	[0.225]	[0.055]	[0.230]	[0.066]	[0.277]	[0.049]
year	yes	yes			yes	yes		
Reporter effects	yes				yes			
Partner effects	yes				yes			
Reporter#year effects			yes	yes			yes	yes
Partner#year effects			yes	yes			yes	yes
Reporter#Partner effects		yes		yes		yes		yes
Cluster(Reporter#Partner)	yes	yes	yes	yes	yes	yes	yes	yes
N	426375	424458	426374	424457	371361	368376	371361	368376

Notes: This table is a summary of the parameters of each economic corridor under various regressions, where corridors are not included simultaneously but one by one. The additional rhs variables include WTO, ASEAN and ACFTA (statistically significant and positive parameters), not included in the table for space constraints. * p<0.10, ** p<0.05, *** p<0.01

Source: own compilation

Next we perform the same exercise but with GVC measures as dependent variables. The results for DVA and the various OBOR corridors are presented in Table 10. In terms of domestic value added, BCIM, CMRF and CP are the corridors with positive and significant parameters in most specifications. For the New Eurasian Land Bridge corridor, it is not possible to show a positive

⁹ Information about the construction of specific projects comes from Belt and Road Portal (2020). <https://www.yidaiyilu.gov.cn/index.htm>

relationship with DVA. For FVA (Table 11), we can see that BCIM and CP are important for the promotion of linkages. But given that the database covers only 61 countries and lacks data for 2001-2009, it is not surprising that only a few corridors show significant and positive correlations. Most corridors showed positive correlations for value contributed by a partner to reporter's total exports (Table 12). We obtained consistent, positive, and significant results for the Bangladesh-China-India-Myanmar, China-Mongolia-Russian Federation and China-Pakistan corridors in most specifications.

Table 10. Estimation results of the gravity model for DVA, various economic corridors among independent variables, fast Poisson estimation under the high-dimensional fixed effect

	DVA			
	(1)	(2)	(3)	(4)
BCIM_{rpt}	0.708***	0.178*	0.655***	-0.001
	[0.202]	[0.095]	[0.218]	[0.127]
CCWA _{rpt}	-0.087	0.212***	-0.204	0.03
	[0.261]	[0.076]	[0.273]	[0.091]
CIP _{rpt}	0.046	0.236***	-0.196	-0.078*
	[0.128]	[0.083]	[0.132]	[0.042]
CMRF_{rpt}	0.429*	-0.187**	0.628***	0.048
	[0.220]	[0.081]	[0.204]	[0.057]
CP_{rpt}	1.052***	0.349**	0.960***	0.031
	[0.219]	[0.148]	[0.218]	[0.080]
NELB _{rpt}	0.011	0.062	-0.082	-0.092
	[0.238]	[0.102]	[0.273]	[0.062]
year	yes	yes		
Reporter effects	yes			
Partner effects	yes			
Reporter#year effects			yes	yes
Partner#year effects			yes	yes
Reporter#Partner effects		yes		yes
Cluster(Reporter#Partner)	yes	yes	yes	yes
N	32940	32940	32940	32940

Notes: as under Table 9.

* p<0.10, ** p<0.05, *** p<0.01

Source: own compilation

Table 11. Estimation results of the gravity model for FVA, various economic corridors among independent variables, fast Poisson estimation under the high-dimensional fixed effect

	FVA			
	(1)	(2)	(3)	(4)
BCIM_{rpt}	0.560**	-0.028	0.656**	0.06
	[0.259]	[0.042]	[0.294]	[0.067]
CCWA _{rpt}	-0.139	0.062*	-0.163	0.031

