‘Belt and Road’: The ‘China Dream’?

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Abstract

China is committed to a very ambitious infrastructure development project, referred to as the ‘Belt and Road Initiative’. This involves the implementation of massive infrastructure investments that, among other things, will reduce transportation costs. This paper employs a structural gravity approach to analyze how the reduction in transportation costs between China and the EU would change trade flows and consumer welfare in China, EU and the rest of the World. We also look at how these welfare improvements compare to the gains from signing shallow and deep free trade agreements with the EU, as well as analyzing how the BRI interplays with the US-led mega trade deals: TTIP and TPP. We evaluate the dynamics of the welfare changes. Finally, we estimate the impact of Chinese investment in BRI countries on global trade and welfare.

Our results indicate substantial gains from the BRI for China and the EU. A 30 percent reduction in transportation costs between China and the EU would increase the welfare of a representative consumer in China by 1.51 percent and the EU by 0.97 percent. Combining the BRI with a deep FTA would increase welfare by 4.90 and 2.94 percent respectively. Furthermore, the potential negative effect of the TPP on China is more than compensated by the BRI initiative. Chinese investment would further increase welfare of the countries along participating in this project.

Keywords*:* Belt and Road Initiative, China, Gravity model, trade, FDI, welfare

JEL Classification: F13, F14

I. Introduction

China's economic slow-down to a 'new normal' alongside shifting global trade policy around the mega-regional blocks provides an ideal backdrop for China to pivot towards the international stage[1]. The 'Belt and Road Initiative' (BRI) (also translated as 'One Belt One Road', OBOR) is unprecedented policy with Chinese investment in BRI countries exceeding $50 billion (Ministry of Commerce, China). There is little evidence of China seeking quick wins; instead this is a long-term strategy where they are seeking to gain control of strategic assets, which can often take the medium/long-term to turn a profit or their acquisition may be aligned with longer-term goals outlined in the succession of Chinese five-year plans (Liedtke, 2017). Observers have been quick to label this as a major policy shift, taking China into the heart of geopolitics and away from its previously risk-averse position (Xuetong, 2014)[2]. On the other hand, Chinese politicians are keen to emphasize that they are not seeking to establish spheres of influence[3].

While slogans and big ideas are familiar to the Chinese, policy makers outside China are struggling to understand what to make of this initiative. However, businesses have no such difficulties; they have been quick to understand the potential opportunities in terms of project investment, lowering trade costs and opportunities to exploit economies of scale through developing global value chains.

[1] The term mega-regional blocks refers to the Transatlantic Trade and Investment Partnership (TTIP), Trans-Pacific Partnership (TPP) and Regional Comprehensive Economic Partnership (RCEP).

[2] Referred to as moving from 韬光养晦 (keeping a low profile, KLP) to 奋发有为 (striving for achievement, SFA)

[3] Keynote speech given by Chinese President Xi Jinping at the opening ceremony of the Belt and Road Forum for International Cooperation (14 May 2017): Work Together to Build the Silk Road Economic Belt and The 21st Century Maritime Silk Road "*In pursuing the Belt and Road Initiative, we will not resort to outdated geopolitical manoeuvring.*"

However, policy makers are nervous and would like to see more extensive multilateral/plurilateral discussions[4]. Moreover, data from 2016 puts Chinese investment into the UK, France and Germany above that of all other BRI investments together (Ministry of Commerce, China and Rhodium Group). There is also concern that the BRI is being used as an alternative to Free Trade Agreements (FTAs), where these well-established trade arrangements bring a level of detail and certainty regarding the rules of the game (European Union, 2016). There is undoubtedly missing detail and this is making it even more difficult for some countries, and the EU in particular, to develop a strategic response (Le Corre, 2017). Moreover, this has stunted the development of empirical modeling literature.[5]

This paper conducts an empirical assessment of this Chinese-led policy. Our contribution is three-fold. Firstly, our assessment uses an emerging research framework of structural trade policy analysis (Head and Mayer, 2014; Anderson et al., 2015; Jackson and Shepotylo, 2017) to explore the potential impact of the BRI on China and the EU. Secondly, we model a range of scenarios such that we can understand the potential interaction of the BRI combined with other policy initiatives such as an FTA between China and the EU or US led initiatives such as TTIP and TPP. These additional scenarios provide useful benchmarks against which the gains of the BRI are measured. Third, we consider dynamics of the effect of FTA and BRI on trade. Fourth, we assess the importance of Chinese investment into the BRI

[4] Speech by Jyrki Katainen, Vice President of the European Commission at the Leaders' Roundtable of the Belt and Road Forum for International Cooperation (15 May 2-17) welcomed "*…commitments on behalf of China to free trade, multilateralism and sustainable development*." and mentioned the need for the BRI to be a "*open initiative"* (http://europa.eu/rapid/press-release_SPEECH-17-1332_en.htm).

[5] One of the very few empirical studies of this policy is by Garcia Herroro and Xu (2016).

countries as additional source of welfare gains and see how it interacts with reduction in trade costs and regional integration scenarios.

The BRI aims to reduce non-tariff barriers (NTBs) and transportation costs via infrastructure investment along the corridors, as well as opening up Chinese outward investment opportunities. Therefore, we model changes to trade costs and investment by separately estimating the impact of those two channels on welfare. Our framework permits us to model the effect of BRI-related policy decisions on social welfare through the plulateral reduction in trade costs and outward investment; isolating them from the impact via changes in productivity, labour mobility and capital market integration. Therefore, we construct a tractable model of global trade without compromising its general equilibrium features.

Our empirical strategy includes the following steps. First, the gravity model that accounts for zero trade flows and firm heterogeneity is estimated on a panel of 162 countries for the period 1960-2014, which allows us to gauge the long run elasticity of trade with respect to trade costs as well as the average effect of FTAs on trade flows. Second, we move to the structural gravity analysis developed by Anderson et al. (2015), where we compute the price effects of changes in trade costs and FTA formation associated with different policy scenarios, based on the general equilibrium global trade flows, using 2012 data as a benchmark. The relative merits of each scenario are examined from the standpoint of the welfare gains/losses of a representative consumer. Third, we estimate how foreign investments contribute to long run economic growth using a production function approach and re-evaluate

welfare gains, taking into account Chinese FDI inflows into the countries subscribed to the BRI program.[6]

We find that a reduction in transport costs between China and the EU would lead to considerable welfare gains for both parties. For example, a 30 percent reduction in transport costs would increase the welfare of a representative consumer in China by 1.51 percent and the EU by 0.97 percent. On the other hand, signing a deep FTA between China and EU would increase welfare by 2.77 and 1.81 percent, respectively. Whereas, a joint policy of reducing transport costs (via the BRI) and signing the (deep) FTA would increase welfare by 4.90 and 2.94 percent; larger than the sum of gains from the two separate policies. Therefore, the joint policy is super additive, such that it magnifies the gains from the separate policies.

On the other hand, a shallow FTA that lowers applied MFN tariffs between China and EU would only lead to a 0.54 percent increase in welfare for China and 0.16 percent increase for the EU. This suggests that the effect of a deep FTA is driven by the reduction of non-tariff barriers and, perhaps, due to reduction in trade policy uncertainty (Handley and Limao, 2015). Furthermore, the positive effect of BRI on China more than compensates for the potential negative effects of other mega initiatives that exclude China: TTIP and TPP. There is an overall increase in the global welfare from the BRI initiative, with a negative effect for South Asia and Sub-Saharan Africa countries. In broad terms, the welfare losses would be predominantly in low-income countries, where the rich countries would gain. Considering the dynamics of the effect of FTA on trade, we expect that the positive affect of FTA

[6] According to the Chinese Academy of Social Sciences, there are 65 key countries involved in the initiative (Appendix A).

between China and EU would accumulate over time and would help to achieve higher welfare gains of 4 percent for China and 2.5 percent for EU. Finally, the Chinese FDI channeled into BRI countries would increase the overall welfare by 0.57 percent.[7] These FDI inflows would make a difference for low and middle-income countries such as Ethiopia and Lao, where Chinese investment would considerably increase capital stock.

The rest of the paper is organized as follows. Section II discusses potential policy scenarios. Section III outlines the methodology and data, where Section IV discusses the results of the analysis. Section V performs robustness checks. Finally, section VI concludes.

II. Belt and Road Initiative

The recent political and economic history of China can be traced out with reference to a variety of slogans. Hu Jintao, General Secretary of the Chinese Communist Party (CCP) 2002-2012, focused on a domestic agenda with a view to creating a 'harmonious society' targeted on the 'China Dream'. The concept of the China Dream aimed to carefully balance individual innovation and ambition with the collective vision. In doing so, creating the Dream meant tackling the difficult issue of severe disparities between the poor western provinces and their richer eastern counterparts. During Hu's leadership, improvements were forthcoming but considerable work remained for Xi Jinping (General Secretary, CCP, 2012-to-date). On the back of

[7] These welfare gains were computed under assumption of 100 bln USD inflows of FDI into the BRI countries. Moreover, it does not assume an increase in the capital stock within China itself. If all plans of investing 3 trln. USD are implemented, the gains would be considerably larger.

China's strong economic performance, as China settled down to its 'new normal', Xi began to look towards the international stage, while he kept a keen eye on the west-east domestic inequalities. In 2013, Xi announced the very ambitious infrastructure development project, referred to as the BRI. This consists of two strands: The Silk Road Economic Belt - 'Belt'; The 21st Century Maritime Silk Road - 'Road'[8].

The BRI has been compared to the American strategy towards Western Europe and Japan in the aftermath of the Second World War; a so-called Chinese Marshall plan (Cheng, 2016). Whether or not this is a fair comparison (with the Chinese strongly rejecting the geopolitical motives suggested by the link) the potential disintegration of the US-Asia mega-regional bloc (from which China is excluded), the Trans-Pacific Partnership (TPP), offers China a great opportunity. The US position provides China with plenty of room to manoeuvre, particularly given that the BRI has already been years in the planning. Prior to the recent US elections, the situation for China was looking very different. They were facing the prospect of being outside the three mega-arrangements, which could have proved costly (Winters, 2015). Du (2016) goes so far as to compare the implications of the TPP and BRI, and in doing so highlights the competing nature of the two initiatives.

Therefore, the BRI also offers an opportunity for China to drive the international agenda as well as support the ailing 'Go West' initiative, by seeking to link western China to the central Asian economies. Moreover, we should not forget the pressing issue of maintaining strong levels of Chinese economic growth, where the slowdown

[8] The first edition of the policy was published in 2015: http://en.ndrc.gov.cn/newsrelease/201503/t20150330_669367.html and the Communist Party Charter was amended to include the BRI during the closing session of the 19th Communist Party of China National Congress (24 Oct 2017).

reflects improvements in China's development as well as the slow recovery of other countries from the financial crisis (Huang, 2016). This means dealing with productive overcapacity, developing Global Value Chains as well as seeking out new investment opportunities (Gasiorek and Lopez-Gonzalez, 2014). Additionally, the BRI dovetails with the promotion of the Chinese Renminbi (RMB), which policy makers hope to see become the dominant global reserve currency (Ito, 2017). At the same time, it will be important for China to avoid negative publicity of the type it received when investing in Africa (Shen, 2015). Furthermore, China is offering loans at concessionary rates, which are proving popular with the high interest rate countries along the belt and road; changes to these favorable rates may be necessary but unwelcome.

Political/conflict risks

While the BRI seeks to involve a massive 65 key countries and six corridors, the United States remains clearly outside its geographic focus. Each of the six corridors presents different challenges. For example, the China-Pakistan Corridor faces strong opposition from India[9]. Undoubtedly, there are important players that China needs to get on board to deliver key elements of the required infrastructure. Moreover, the BRI route includes numerous countries with medium-high risk of political unrest and/or conflict. This is a significant concern for China. Nevertheless, Chinese policy makers are keen to point out that China has no any desire to be involved in direct

[9] India has signed-up to the BRI but remains very hesitant and did not send a delegate to the recent Belt and Road Forum for International Cooperation in Beijing (May 2017).

(military-led) peace building[10]. In fact, there is a broader narrative around the role of Chinese policies, including the BRI and 'The New Type of Great Power Relations', in avoiding conflicts and military interventions that may arise from the increasing power of China[11]. In other words, China argues that it looks to utilize its economic strength to develop its discursive power to keep the peace (Zhao, 2016).

However, China's role in Africa's security architecture suggests that their long held position of non-interference is changing. China has substantial assets in regions facing serious security issues. This has led to substantial shifts in the nature of Chinese involvement in the UN Security Council. A further example is the Chinese involvement in brokering peace in South Sudan (Alao et al., 2017). This leads to questions as to whether these examples have been calculated trial runs for China as they consider a potential shift away from their non-involvement stance. China is certainly a newcomer to peace and security issues and as such has lots to learn. In the context of the BRI, there may be a growing acceptance that economic leverage will need to be accompanied by a relaxation of the non-intervention policy. Therefore, perhaps Africa is a testbed for intervention, which could be used on a larger scale along the belt and road. Alternatively, perhaps conflict will mean that China may change track and withdraw from further involvement in the economy.

[10] The speech by H.E. Ambassador Liu Xiaoming at the Royal College of Defence Studies (Chinese Embassy in UK) on 14 Nov 2014 summarises the Chinese policy of non-interference: http://www.fmprc.gov.cn/mfa_eng/wjb_663304/zwjg_665342/zwbd_665378/t1210811.shtml

[11] The prospect of potential conflicts is discussed in the context of power transition theory and referred to as "Thucydides trap". In addition, "The New Type of Great Power Relations" focuses on the G2, Sino-US relations, but has led to a more general debate on the countries considered to be great powers (Hao, 2015).

China-EU

All trade routes end in Europe, but Europeans remains deeply divided on the issue of the BRI. While China views European trade relations of key strategic importance, Zeng (2017) highlights the Chinese view of an EU capability-expectations gap resulting from the recent European financial, migration and political crises. While European business leaders are keen to exploit the inward investment that may come as part of the BRI, EU policy makers are deeply concerned[12]. For China, they will need to exercise caution so as not to repeat previous mistakes elsewhere in the world, where their investment became unpopular and unviable. In turn, Europe will need to convince the Chinese leadership that they are a future global power that can meet expectations.

In the case of Greece, one of the economically weakest EU members, Chinese investment is already extremely important and long-term in nature. However, there has also been a resurgence of the unpopularity of Chinese investment where it is viewed as taking over traditional Greek-owned industries such as shipping[13]. Chinese acquisitions are a EU-wide issue, where Chinese inflows of Foreign Direct Investment substantially outstrip EU-outflows to China (2016 figures from the Rhodium Group). One of the key reasons for Chinese success is that state-owned companies allow a much greater level of strategic planning of investments and the associated gains in terms of market access. In fact, the Chinese plan has a name:

[12] The EU is keen to push for plurilateral discussions as well as putting the BRI under the umbrella of the EU-China Connectivity Platform.

[13] In April 2016, the Greek state sold a 67% controlling stake of Piraeus Port Authority, the largest Greek port, to Cosco (Chinese government owned shipping company). The deal was met with protests from port workers. This was part of the terms of bailout but it conflicted with the governing Syriza Party's pre-election position against selling state-owned assets.

'Made in China 2025'. On the other hand, Germany has strong industrial-level relationships with China and is keen to use high-level trade missions to maintain and build Business-to-Business (B2B) links, although there are concerns about Chinese acquisitions of German companies[14]. This member state level support of international trade is likely to be on the increase, where trade and investment decisions go hand-in-hand. These member state level dialogues can be used to re-establish credibility. In terms of Chinese culture, moving the dialogue from the EU-level to member states is likely to yield success since personalized socially embedded networks typically underpin business relationships. However, the current situation presents a challenge for Europe. There is little appetite for turning away investment but there is an identified need for strategic oversight and planning of inward and outward investment, which underpins market access. The absence of large-scale state ownership across Europe limits the tools available.

In addition, negotiations are currently being held towards a China-EU Investment Agreement (which has been linked to the BRI), which may be followed by an FTA (Pelkmans et al., 2016). Skeptical observers may note that while the EU is attempting to broker a deal providing EU companies easier opportunities to investment in China, massive Chinese investment is already taking place in the EU. Of course, China already has access to the EU market via the Bilateral Investment Treaties (BITs) with individual member states. On the other hand, the EU doesn't

[14] Cora Jungbluth, project manager at the Bertelsmann Stiftung, a German think-tank, and an expert on Chinese investment in Germany was quoted in the Financial Times (*Chinese investment in EU dwarfs flow the other way*, 10 Jan 2017) as saying "The key German aim in these talks is reciprocity — improving German companies' access to the Chinese market and freeing them from the obligation in certain sectors to form joint ventures with local partners…The talk about limiting Chinese investment in Germany is just populist rhetoric."

have good access the Chinese market under these, largely outdates, agreements. Furthermore, EU-wide investment deal would require China to agree to concessions, which are considered unachievable in the short-run (Pelkman, 2016). Therefore, the Investment Agreement and FTA are not likely to be agreed in the near future. This has led come to view the BRI as the Chinese alternative to the China-EU FTA.

III. Policy scenarios

We refer to a 'core' group, which will be expected to be most involved in the initiative and have the highest likelihood to experience direct impacts from the policy. According to the Chinese Academy of Social Sciences, there are 65 key countries involved in the initiative (Appendix A). In addition, the EU member states are incorporated into our core group. One justification for this inclusion is that the New Eurasian Land Bridge (also known as the New Eurasian Continental Bridge), linking China to Western Europe. Furthermore, the EU (EU-China Round Table at EESC: Joint statement on innovation, rural development, 'One Belt, One Road' and investment, May 2016), alongside individual member states such as Greece (China-Greece Joint Statement on Strengthening a Comprehensive Strategic Partnership, July 2016), have already issued formal joint statements linked to the BRI. Nevertheless, we should not confuse the core group with leadership of the initiative; China is very clearly at the helm, with Chinese-only membership of the 'Advancing the Development of the One Belt and One Road Leading Group' established in February 2015.