	[0.283]	[0.035]	[0.314]	[0.080]
CIP _{rpt}	-0.003	0.043	-0.098	-0.091**
	[0.103]	[0.079]	[0.122]	[0.046]
CMRF _{rpt}	0.319	-0.256*	0.515**	0.021
	[0.275]	[0.137]	[0.246]	[0.043]
CP _{rpt}	0.793***	0.153***	0.846***	0.134***
	[0.296]	[0.033]	[0.314]	[0.043]
NELB _{rpt}	0.175	0.115*	0.104	-0.118***
	[0.280]	[0.063]	[0.316]	[0.045]
year	yes	yes		
Reporter effects	yes			
Partner effects	yes			
Reporter#year effects			yes	yes
Partner#year effects			yes	yes
Reporter#Partner effects		yes		yes
Cluster(Reporter#Partner)	yes	yes	yes	yes
N	32938	32938	32938	32938

Notes: as under Table 9.* p<0.10, ** p<0.05, *** p<0.01

Source: own compilation

Table 12. Estimation results of the gravity model for value contributed by a partner to reporter's total exports (VC_{p-IN-E_r}), various economic corridors among independent variables, fast Poisson estimation under the high-dimensional fixed effect

	VC _{p-IN-E_r}			
	(1)	(2)	(3)	(4)
BCIM _{rpt}	0.816***	0.570***	0.487**	0.07
	[0.251]	[0.196]	[0.231]	[0.145]
CCWA _{rpt}	0.313**	0.405***	0.088	0.102*
	[0.157]	[0.132]	[0.142]	[0.060]
CIP _{rpt}	0.249**	0.276***	-0.068	-0.059
	[0.101]	[0.100]	[0.100]	[0.046]
CMRF _{rpt}	0.406*	0.260**	0.24	0.034
	[0.243]	[0.109]	[0.236]	[0.081]
CP _{rpt}	0.548**	0.265***	0.321	-0.072**
	[0.216]	[0.065]	[0.216]	[0.032]
NELB _{rpt}	0.446***	0.390***	0.18	0.041
	[0.171]	[0.129]	[0.178]	[0.059]
year	yes	yes		
Reporter effects	yes			
Partner effects	yes			
Reporter#year effects			yes	yes
Partner#year effects			yes	yes
Reporter#Partner effects		yes		yes

Cluster(Reporter#Partner)	yes	yes	yes	yes
N	598614	598614	598614	598614

Notes: as under Table 9. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Source: own compilation

Finally, having verified the relationship between OBOR and bilateral trade by a variety of estimation methods, we now run some additional robustness checks: a) changing the set of right-hand-side variables by excluding ASEAN and ACFTA; and b) additional estimations restricted to OBOR countries alone. These adjustments do not alter the results substantially, so our general conclusion stands. That is, the OBOR initiative has a positive and significant effect on bilateral trade.

6. CONCLUSIONS

Since the OBOR strategy was introduced, the constant improvement in transportation infrastructure and the development of a series of new trade routes (such as the China-Europe railway, the overseas e-mall, or bonded warehouses) have significantly strengthened the trade links between the participant countries. In addition, as China is the “factory of the world” and participates intensely in international trade, the OBOR strategy, as expected, also affects world trade flows. This study has applied the gravity model to examine the relationship between the OBOR initiative and bilateral trade flows on a global scale.

As the division of production labor within countries has been gradually replaced by the international division of production within global value chains, intermediate products have become an essential element in most countries’ foreign trade. OBOR also constitutes an investment strategy, embracing the establishment of investment banks for Asian infrastructure, settlement in RMB, and possibly increased foreign investment in China. We therefore expect all of these factors to impact on global value chains, and we have extended our research accordingly, adopting the perspective of value-added trade and global value chains. In order to resolve the calculation errors caused by multiple resistances, macroeconomic effects, endogeneity of trade policy, zero trade flows, and cluster effects, we have employed different estimation methods, including various fixed effects.