One of the important pillars of the BRI is the investment in infrastructure along the six corridors, with the objective of lowering transport costs. 'The New Eurasian

Land Bridge' focuses on rail links between China and Europe, where potential cost reductions may arise from reducing the number of checks and addressing issues regarding break-of-gauge. On the other hand, 'The China – Mongolia – Russia Corridor' covers rail and road links with potential reductions in clearance times as well as faster international road freight routes (replacing rail links). Thirdly, 'The China – Central Asia – West Asia Corridor' covers Kazakhstan, Kyrgyzstan, Tajikistan, Uzbekistan, Turkmenistan, Turkey and Iran; focusing on energy trade, including gas and oil pipelines. 'The China – Indochina Peninsula Corridor' primarily covers rail, road and air links. However, 'The Bangladesh – China – India – Myanmar Corridor' has a broader agenda including transport, investment and people development. Finally, 'The China – Pakistan Corridor' refers to highways, railways, energy pipelines and digital infrastructure. In summary, each corridor is the subject of separate discussions/negotiations, making the BRI a complex set of arrangements. Nevertheless, the central approach is to cut transport costs. Therefore, these cost reductions provide the basis for our BRI scenario. We account for the complexity and uncertainty of the arrangements by considering a range of China-EU transport cost reductions and estimating the associated welfare impacts.

The following additional scenarios have been constructed to shed light on a number of important issues, particularly given the uncertainty regarding the future of the TPP and TTIP blocs. This uncertainty increases the likelihood of the BRI plus a China-EU FTA. The FTA may be considered as shallow where tariffs are reduced to zero. Alternatively, a deep FTA additionally assumes the harmonization of non-tariff regulations with commitments on services. This range of scenarios permits the benchmarking of possible welfare impacts.

We define and label potential trade policy scenarios as follws.

1. BRI infrastructure projects - reduction in transport costs (BRI)
2. China-EU deep FTA (EU FTA)
3. BRI and China-EU deep FTA (BRI&EU FTA)
4. BRI and tariff reduction shallow FTA (BRI&NoTariff)
5. BRI and TPP (BRI&TPP)
6. BRI and TTIP (BRI&TTIP)

In addition, we estimate the impact of Chinese FDI into the 'core' group BRI countries and re-evaluate welfare gains based on updated income levels. We discuss these results in a separate sub-section on FDI and welfare.

IV. Methodology and Data

The underlying model for our analysis is a structural 'new trade theory' model (Helpman et al., 2008), which captures selection into positive bilateral trading partners and the effect of trade policy on extensive and intensive margins of trade. As pointed out by Head and Mayer (2014), the structural gravity model is consistent with a wide class of models, including Armington (1969), Krugman (1980), and Melitz (2003). This model has been used to estimate the effect of preferential trade agreements (Egger et al., 2011).

Model

Consider a world economy consisting of countries $i = 1 \dots N$, each having a mass N_i of heterogeneous firms. Firms differ in productivity drawn from a known distribution $G(\varphi)$ over support $[\varphi_{min}, \varphi_{max}]$. Each firm produces a differentiated

product facing a residual, downward-sloping demand curve where the elasticity of substitution across varieties is σ. Preferences are identical across all countries, but countries differ in size. In order to export, each firm has to pay country-pair specific fixed costs, f_{ij}, and variable trade costs, τ_{ij}. This model specification follows Helpman et al. (2008). It captures zero trade flows, models country level heterogeneity, and offers decomposition of trade at extensive and intensive margins, which allows us studying the effect of trade policy on both margins.

This model leads to a structural gravity representation:

$$X_{ij} = \frac{Y_i E_j}{\Omega_i P_j} \tau_{ij} \quad (1)$$

where X_{ij} is exports from country i to country j, $Y_i = \sum_j X_{ij}$ is total income in country i and $E_j = \sum_i X_{ij}$ is total expenditure in country j. $\Omega_i = \sum_j \frac{\varphi_{ij} E_j}{P_j}$ is outward multilateral resistance and $P_j = \sum_i \frac{\varphi_{ij} Y_i}{\Omega_i}$ is the inward multilateral resistance term.

We model τ_{ij} as

$$\ln \tau_{ij} = \gamma_{dist} \ln(\lambda_{ij} \times dist_{ij}) + \gamma_{RTA} FTA_{ij} + Z_{ij}\gamma_Z + u_{ij} \quad (2)$$

We assume that variable trade costs are proportional to distance and also depend on transport infrastructure parameter, λ_{ij}. In our simulations, we model improvements in transport infrastructure as a reduction in λ, which varies across country-pairs. FTAs facilitate trade by lowering tariff and non-tariff barriers to trade. To estimate effects of FTAs, we introduce a variable FTA that equals one for country-pairs that have a bilateral free trade agreement, and zero otherwise. In what follows, we model several potential free trade agreements, including a free trade agreement between EU and China as a benchmark policy scenario.

Estimation of trade elasticities

Our empirical strategy is similar to Egger et al. (2011). We estimate a structural model with responses to trade policy at extensive and intensive margins. It also addresses the issue of zero trade flows and provides unbiased estimates in the presence of heteroskedasticity. In order to calculate trade elasticities with respect to trade costs identified in equation (2), we estimate a probit model to explore $T_{ij,t}$, the probability of positive trade flows between *i* and *j*:

$$T_{ij,t} = \Pr\left(Trade_{ij,t} = 1 \middle| . \right) = \Phi(H_{ij,t}\Gamma^{Trade}) \qquad (3)$$

where $Trade_{ij,t}$ is a binary variable that takes value of 1 if we observe positive trade flows and zero otherwise. $H_{ij,t}$ denotes policy variables (FTA) as well as the determinants of fixed and variable trade costs including distance, common border, common spoken language, common legal system, common colonial past and common religion. Further, we form variables that control for the selection into positive trade flows and heterogeneity of exporting firms:

$$\hat{\rho}_{ij,t} = \Phi\left(H_{ij,t}\hat{\Gamma}^{Trade}\right) = \Phi(\hat{z}_{ij,t}) \qquad (4)$$

$$\hat{\eta}_{ij,t} = \frac{\phi(\hat{z}_{ij,t})}{\Phi(\hat{z}_{ij,t})} \qquad (5)$$

$$\hat{\tilde{z}}_{ij,t} = \hat{z}_{ij,t} + \hat{\rho}_{ij,t} \qquad (6)$$

Next, we augment the gravity equation (1), by using (4)-(6) as well as introducing a full set of exporter-time, importer-time and bilateral fixed effects to control for multilateral resistance terms:

$$\ln X_{ij,t} = \gamma_0 + \gamma_1 FTA_{ij,t} + \gamma_2\hat{\eta}_{ij,t} + \sum_{m=1}^{3}\gamma_{m+2}(\hat{\tilde{z}}_{ij,t})^m + D_{it} + D_{jt} + D_{ij} + \epsilon_{ij,t} \qquad (7)$$

Therefore, we estimate (7) using a panel of bilateral export data from 1960-2014 for 162 countries. We overcome the computational issue of dealing with 36,000 fixed effects by applying an algorithm developed by Guimaraes and Portugal (2010).

Endogeneity of trade policy

The procedure outlined in the previous section captures heterogeneity of country-pairs, controls for country-time specific effects and accounts for the selection into trading partners. However, it does not deal with endogeneity of trade policy. A decision to sign an FTA is driven by bilateral relationships between countries that may evolve over time. Moreover, these decisions are influenced by trade costs. Ignoring the selection into RTA partners is likely to bias downwards the estimation of the effect of an FTA on trade (Baier and Bergstrand, 2007)[15]. We deal with this issue by modelling the selection into FTA and further instrumenting our FTA variable with the obtained selection probabilities. We estimate the probit model of FTA formation as follows:

$$\delta_{ij,t}^{RTA} = \Pr\left(FTA_{ij,t} = 1 \middle| . \right) = \Phi(G_{ij,t}\Gamma^{FTA}) \qquad (8)$$

where $G_{ij,t}$ captures fixed and variable trade costs including distance, common border, common spoken language and common legal system. We then re-estimate model (7) using instrumental variables method, where the RTA variable is instrumented by predicted values of $\hat{\delta}_{ij,t}^{FTA}$ and the inverse Mill's ratio.

Welfare gains. Evaluating counterfactual scenarios

[15] The downward bias occurs if high, unobserved bilateral trade costs make signing an RTA more likely.

We evaluate how changes in trade costs and trade policies, *ceteris paribus,* influence the global equilibrium trade flows and welfare. Therefore, we keep production and expenditure constant and suppose that a vector of trade costs change because of exogenous shock from τ to τ'.