Our analysis yields three main conclusions. (1) First, notwithstanding the use of different estimation methods, in general we find a significant positive correlation between participation in OBOR and the volume of bilateral imports and exports. Similar relationships are indicated for DVA and FVA in exports, and for the value contributed to another country's total exports. (2) Second, the specific results indicate that WTO, ACFTA, and ASEAN are more important than OBOR in promoting bilateral imports or exports. However, when OLS or FE estimation is used the results for

ACFTA and ASEAN in GVC are unclear. (3) Third, of the six economic OBOR corridors, China-Pakistan, China-Mongolia-Russian Federation, and Bangladesh-China-India-Myanmar were found to play a major role in promoting gross bilateral trade and GVC. Considering that the China-Mongolia-Russian Federation corridor is located along the CR Express routes, symbolic of OBOR's function of promoting trade connectivity, we suspect that CR Express is one of the crucial reasons for promoting trade growth for the countries along it. Additionally, since a good many important infrastructure and energy facilities have already been completed in the CP and BCIM corridors, we expect that other corridors too will soon have a positive impact on trade, given the steady improvement in transportation infrastructure along the corridors.

Finally, it should be made clear that this study is based on general statistics covering all sectors. A natural extension of this work would be analysis of specific, individual sectors. Additionally, we recommend the general equilibrium model in which one can use the gravity coefficients for OBOR.

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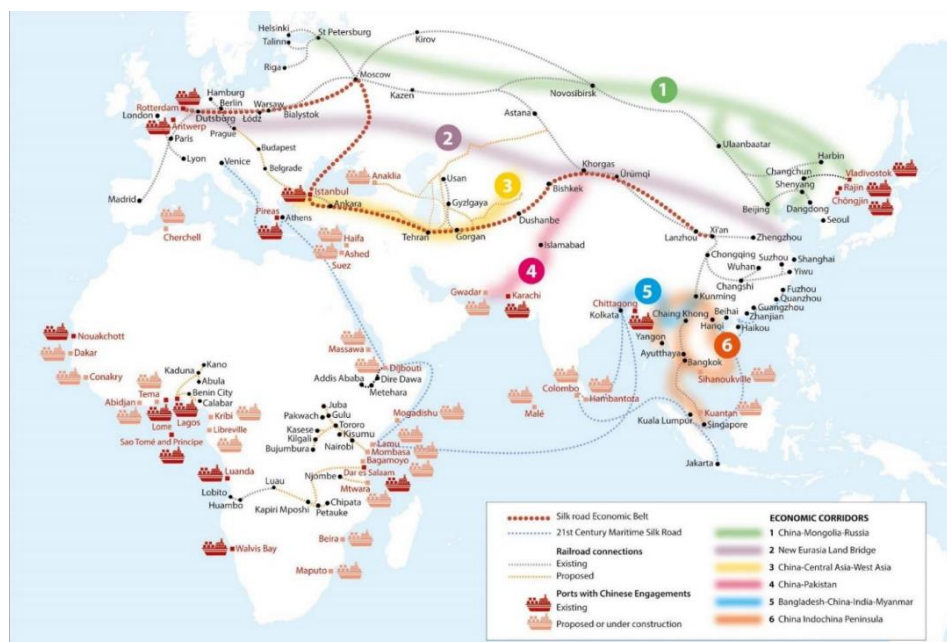
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APPENDIX

Figure A.1. One (land) one belt (maritime) road



Source: OECD (2018) (pp. 11).

Table A.1 Participating countries and economic corridors in OBOR

Economic Corridors in OBOR	Country Code (ISO3)
1 Bangladesh-China-India-Myanmar (BCIM)	CHN; BGD; BTN; IND; MMR; NPL; LKA.
2 China-Central West Asia (CCWA)	CHN; ALB; ARM; AZE; BIH; BGR; HRV; GEO; IRN; IRQ; ISR; JOR; KGZ; LBN; MKD; MDA; MNE; PSE; ROU; SRB; SYR; TJK; TUR; IKM; UZB.
3 China-Indochina Peninsula (CIP)	CHN; BRN; KHM; LAO; MYS; PHL; SGP; THA; VNM; TLS.
4 China-Mongolia-Russian Federation (CMRF)	CHN; BLR; EST; LVA; LTU; MNG; RUS.
5 China-Pakistan (CP)	CHN; AFG; BHR; KWT; OMN; PAK; QAT; SAU; ARE; YEM
6 New Eurasian Land Bridge (NELB)	CHN; CZE; HUN; KAZ; POL; SVK; SVN; UKR
Other members	EGY; IDN; MDV

Source: Own compilation based on OECD (2018) (pp. 9-12).