Following Anderson et al. (2015), we evaluate inward and outward multilateral terms before and after the shock by applying the Poisson Pseudo Maximum Likelihood estimator (PPML estimator, see Silva and Tenreyro, 2006). We constrain the coefficients of policy and selection variables to be equal to our estimated coefficients from the previous stage. Our estimated models are given by

$$X_{ij} = \exp\big(\gamma_{dist} \ln(\lambda_{ij} \times dist_{ij}) + \hat{\gamma}_{FTA} FTA_{ij} + \hat{\gamma}_3 \hat{\eta} + \sum_{m=1}^{3} \hat{\gamma}_{m+3} (\hat{\hat{z}}_{ij,t})^m + Z_{ij}\pi + \chi_i + \xi_j\big) + \upsilon_{ij} \quad (9)$$

and

$$X_{ij} = exp\big(\gamma_{dist}\, ln(\lambda'_{ij} \times dist_{ij}) + \hat{\gamma}_{FTA} FTA'_{ij} + \hat{\gamma}_3 \hat{\eta} + \sum_{m=1}^{3} \hat{\gamma}_{m+3} (\hat{\hat{z}}_{ij,t})^m + Z_{ij}\pi + \chi'_i + \xi'_j\big) + \upsilon'_{ij} \quad (10)$$

where Z_{ij} are bilateral trade costs variables including distance, common border, colonial links, common legal origin, common spoken language and common religion. Using result by Fally (2015), we compute the inward and outward multilateral resistance terms according to the following expressions:

$$\hat{P}_j^{1-\sigma} = E_j \exp\big(-\hat{\xi}_j\big)/E_0 \quad (11)$$

$$\widehat{P'}_j^{1-\sigma} = E_j \exp\big(-\hat{\xi}'_j\big)/E_0 \quad (12)$$

$$\widehat{\Omega}_i^{1-\sigma} = E_0 Y_i \exp(-\hat{\chi}_i) \quad (13)$$

$$\widehat{\Omega}'^{1-\sigma}_i = E_0 Y_i \exp(-\widehat{\chi'}_i) \quad (14)$$

where E_0 is the level of expenditure in the country for which the inward multilateral resistance is normalized to $P_0 = 1$.[16] Finally, we evaluate welfare changes according to the following formula,

$$\widehat{W} = 100\% \times \left(\frac{{Y_i'}/{\hat{P}_i'}}{{Y_i}/{\hat{P}_i}} - 1 \right) = 100\% \times \left(\frac{\hat{P}_i}{\hat{P}_i'} - 1 \right) \qquad (15)$$

where the last equality is due to the fact that in the conditional scenario we keep outputs and expenditures constant.

General equilibrium effects and FDI

Trade flows increase productivity through the transfer of technology (Grossman and Helpman, 1991), increasing the variety of intermediate inputs (Ethier, 1982; Markusen, 1989) and importing advanced, high quality products (Hallak and Sivadasan, 2013). Therefore, firms that import from technologically advanced countries adopt new technologies and thereby improve their productivity. However, this process takes time since improvement in technology requires significant investment.

An extensive literature illustrates that the purchase of imported intermediate goods and inward foreign direct investment are important mechanisms for the increase in total factor productivity (TFP). Amiti and Koenings (2007) disentangle the effect of trade liberalization on productivity by separating input and output

[16] In our estimation, Afghanistan is chosen as the reference country. It is worth mentioning that our welfare results do not depend on the choice of the reference country. Since we keep expenditure levels of all countries constant, welfare changes are given by the ratio of exponentiated fixed effects in the status quo and counterfactual scenarios: $\frac{\hat{P}_i}{\hat{P}_i^*} = \frac{\exp(-\hat{\xi}_i)}{\exp(-\hat{\xi}_i^*)}$. Also, this formula is consistent with a wide class of models, including a Melitz model with heterogeneous firms, which was the basis for our first-stage estimation.

competition liberalization effects. They explore the trade liberalization episode in Indonesia and show that lower tariffs on intermediate inputs is the major channel of productivity growth.

Chinese officials emphasize that the BRI will boost investment in manufacturing, energy, and telecom industries. These projects will be financed by Chinese-backed capital and public private partnerships (PPP), which will channel investments into industries in countries participating in the BRI. These investments may increase output directly, through an increase in capital, and indirectly, via the transfer of technology, leading to higher productivity. These output gains are dynamic in nature and may lead to higher long run output if a) a recipient country has below the optimal level of capital; b) the level of technology in the recipient country is further away from the technology frontier than the source country.

As a point of departure, we use the model specification of Anderson, Larch, and Yotov (2015). Output is produced using Cobb-Douglas technology where we add stock of foreign direct investment as an additional input into production function:

$$Q_{jt} = A_{jt} K_{jt}^{\alpha_K} L_{jt}^{\alpha_L} FDI_{jt}^{\alpha_{FDI}}$$

where K_{jt} and L_{jt} are capital and labor of country j at time t; FDI_{jt} is stock of foreign direct investment in country j; A_{jt} is total factor productivity; α_K and α_{FDI} are production function parameters. Income is given by

$$Y_{jt} = p_{jt} Q_{jt}$$

In equilibrium, income is determined by the following equation:

$$\ln Y_{jt} = (1-\rho)\ln Y_t + \rho \ln TFP_{jt} + \rho\alpha_L \ln L_{jt} + \rho\alpha_K \ln K_{jt} + \rho\alpha_{FDI} \ln FDI_{jt} + (\rho - 1)\ln \Omega_{jt}^{\sigma-1} \quad (16)$$

where $\rho = (\sigma - 1)/\sigma$ is a parameter determined by the elasticity of substitution; Y_t is global income at time t. The outward multilateral resistance term Ω_{jt} influences income through its impact on price p_{jt} of output: $Y_{jt} = p_{jt}Q_{jt}$, where Q_{jt} is quantity of output. The estimated empirical counterpart of (16) is

$$\ln Y_{jt} = \beta_{TFP} \ln \phi_{jt} + \beta_L \ln L_{jt} + \beta_K \ln K_{jt} + \beta_{FDI} \ln FDI_{jt} + \beta_{ORT} \ln \Pi_{jt}^{\sigma-1} + \mu_t + \mu_j + \epsilon_{jt} \quad (17)$$

where $\sigma = -1/\beta_{ORT}$ and $\alpha_f = \beta_f \times (1 + \beta_{ORT})$, where $f = \{L, K, FDI\}$

Given considerable FDI inflows planned by China into countries participating into BRI, we re-evaluate income levels as follows:

$$Y'_{jt} = Y_{jt} \times (1 + \beta_{FDI} \times \widehat{FDI_{jt}}) \quad (18)$$

where $\widehat{FDI_{jt}}$ is percentage change in FDI stock due to FDI inflows from China. We further re-evaluate global trade equilibrium and compute welfare gains given by

$$\widehat{W} = 100\% \times \left(\frac{Y'_i / \hat{P}'_i}{Y_i / \hat{P}_i} - 1 \right). \quad (19)$$

Data

Aggregate bilateral exports measured in billions of current US dollars are taken from the Direction of Trade (DOTS) provided by the International Monetary Fund (IMF).[17] DOTS covers 162 countries in 1960-2014. The data on Gross Domestic Product (GDP) in current US $ and total population are from the World Development Indicators

[17] We have chosen DOTS over alternative data sources such as COMTRADE or WIOD because of the following advantages: DOTS has a longer time dimension than COMTRADE and covers more countries than WIOD.

(WDI, 2014) published by the World Bank. Geographical characteristics and distances between countries are taken from the Centre D'Etudes Prospectives et D'Informations Internationales (CEPII, see Head et al., 2010 for a detailed description of the data). Colony and contiguity dummy variables are used to control for pair-specific trade costs that are not directly related to distance. Furthermore, the dummy representing common legal origin captures the compatibility of the legal systems of trading partners and trade costs related to the signing of contracts. The common spoken language and common religion dummy variables capture the effect of cultural similarities on trade (Melitz and Toubal, 2014). Table 1 reports summary statistics of all variables in our data set.

National accounts data are taken from version 9.0 of Penn World Tables (Feenstra et al., 2015). We use output-side real GDP at current PPPs (in mil. 2011US$) to measure income, capital stock at current PPPs (in million 2011 US$) to measure capital, and number of persons engaged (in millions) to measure labor. To calculate FDI stock, we use FDI inflows in current US $ from World Development Indicators, adjust them to 2011 US $ levels using data on the US inflation, and employ perpetual inventory model to construct FDI stock in country i at time t: $FDI_{it}^{s} = (1-\delta_i)^t FDI_0^f + \sum_{\tau=1}^{t}(1-\delta)^{t-\tau} FDI_{i\tau}^f$, where $FDI_{i\tau}^f$ is FDI inflow and δ_{it} is average depreciation rate of the capital stock, which is country and time specific (see Feenstra et al., 2015).

We also use Bilateral China FDI stock data for BRI countries in 2012 from UNCTAD to compute $shareFDI_i = FDI_{i2012}^{s,China} / \sum_{i \in BRI} FDI_{i2012}^{s,China}$. We later apply these shares to distribute planned Chinese investment in the BRI countries proportionally to the existing FDI stocks.

Table 1: Summary statistics

Variable	N	Mean	S.d.	Min	Max
$\ln(EXP_{ij,t})$	608348	-5.72	3.60	-34.9	6.0
Export>0, Yes=1	1191625	0.51	0.50	0	1
FTA, Yes=1	1184005	0.05	0.21	0	1
$\hat{\eta}_{ij,t}$	967239	0.83	0.71	0.0	4.4
$\hat{z}_{ij,t}$	967239	1.14	0.79	0.2	4.8
Common border, Yes=1	1191625	0.02	0.14	0	1
Colonial past, Yes=1	1191625	0.01	0.12	0	1
Common legal, Yes=1	1191625	0.36	0.48	0	1
Common religion, Yes=1	1191625	0.19	0.26	0	1
Common language, Yes=1	1183291	0.12	0.23	0	1
$\ln(dist_{ij})$	1191625	8.71	0.83	2.1	9.9
$\ln(GDP_{it})$	1050970	23.18	2.41	16.7	30.5
$\ln(pop_{it})$	1120141	15.64	1.86	10.9	21.0

V. Empirical Results

Estimating elasticities

Table 2 presents estimations of long-run export elasticities with respect to trade costs. In columns (1) and (2) we implement a semi-parametric version of Helpman, Melitz, and Rubinstein (2008), where we first estimate a probability of positive trade flows in column (1), and then we estimate a gravity equation with the results presented in column (2). Our main variable of interest, FTA, has a positive impact on exports at extensive and intensive margins. Negotiating an FTA is associated with a 13.2 percent higher probability of positive exports and, on average, 52.3 percent higher exports relative to countries without an FTA. Common spoken language increases

the probability of positive trade by 33 percent. More geographically remote countries are less likely to have positive trade.

Column (3) presents marginal effects of the model that explain how countries are selected into trading partners. Common language, common origin of legal system and high GDP in both countries increases the probability of signing an FTA. Common colonial past, common religion, large population and larger distance have a negative effect on signing an FTA. In columns (4) and (5), we report coefficients of the first and second stages of the IV estimation, where the effects of the FTA are instrumented by the inverse Mills ratio from the model (3). As column (5) indicates, the effect of FTA on exports is significantly higher than reported in column (2). This is consistent with other results in the literature (Baier and Bergstrand, 2007; Felbermayr et al., 2014).

Table 2: Estimation of trade elasticities

	(1) Export>0	(2) Gravity OLS	(3) RTA selection	(4) Gravity IV First stage	(5) Gravity IV
FTA	0.132**	0.523**			1.477**
	(0.010)	(0.065)			(0.179)
FTA Inv. Mills ratio				1.522**	
				(0.129)	
$\hat{\eta}_{ij,t}$		2.359**		-1.733**	3.748**
		(0.136)		(0.016)	(0.288)
$\hat{\hat{z}}_{ij,t}$		3.570**		1.727**	1.745**
		(0.241)		(0.038)	(0.397)
$\hat{\hat{z}}^2_{ij,t}$		-1.327**		-0.070**	-1.170**
		(0.073)		(0.013)	(0.078)
$\hat{\hat{z}}^3_{ij,t}$		0.145**		0.007**	0.123**
		(0.008)		(0.002)	(0.009)
Common border	0.030		-0.008		
	(0.021)		(0.005)		
Colonial past	0.216**		-0.011*		
	(0.022)		(0.005)		
Common legal	-0.003		0.008**		
	(0.003)		(0.002)		
Common religion	-0.050**		-0.028**		
	(0.007)		(0.003)		

Common language	0.334**		0.034**		
	(0.007)		(0.003)		
$\ln(dist_{ij})$	-0.111**		-0.066**		
	(0.002)		(0.001)		
$\ln(GDP_{it})$	0.088**		0.013**		
	(0.001)		(0.000)		
$\ln(pop_{it})$	-0.003**		-0.009**		
	(0.001)		(0.001)		
$\ln(GDP_{jt})$	0.064**		0.013**		
	(0.001)		(0.000)		
$\ln(pop_{jt})$	0.006**		-0.009**		
	(0.001)		(0.001)		
Observations	967239	538344	967239	538344	538344
R^2	0.394	0.870	0.422	0.974	0.870

* 0.05 ** 0.01

Notes: Estimation sample is DoTs IMF, 1950-2014 for 162 countries. Model (1) estimates probability of positive bilateral trade. Model (2) estimates a gravity model with exporter-time, importer-time, and bilateral fixed effects. Model (3) estimates probability of FTA formation. Model (4) reports first stage IV result. Model (5) estimates gravity equation with FTA formation instrumented as shown in column (4). Marginal effects are reported in columns (1) and (3). The other columns report regression coefficients. In all regressions, standard errors that are presented in brackets are clustered at country-pair level.

Dynamic effects of RTA

The dynamics of the impact of an FTA on bilateral trade flows is not well understood. Does gains of signing FTA are immediate or they increase gradually over time? We perform the analysis of the FTA effect on trade conditional on its duration.[18] For each bilateral trade agreement, we establish its starting point and include the interaction terms of the FTA variable with its duration. Duration is limited to values from 1 to 40 years.[19] We also test whether the effect of an FTA varies over decades, by interacting the FTA variable with the decade indicators. The average effects on trade for FTA members relative to non-members, in percent, are presented in Figure 3.

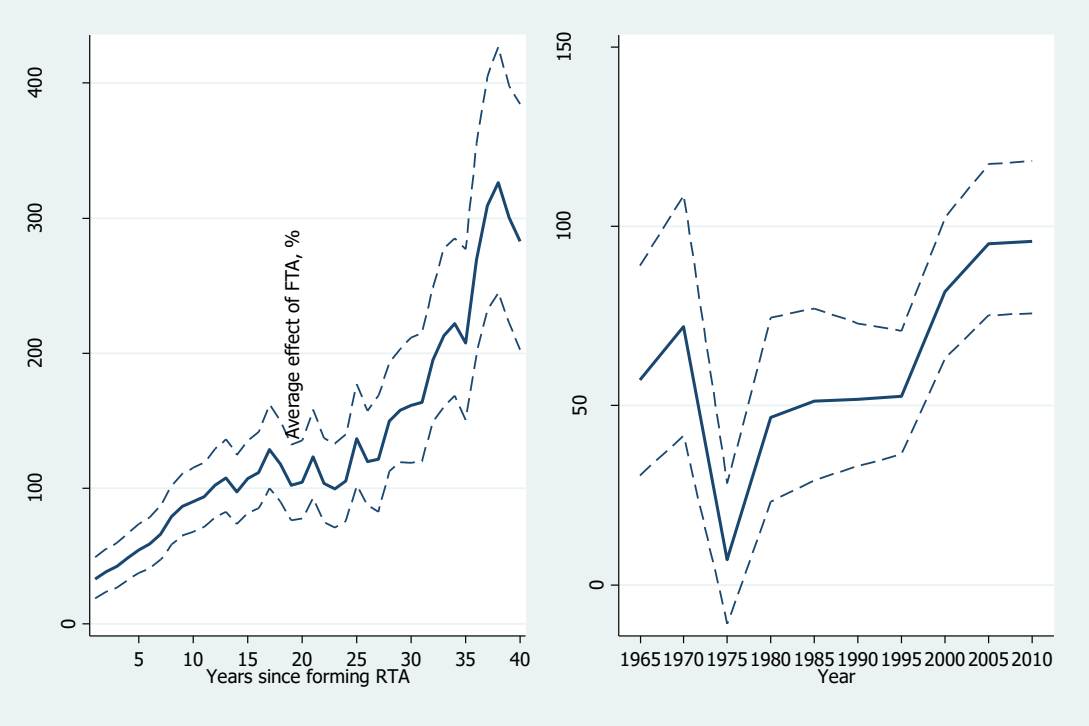
Several important regularities emerge. First, the positive effect of FTAs accumulates over time with some acceleration for FTAs over 25 years old. Second,

[18] Head, Mayer, and Reis (2010) perform similar analysis of the effect of decolonization of post-colonial trade.

[19] We include all RTAs with duration above 40 years in the same category.

FTAs are currently having the strongest impact on trade over the period 1960-2014. We take these findings into account when we evaluate dynamic effects of our scenarios.

Figure 1: Dynamics of trade effects of FTAs conditional on duration and decade



Note: Figure reports estimates of the effect of FTA on exports, conditional on its duration (left panel) and conditional on the decade the agreement became active (right panel). The dashed lines represent 5 and 95 percent confidence intervals.