Table A.2 Data and sources

Variable	Definition	Data source	Time period
import	Gross imports from partner (1000 US\$)	WITS/ UN Comtrade/ HS1996	2000 - 2018
export	Gross exports to partner (1000 US\$)	WITS/ UN Comtrade/ HS1996	2000 - 2018
DVA	Domestic value added in exports	UIBE GVC Database/ ADB- MRIO2018/ index2	2000, 2010- 2017
FVA	Foreign value added in exports	UIBE GVC Database/ ADB- MRIO2018/ index2	2000, 2010- 2017
VC _p _IN_E _r	Value contributed by partner in reporter's exports	UNCTAD-Eora Global Value Chain Database	2000-2018
GDP	GDP (current US\$)	World Bank	2000-2018
GDPpc	GDP per capita (current US\$)	World Bank	2000-2018
Dist	simple distance between capitals (km)	CEPII	2000 - 2018
Contig	1=contiguity	CEPII	2000 - 2018
Lang	1=Common official or primary language	CEPII	2000 - 2018
Colony	1=Pair ever in colonial relationship	CEPII	2000 - 2018
Smctry	1 if countries were or are the same country	CEPII	2000 - 2018
WTO	1=Pair are GATT/WTO members	CEPII (2000-2015) WTO (2016-2018)	2000 - 2018
OBOR	1=Pair are OBOR members	OECD. (2018)	2000 - 2018
ASEAN	1=Pair are ASEAN members	Association of Southeast Asian Nations—ASEAN	2000 - 2018
ACFTA	1=Pair are ACFTA members	ASEAN–China Free Trade Area Business Portal Zhang, Y., & Wang, S. (2015)	2000-2018
Corridor	BCIM; CCWA; CIP; CMRF; CP; NELB	OECD. (2018)	2000-2018

Source: own compilation

Table A.3 Descriptive Statistics

VarName	Obs	Mean	SD	Min	Median	Max
lnimport _{rpt}	426341	7.284	4.439	-6.908	7.528	20.149
lnexport _{rpt}	364629	8.053	4.005	-6.908	8.222	19.989
lnDVA _{rpt}	32938	4.432	3.090	-8.664	4.696	12.620
lnFVA _{rpt}	32936	3.012	3.224	-10.340	3.344	11.535
lnVC _{p_IN} _E _{rt}	598351	6.357	2.936	-2.650	5.683	18.517
lnGDP _{rt}	452180	24.712	2.229	18.146	24.655	30.654
lnGDP _{pt}	441981	24.265	2.370	16.395	24.155	30.654
lnGDPpc _{rt}	452180	8.744	1.517	4.718	8.751	11.685
lnGDPpc _{pt}	441981	8.545	1.569	4.718	8.536	11.685
lnDist _{rp}	458287	8.675	0.817	4.088	8.873	9.899
Contig _{rp}	458287	0.019	0.137	0.000	0.000	1.000
Lang _{rp}	458287	0.154	0.361	0.000	0.000	1.000
Colony _{rp}	458287	0.015	0.123	0.000	0.000	1.000
Smctry _{rp}	458287	0.010	0.101	0.000	0.000	1.000
WTO _{rpt}	458287	0.682	0.466	0.000	1.000	1.000
ACFTA _{rpt}	458287	0.004	0.061	0.000	0.000	1.000
ASEAN _{rp}	458287	0.003	0.057	0.000	0.000	1.000
OBOR _{rpt}	458287	0.034	0.181	0.000	0.000	1.000

Notes: Data sources: WITS/UN COMTRADE, World Bank, CEPII, WTO, OECD BUSINESS AND FINANCE OUTLOOK 2018. Import/export: 186 reporters and 199 partners (2000-2018), DVA: 61 reporters and 61 partners (2000, 2010-2017), VC_{p_IN}_E_r: 178 reporters and 178 partners (2000-2018). The data is available as Supplementary materials: https://zie.pg.edu.pl/opus_gvc/data-sources

Supplementary materials to the paper:

**“THE IMPACT OF CHINA’S ONE-BELT ONE-ROAD INITIATIVE ON INTERNATIONAL
TRADE AND GLOBAL VALUE CHAINS”**

[Not to be included in the main text]

----- **DATA** -----

The original data comes from WITS, World Bank, CEPIL, WTO, UIBE GVC Database and UNCTAD-Eora GVC Database. For the exact data definition and source see Table A2 in the main text.

The data is freely available for research purposes, when using the data please for curtesy reasons cite our paper: Lu, Wolszczak-Derlacz (2020) *The impact of China’s One-Belt One-Road initiative on international trade and Global Value Chains*

https://zie.pg.edu.pl/opus_gvc/data-sources

----- **STATA CODES** -----

We provide all do files used for preparation of the article, specifically:

1. Data_Gravity_Gross trade.do (International trade Data)
2. Data_UIBE.do (DVA and FVA in trade)
3. Data_UNCTAD_Eora_GVC.do (Value contributed by a reporter in a partner’s total export)
4. OLSFE_PPMLHDFE_Regression.do (Figures, Descriptive statistics and Regressions)

The do files are freely available for research purposes, when using the do files please for curtesy reasons cite our paper: Lu, Wolszczak-Derlacz (2020) *The impact of China’s One-Belt One-Road initiative on international trade and Global Value Chains*

https://zie.pg.edu.pl/opus_gvc/data-sources

----- **ADDITIONAL ESTIMATIONS** -----

Table S1. Estimation results of the gravity model for total imports and exports, different economic corridors among independent variables, OLS/FE

	lnimport			lnexport		
	OLS	OLS	FE	OLS	OLS	FE
	(1)	(2)	(3)	(4)	(5)	(6)
BCIM _{rpt}	-0.770** [0.372]	-0.713* [0.377]	0.1 [0.170]	-0.761** [0.317]	-0.443 [0.299]	0.191 [0.154]
CCWA _{rpt}	0.123 [0.126]	0.580*** [0.108]	0.085 [0.074]	0.123 [0.130]	0.732*** [0.115]	0.148** [0.062]
CIP _{rpt}	-0.05 [0.203]	0.15 [0.165]	0.159 [0.119]	0.107 [0.197]	0.138 [0.160]	0.17 [0.109]
CMRF _{rpt}	1.213*** [0.331]	0.902*** [0.299]	-0.034 [0.123]	1.434*** [0.268]	0.787*** [0.256]	0.017 [0.143]
CP _{rpt}	-0.076 [0.288]	0.236 [0.266]	-0.201 [0.126]	-0.440* [0.236]	0.151 [0.224]	-0.234* [0.129]
NELB _{rpt}	1.192*** [0.145]	0.660*** [0.177]	0.053 [0.080]	1.171*** [0.147]	0.869*** [0.168]	0.103 [0.088]
year	yes	yes	yes	yes	yes	yes
Reporter effects		yes			yes	
Partner effects		yes			yes	
Cluster(Dist)	yes	yes	yes	yes	yes	yes
N	406281	406281	406281	350634	350634	350634
R2	0.66	0.74	0.11	0.63	0.73	0.14