Estimating the income equation

We estimate income equation (17) by adding country fixed effects, year fixed effects, outward resistance term, and TFP measure. Standard errors are clustered at country level. Results are presented in Table 3. While estimates without fixed effects give production function parameters estimates α_L and α_K that are far from traditionally used in the literature which takes $\alpha_L = 2/3$ and $\alpha_K = 1/3$, our estimates with country and time fixed effects deliver $\alpha_L = 0.418$ and $\alpha_K = 0.373$. If we also account for the effect of trade on the income level, we have slightly higher estimates for both capital

and labor. For FDI, the coefficient is always positive and significant, which translates into $\alpha_{FDI} = 0.031$ for model in column (4), which is our preferred specification. Adding the TFP measure, which is available from the Penn World Table 9.0 dataset, makes coefficients on FDI insignificant, which indicates that the positive effect of FDI on output and income stems from its effect on productivity.

Table 3: Income equation estimates

	(1) OLS	(2) FE	(3) +Year	(4) +ORT	(5) +TFP
Labor	.257**	.443**	.418**	.400**	.497**
	(.028)	(.097)	(.103)	(.104)	(.049)
Capital	.676**	.414**	.373**	.367**	.444**
	(.032)	(.049)	(.062)	(.069)	(.038)
FDI	.043**	.050**	.049**	.025**	.006
	(.015)	(.012)	(.012)	(.009)	(.004)
$\ln \Pi_{jt}^{\sigma-1}$				-.240*	-.081*
				(.094)	(.037)
TFP					1.448**
					(.119)
Year	No	No	Yes	Yes	Yes
α_L	.257	.443	.418	.496	.538
α_K	.676	.414	.373	.455	.480
α_{FDI}	.043	.050	.049	.031	.006
σ				4.2	12.3
Observations	642	642	642	571	474
R^2	.962	.849	.854	.856	.967

** Significant at the 1% level. * Significant at 5% level. Standard errors clustered at country level in brackets.

Simulations: BRI and China-EU FTA, Scenarios 1-3

In this section we considered the first 3 scenarios of trade between China and EU. The BRI scenario reduces transportation costs between China and the EU by a certain percentage due to infrastructure projects including the building of high speed railway connections. FTA EU considers the effects of signing FTA between China and EU. Finally, BRI&FTA EU considers simultaneous implementation of transport

cost reductions and signing of the FTA. The last two scenarios serve two purposes. First, EU FTA is a benchmark to compare with our BRI results. Second, BRI&EU FTA illustrates that welfare gains of this joint policy are super-additive, suggesting that gains from BRI&FTA EU exceed a sum of gains from BRI and FTA EU.

Table 4 presents the welfare gains of these scenarios relative the status quo in 2012 for a range of trade cost reductions (15 to 50 percent reductions) and for different regions. First, both China and EU countries gain under all 3 scenarios. Second, signing and implementing a free trade agreement between China and EU is equivalent to reduction in transportation costs by approximately 45 percent. Third, joint reduction of transportation costs and signing a free trade agreement generates welfare gains that exceed sum of welfare gains of separate implementation of these policies. This indicates that the two policies complement and reinforce each other.

The only two regions that lose as the result of the policies are Sub-Saharan Africa and South Asia. However, the losses are small, and the overall effect on the global economy is positive. This suggests that the policies could hurt most vulnerable groups. Furthermore, Table 5, which reports our results by income group confirms this conclusion.

Table 4: Welfare gains of BRI, EU FTA, and BRI&EU FTA by regions

A. Mean welfare gains of reduction in transport cost due to Belt and Road Initiative (BRI) by region, percent

	Reduction in transport costs, %								
Region	15	20	25	30	35	40	45	50	Average
China	0.65	0.91	1.19	1.51	1.86	2.26	2.70	3.22	1.79
East Asia & Pacific	0.00	0.00	0.00	0.00	0.00	0.00	-0.01	-0.01	0.00
Europe & Central Asia	0.10	0.13	0.16	0.20	0.23	0.25	0.28	0.30	0.21
European Union	0.44	0.61	0.78	0.97	1.18	1.40	1.63	1.88	1.11
Latin America & Caribbean	0.04	0.06	0.09	0.13	0.17	0.22	0.29	0.37	0.17
Middle East & North Africa	0.11	0.14	0.18	0.23	0.27	0.32	0.37	0.42	0.25

North America	0.12	0.18	0.25	0.32	0.42	0.53	0.67	0.83	0.41
South Asia	-0.02	-0.02	-0.03	-0.05	-0.06	-0.08	-0.10	-0.13	-0.06
Sub-Saharan Africa	-0.02	-0.03	-0.04	-0.04	-0.05	-0.05	-0.05	-0.04	-0.04
All	0.11	0.15	0.19	0.24	0.29	0.35	0.41	0.48	0.28

B. Mean welfare gains of signing FTA EU and China by region, %

Region	Welfare gains, %
China	2.77
East Asia & Pacific	0.01
Europe & Central Asia	0.40
European Union	1.81
Latin America & Caribbean	0.19
Middle East & North Africa	0.44
North America	0.54
South Asia	-0.07
Sub-Saharan Africa	-0.10
All	0.44

C. Mean welfare gains of reduction in transport cost due to Belt and Road Initiative (BRI) and signing FTA EU and China by region, %

	Reduction in transport costs, %								
Region	15	20	25	30	35	40	45	50	Average
China	3.69	4.06	4.46	4.90	5.40	5.95	6.56	7.26	5.28
East Asia & Pacific	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00
Europe & Central Asia	0.48	0.51	0.53	0.56	0.58	0.59	0.60	0.60	0.56
European Union	2.32	2.52	2.72	2.94	3.16	3.41	3.66	3.93	3.08
Latin America & Caribbean	0.30	0.34	0.40	0.46	0.54	0.64	0.75	0.88	0.54
Middle East & North Africa	0.56	0.60	0.65	0.69	0.74	0.80	0.85	0.90	0.72
North America	0.77	0.87	0.98	1.11	1.26	1.44	1.65	1.90	1.25
South Asia	-0.11	-0.12	-0.14	-0.16	-0.19	-0.22	-0.25	-0.29	-0.18
Sub-Saharan Africa	-0.11	-0.11	-0.11	-0.11	-0.10	-0.09	-0.07	-0.05	-0.09
All	0.57	0.62	0.68	0.74	0.80	0.88	0.96	1.04	0.79

Notes: all values are computed for elasticity of substitution equals 5.14

Table 5: Welfare gains by country income groups

A. Mean welfare gains of reduction in transport cost due to BRI by income level, %

	Reduction in transport costs, %								
Country income group	15	20	25	30	35	40	45	50	Average
High income countries	0.26	0.36	0.47	0.59	0.71	0.85	1.00	1.16	0.68
Low income countries	-0.02	-0.03	-0.04	-0.04	-0.05	-0.05	-0.06	-0.05	-0.04
Lower middle income countries	0.02	0.02	0.03	0.04	0.04	0.05	0.06	0.07	0.04
Upper middle income countries	0.07	0.10	0.13	0.16	0.20	0.25	0.30	0.36	0.20
All countries	0.10	0.14	0.19	0.23	0.29	0.34	0.41	0.48	0.28

B. Mean welfare gains of signing FTA EU and China by income level, %

	Reduction in transport costs, %								
Country income group	15	20	25	30	35	40	45	50	Average
High income countries	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09
Low income countries	-0.09	-0.09	-0.09	-0.09	-0.09	-0.09	-0.09	-0.09	-0.09
Lower middle income countries	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07
Upper middle income countries	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29
All countries	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.44

C. Mean welfare gains of reduction in transport cost due to BRI and signing FTA EU and China by income level, %

	Reduction in transport costs, %								
Country income group	15	20	25	30	35	40	45	50	Average
High income countries	1.41	1.53	1.66	1.80	1.94	2.10	2.27	2.45	1.89
Low income countries	-0.11	-0.11	-0.11	-0.12	-0.12	-0.11	-0.11	-0.09	-0.11
Lower middle income countries	0.09	0.10	0.11	0.12	0.13	0.14	0.16	0.18	0.13
Upper middle income countries	0.39	0.43	0.48	0.53	0.59	0.65	0.73	0.81	0.58
All countries	0.56	0.61	0.67	0.73	0.79	0.86	0.94	1.03	0.79

Notes: all values are computed for elasticity of substitution equals 5.14.

Simulations: Zero tariffs, Scenario 4

We also consider a scenario where China and EU negotiate tariff free trade. In WTO terms, it is a shallow FTA without agreements to harmonize non-tariff regulations and without commitments on services, etc. The data on applied tariff rates is collected from the TRAINS database for the period 2003-2013, which limits our sample for estimation of the long run effect of RTA on trade. We estimate the following model,

$$\ln X_{ij,t} = \gamma_0 + \gamma_1 FTA_{ij,t} + \gamma_2 \ln(1 + t_{ji,t}) + \gamma_3 \hat{\eta}_{ij,t} + \sum_{m=1}^{3} \gamma_{m+3} (\hat{\tilde{z}}_{ij,t})^m + D_{it} + D_{jt} + D_{ij} + \epsilon_{ij,t} \quad (20)$$

where $t_{ji,t}$ are MFN tariff rates that country j applies against exports from country i. Table 6 presents estimates of the elasticity of trade with respect to the applied tariff for different model specifications. The results are very stable and take values close to

-1 if we run an OLS model. Whereas, the results are approximately -1.6 if we instrument FTA with selection probabilities and inverse Mills ratio.