Notes: This table is a summary of the parameters of each economic corridor from different regressions, where corridors are not included simultaneously but one by one. The additional variables include: WTO, ASEAN and ACFTA (they are statistically significant and positive), not included in the table due to the space constraints. FE: fixed effects estimations when panel id=Reporter x Partner, * p<0.10, ** p<0.05, *** p<0.01

Source: own compilation

Table S2. Estimation results of the gravity model for DVA, different economic corridors among independent variables, OLS/FE

	lnDVA		
	OLS	OLS	FE
	(1)	(2)	(3)
BCIM _{rpt}	-0.854** [0.348]	-0.348 [0.325]	-0.183** [0.083]
CCWA _{rpt}	-0.044 [0.159]	0.400** [0.182]	0.006 [0.074]
CIP _{rpt}	-0.061 [0.135]	-0.038 [0.135]	0.264*** [0.098]
CMRF _{rpt}	0.590** [0.265]	0.493* [0.270]	-0.194*** [0.044]

CP _{rpt}	-0.436*** [0.151]	-0.184 [0.185]	-0.206*** [0.018]
NELB _{rpt}	0.523*** [0.131]	0.474*** [0.127]	-0.154* [0.089]
year	yes	yes	yes
Reporter effects		yes	
Partner effects		yes	
Cluster(Dist)	yes	yes	yes
N	32938	32938	32938
R2	0.8	0.89	0.61

Notes: as under Table S1

Source: own compilation

Table S3. Estimation results of the gravity model for FVA, different economic corridors among independent variables, OLS/FE

	lnFVA		
	OLS (1)	OLS (2)	FE (3)
BCIM _{rpt}	-1.065*** [0.398]	-0.266 [0.368]	-0.136 [0.099]
CCWA _{rpt}	0.127 [0.195]	0.440** [0.194]	0.036 [0.071]
CIP _{rpt}	-0.038 [0.140]	0.038 [0.120]	0.246** [0.097]
CMRF _{rpt}	0.386 [0.310]	0.549* [0.295]	-0.226*** [0.060]
CP _{rpt}	-1.117*** [0.164]	-0.373** [0.190]	-0.207*** [0.019]
NELB _{rpt}	0.582*** [0.184]	0.428*** [0.138]	-0.222** [0.110]
year	yes	yes	yes
Reporter effects		yes	
Partner effects		yes	
Cluster(Dist)	yes	yes	yes
N	32936	32936	32936
R2	0.76	0.89	0.59

Notes: as under Table S1

Source: own compilation

Table S4. Estimation results of the gravity model for value contributed by a partner in a reporter's total exports (VCp_IN_Er), different economic corridors among independent variables, OLS/FE

	lnVCp_IN_Er		
	OLS	OLS	FE

	(1)	(2)	(3)
BCIM _{rpt}	-0.742** [0.339]	-0.352* [0.211]	0.204*** [0.077]
CCWA _{rpt}	-0.121 [0.093]	0.079 [0.058]	0.183*** [0.027]
CIP _{rpt}	0.285 [0.275]	0.047 [0.128]	0.005 [0.039]
CMRF _{rpt}	1.076*** [0.230]	0.479*** [0.172]	0.524*** [0.105]
CP _{rpt}	-0.813*** [0.207]	0.267* [0.156]	0.357*** [0.031]
NELB _{rpt}	2.332*** [0.137]	1.003*** [0.108]	0.231*** [0.029]
year	yes	yes	yes
Reporter effects		yes	
Partner effects		yes	
Cluster(Dist)	yes	yes	yes
N	552483	552483	552483
R2	0.78	0.91	0.67

Notes: as under Table S1.