Table 6: Trade, FTA, and applied MFN tariffs

	(1) Export>0	(2) Gravity OLS	(3) FTA selection	(4) Gravity IV First stage	(5) Gravity IV
FTA	0.118**	0.261*			0.963
	(0.010)	(0.110)			(1.185)
Applied tariff, $(1 + t_{ijt})$	-0.077**	-1.206**	-0.584**	-0.203	-1.651*
	(0.023)	(0.187)	(0.030)	(0.110)	(0.698)
η_{ijt}		1.540**		-1.923**	2.875
		(0.344)		(0.008)	(2.260)
z_{ijt}		1.867**		1.895**	0.527
		(0.561)		(0.024)	(2.303)
z_{ijt}^2		-0.705**		-0.009	-0.693**
		(0.180)		(0.010)	(0.180)
z_{ijt}^3		0.066**		0.001	0.065**
		(0.020)		(0.001)	(0.020)
				0.190**	
η_{ijt}^{RTA}				(0.024)	
N	287462	199942	287462	199942	199942
R^2		0.917		0.998	0.917
Hansen J-stat					2.288
p-value					0.1304

** Significant at the 1% level. * Significant at 5% level.

If elasticity of substitution equals 5, the welfare gains under negotiating zero tariffs for China and EU are 0.54 percent and 0.16 percent consequently. Compared with 2.77 percent and 1.81 percent of gains for China and EU from signing an FTA, it indicates that the major gains from the China and EU FTA are not due to tariff reductions. Other effects of an FTA include lowering non-tariff measures, agreements in services sector (Francois and Hoekman, 2010), and reduction of trade policy uncertainty (Handley and Limao, 2015).

Simulations: TTIP and TPP, Scenarios 5 and 6

We also consider how BRI interacts with US-led mega trade programs: TPP and TTIP. Our main interest is to understand the effect of these agreements on Chinese trade and welfare and how they interact with the BRI scenario. Table 7 presents estimates of welfare gains of TTIP, TTIP&BRI, TPP, TPP&BRI. TTP has a negative effect on China, while TTIP has a very small positive effect. At the same time, the positive effect of the BRI on China more than compensates for the potential negative effects of TPP.

Table 7: Effect of TTIP and TPP and their interactions with transport cost reduction on welfare in China.

Transport cost reduction, %	**TTIP**	**TTIP and BRI**	**TPP**	**TPP and BRI**
15		0.758		0.218
20		1.026		0.482
25		1.321		0.774
30	0.088	1.65	-0.443	1.098
35		2.017		1.46
40		2.43		1.867
45		2.898		2.328
Average	0.088	1.577	-0.443	1.175

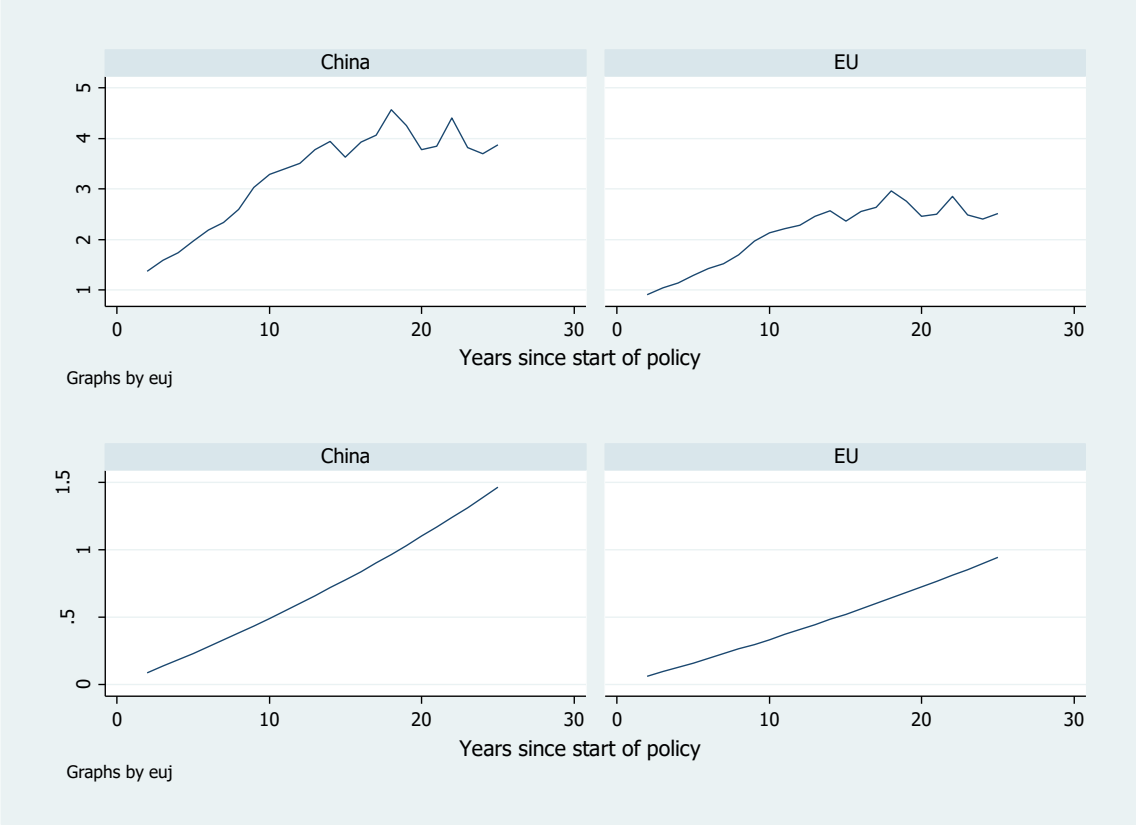
Notes: all values are computed for elasticity of substitution equals 5.14

Simulations: Dynamic effects

Following our estimates of the effect of the duration of FTA on trade flow, we can forecast how gains from the trade agreement would accumulate over time. We also present and contrast the effect of BRI policy that would achieve a reduction of transportation cost between China and EU by 30 percent over a period of 25 years. We assume that reductions in transportation costs are achieved at constant rate. Figure 2 presents welfare gains. Longer duration of a trade agreement between

China and Europe would allow achieving a stronger welfare effects relative to our baseline FTA scenario, while gains due to lower transportation costs after 25 years are the same as in the baseline BRI scenario. These results are consistent with the literature that finds benefits of trade agreements or other forms of special trade relationships or regimes are achieved not immediately, but growing over time, while the effect of breaking such relationships is also spread over time (Head, Mayers and Ries, 2010)

Figure 2: Forecast of the dynamic effects of FTA and BRI over 25 years



Notes: welfare gains under FTA scenario (upper panel) and BRI scenario (lower panel). The dynamic effect of FTA over time is based on the estimation of the gravity model with FTA interacted with duration variables. We assume 30 percent transport cost reduction over the period of 25 years under the Brexit scenario.

FDI and welfare

Chinese FDI inflows may considerably influence the stock of FDI in countries that are participants of BRI. The announced plan to inject 3 trillion USD into BRI related

projects is a very ambitious plan, which would dramatically improve transport infrastructure and productive capacity of BRI countries. We do not consider such scenario for several reasons. First, we do not know what share of this investment would be channelled abroad. Second, we do not know the time frame of such investment plan. Moreover, it considerably exceeds current FDI outflows from China (if one does not count outflows to Hong-Kong and offshore zones). In 2012 China FDI outflows were 87bln USD with 53 bln going to Hong Kong and 14 bln going to developed countries. Which means that all other countries, including BRI countries, received 20 bln. 10-15 bln dollars per year spend on BRI seems like a reasonable approximation. If we expand this estimate for a decade and take the present value, we get a value of around 100 bln USD. This number correspond well with the sum for the newly signed contractual projects announced by the Ministry of Commerce of China.[20] Furthermore, we allocate 100 bln USD FDI inflows into BRI countries according to current shares of Chinese FDI stock in those countries. These FDI inflows would make a large difference for low and middle-income countries as such Ethiopia and Lao, where this Chinese investment would increase FDI stock by 3 and 16 percent respectively. The overall increase in FDI stock would be 1 percent.