Source: own compilation

Table S5. Estimation results of the gravity model for import and export, ASEAN and ACFTA not in the independent variables, OLS/FE

	lnimport			lnexport		
	OLS	OLS	FE	OLS	OLS	FE
	(1)	(2)	(3)	(4)	(5)	(6)
lnGDP _{rt}	1.033*** [0.007]	1.215*** [0.065]	1.332*** [0.064]	1.274*** [0.008]	0.362*** [0.076]	0.598*** [0.072]
lnGDP _{pt}	1.188*** [0.007]	0.197** [0.079]	0.262*** [0.077]	0.867*** [0.007]	0.779*** [0.062]	0.761*** [0.057]
lnGDPpc _{rt}	-0.018* [0.009]	-0.567*** [0.069]	-0.541*** [0.067]	0.002 [0.011]	0.054 [0.079]	-0.098 [0.075]
lnGDPpc _{pt}	0.143*** [0.009]	0.062 [0.081]	0.107 [0.079]	0.031*** [0.010]	-0.264*** [0.065]	-0.123** [0.059]
lnDist _{rp}	-1.280*** [0.019]	-1.581*** [0.021]		-1.367*** [0.020]	-1.728*** [0.022]	
Lang _{rp}	1.020*** [0.042]	0.968*** [0.041]		0.856*** [0.045]	0.883*** [0.043]	
Contig _{rp}	0.626*** [0.128]	0.353*** [0.135]		0.888*** [0.120]	0.515*** [0.133]	

Colony _{rp}	0.737***	0.778***		0.749***	0.840***	
	[0.112]	[0.124]		[0.115]	[0.121]	
Smctry _{rp}	1.403***	1.076***		1.259***	1.033***	
	[0.182]	[0.170]		[0.173]	[0.168]	
WTO _{rpt}	0.566***	0.228***	0.069**	0.523***	0.256***	0.047*
	[0.032]	[0.043]	[0.029]	[0.033]	[0.043]	[0.028]
OBOR _{rpt}	0.117**	0.190***	0.207***	0.013	0.214***	0.216***
	[0.047]	[0.034]	[0.027]	[0.047]	[0.034]	[0.026]
year	yes	yes	yes	yes	yes	yes
Reporter effects		yes			yes	
Partner effects		yes			yes	
Cluster (Dist)	yes	yes	yes	yes	yes	yes
N	406281	406281	406281	350634	350634	350634
R2	0.66	0.74	0.11	0.63	0.73	0.14

Notes: FE: fixed effects estimations when panel id=Reporter x Partner, * p<0.10, ** p<0.05, *** p<0.01

Source: own compilation

Table S6. Estimation results of the gravity model for import and export, ASEAN and ACFTA not in the independent variables, fast Poisson estimation under the high-dimensional fixed effect

	import				export			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
WTO _{rpt}	0.315***	0.254***	1.529***	0.184***	0.303***	0.222***	1.744***	0.079
	[0.050]	[0.041]	[0.258]	[0.060]	[0.058]	[0.045]	[0.232]	[0.067]
OBOR _{rpt}	0.641***	0.265***	0.635***	0.018	0.724***	0.268***	0.727***	0.002
	[0.086]	[0.036]	[0.128]	[0.028]	[0.099]	[0.041]	[0.145]	[0.027]
year	yes	yes			yes	yes		
Reporter effects	yes				yes			
Partner effects	yes				yes			
Reporter#year effects			yes	yes			yes	yes
Partner#year effects			yes	yes			yes	yes
Reporter#Partner effects		yes		yes		yes		yes
Cluster (Reporter#Partner)	yes	yes	yes	yes	yes	yes	yes	yes
N	426375	424458	426374	424457	371361	368376	371361	368376

Notes: * p<0.10, ** p<0.05, *** p<0.01

Source: own compilation

Table S7. Estimation results of the gravity model for import and export, countries restricted to OBOR participants, OBOR's countries as a reporter, OLS/FE

	Inimport			Inexport		
	OLS	OLS	FE	OLS	OLS	FE

lnGDP _{rt}	1.076*** [0.013]	1.302*** [0.082]	1.432*** [0.080]	1.383*** [0.013]	0.223** [0.091]	0.340*** [0.086]
lnGDP _{pt}	1.212*** [0.011]	0.068 [0.129]	0.267** [0.126]	0.899*** [0.011]	0.811*** [0.095]	0.700*** [0.088]
lnGDPpc _{rt}	-0.062*** [0.018]	-0.593*** [0.080]	-0.578*** [0.078]	-0.092*** [0.020]	-0.024 [0.087]	-0.076 [0.083]
lnGDPpc _{pt}	0.099*** [0.016]	0.095 [0.133]	-0.001 [0.129]	-0.051*** [0.016]	-0.365*** [0.099]	-0.121 [0.090]
lnDist _{rp}	-1.193*** [0.029]	-1.542*** [0.041]		-1.269*** [0.031]	-1.817*** [0.042]	
Lang _{rp}	0.645*** [0.098]	0.855*** [0.099]		0.884*** [0.092]	1.168*** [0.090]	
Contig _{rp}	0.993*** [0.183]	0.641*** [0.179]		0.915*** [0.180]	0.439** [0.175]	
Colony _{rp}	0.475** [0.196]	0.604*** [0.203]		0.671*** [0.212]	0.590*** [0.208]	
Smctry _{rp}	0.745** [0.316]	0.165 [0.315]		0.821*** [0.307]	0.485 [0.326]	
WTO _{rpt}	0.500*** [0.047]	0.173*** [0.053]	0.092*** [0.036]	0.476*** [0.048]	0.161*** [0.053]	-0.048 [0.036]
ASEAN _{rp}	0.739*** [0.279]	-0.058 [0.323]		0.835*** [0.271]	0.026 [0.304]	
ACFTA _{rpt}	0.619*** [0.153]	-0.287 [0.260]	0.048 [0.112]	0.482*** [0.143]	-0.371 [0.245]	-0.234*** [0.074]
OBOR _{rpt}	0.068 [0.050]	0.208*** [0.034]	0.195*** [0.032]	-0.119** [0.050]	0.085*** [0.032]	0.085*** [0.030]
year	yes	yes	yes	yes	yes	yes
Reporter effects		yes			yes	
Partner effects		yes			yes	
Cluster (Dist)	yes	yes	yes	yes	yes	yes
N	143033	143033	143033	133795	133795	133795
R2	0.65	0.74	0.15	0.6	0.73	0.21

Notes: FE: fixed effects estimations when panel id=Reporter x Partner, * p<0.10, ** p<0.05, *** p<0.01
Source: own compilation

Table S8. Estimation results of the gravity model, **countries restricted to OBOR participants, OBOR's countries as a reporter**, fast Poisson estimation under the high-dimensional fixed effect.

	import				export			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
WTO _{rpt}	0.167**	0.01	1.246***	0.107*	0.147**	-0.038	1.440***	0.078

	[0.071]	[0.050]	[0.245]	[0.059]	[0.072]	[0.054]	[0.209]	[0.065]
ASEAN _{tp}	1.256***		1.263***		1.450***		1.466***	
	[0.168]		[0.161]		[0.199]		[0.188]	
ACFTA _{tp}	0.862***	0.048	0.900***	-0.103	1.146***	-0.021	1.236***	0.069
	[0.128]	[0.153]	[0.124]	[0.084]	[0.164]	[0.167]	[0.174]	[0.137]
OBOR _{tp}	0.093**	0.114***			0.102**	0.119**		
	[0.044]	[0.042]			[0.050]	[0.047]		
year	yes	yes			yes	yes		
Reporter effects	yes				yes			
Partner effects	yes				yes			
Reporter#year effects			yes	yes			yes	yes
Partner#year effects			yes	yes			yes	yes
Reporter#Partner effects		yes		yes		yes		yes
Cluster (Reporter#Partner)	yes	yes	yes	yes	yes	yes	yes	yes
N	148340	147759	148340	147759	140487	139842	140487	139842

Notes: * p<0.10, ** p<0.05, *** p<0.01

Source: own compilation

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