We further re-evaluate welfare effects accounting for income gains caused by FDI inflows, using equations (18) and (19). The results are presented in Table 8. Gains from Chinese FDI into BRI countries alone would increase welfare by 0.57 percent. Most gains are attributed to East Asia, Pacific and South Asian countries. In

[20] In the first 3 quarters of 2017 "The Chinese enterprises' FDI in the countries along the line amounted to US$9.6 billion and the total value of the newly signed contractual projects there amounted to US$96.72 billion, up 29.7% year on year." Regular Press Conference of the Ministry of Commerce (November 2, 2017).

addition, some Central Asia countries, which are part of the Europe and Central Asia (ECA) region, would benefit more than average. This policy would help low middle-income countries, but it would also considerably benefit Ethiopia, which is a low-income country. Moreover, the interaction of Chinese FDI inflows with the reduction in transportation costs (assumed at 30 percent lower transportation cost with EU countries) and the EU FTA would further enhance welfare.

In the long run, the initial investment of 100 bln USD would generate an increase in GDP of all countries participating in BRI (including China) by 97 bln USD. Assuming a 25 year period of moving towards a new steady state at constant speed and time discount rate of 7 percent, the net present value of this investment accumulated over the period would be 316 bln USD.

Table 8: FDI and trade policy scenarios

A. Mean welfare gains from different FDI scenarios by region, percent					
	FDI	**FDI&BRI**	**FDI&EUFTA**	**FDI&BRI&EUFTA**	**Average**
Region					
China	0.27	1.73	2.86	4.90	2.44
East Asia & Pacific	1.56	1.56	1.57	1.56	1.56
Europe & Central Asia	0.77	0.96	1.14	1.29	1.04
European Union	0.29	1.23	1.98	3.07	1.64
Latin America & Caribbean	0.28	0.40	0.45	0.71	0.46
Middle East & North Africa	0.57	0.79	0.98	1.23	0.89
North America	0.27	0.58	0.77	1.32	0.74
South Asia	1.33	1.29	1.26	1.18	1.26
Sub-Saharan Africa	0.31	0.27	0.22	0.21	0.25
	0.57	0.80	0.98	1.27	0.90
B. Mean welfare gains from different FDI scenarios by country income groups, percent					
Country income group					
High income	0.33	0.90	1.35	2.03	1.16
Low income	0.26	0.22	0.17	0.15	0.20
Lower middle income	1.20	1.23	1.26	1.31	1.25
Upper middle income	0.44	0.62	0.74	0.99	0.70
All	0.57	0.80	0.98	1.27	0.90

VII. Robustness

Welfare gains strongly depend on elasticity of substitution parameter, σ. In our main table results are reported for $\sigma = 5.14$, as it is common in the literature (see, for example, Head and Mayer, 2014). Figures 3 and 4 present how welfare gains under BRI&EU FTA scenario depend on elasticity of substitution and reduction in transportation costs in China and EU, consequently.

Higher elasticity of substitution reduce welfare gains, because consumers with high elasticity of substitution are less concerned about consuming different varieties and more concerned about acquiring goods at the lowest price. This reduces incentives to trade similar goods and increase incentives to trade based on comparative advantage. As expected, the highest gains are achieved when elasticity of substitution is close to one and transport costs between China and EU are reduced by 50 percent. In that case, China gains more than 19 percent and EU countries gain more than 10 percent.

Figure 3: China welfare gains of BRI and EU FTA for different levels of trade cost reduction and different levels of elasticity of substitution

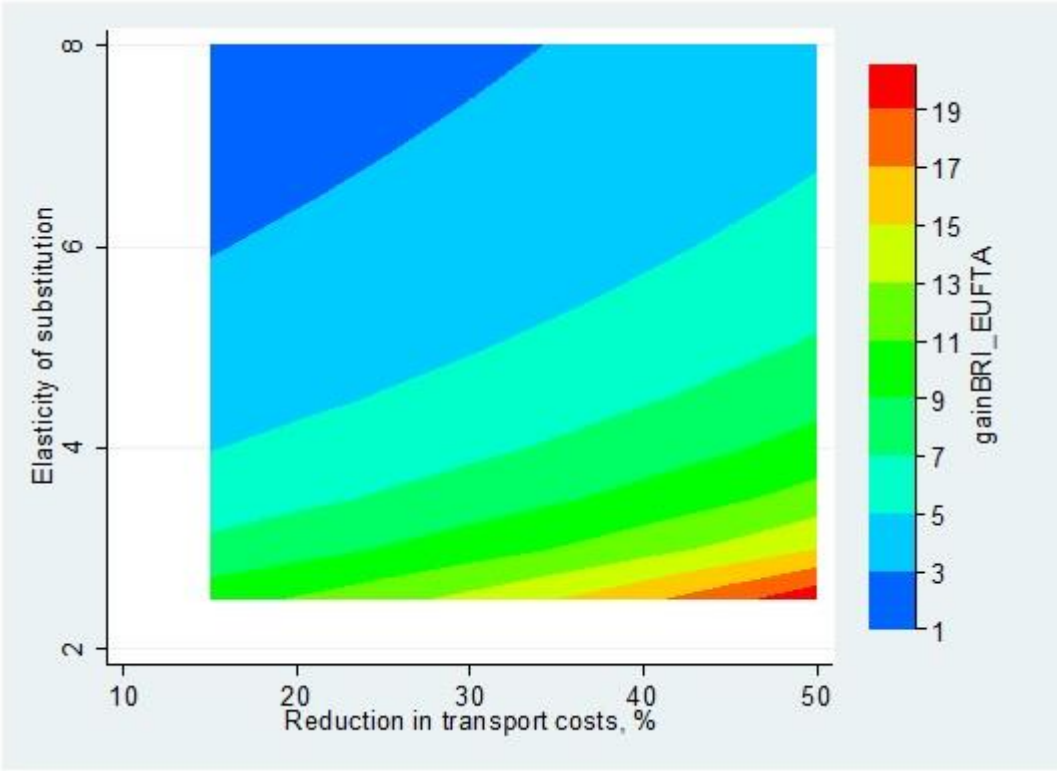
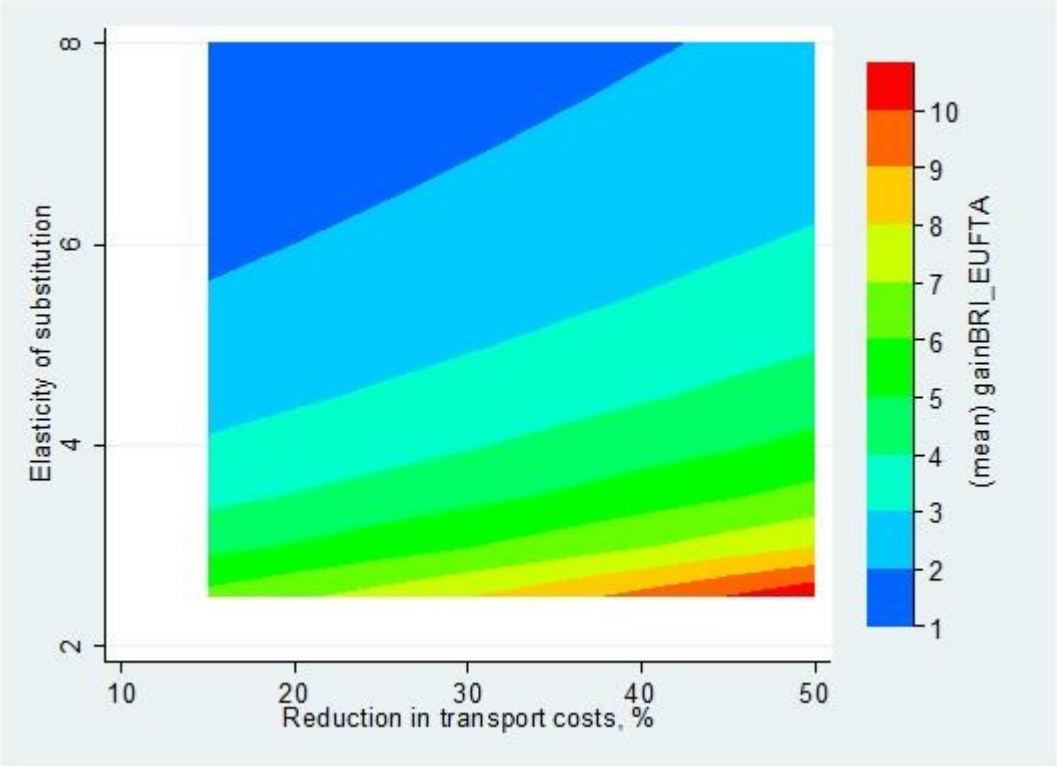


Figure 4: EU welfare gains of BRI and EU FTA for different levels of trade cost reduction and different levels of elasticity of substitution



VII. Conclusion

The BRI as well as the associated FDI flows and transport cost reductions are fast becoming a reality. This initiative is years in the making, where its future is now more assured than the mega-regionals. Furthermore, the BRI has largely avoided the negative publicity that has plagued the TTIP negotiations. Our findings justify the massive financial commitment by China. Moreover, our results also suggest that the rewards for both China and the EU can be even greater if they are also willing to commit to a FTA, where this prospect has been considered as the potential next stage after the China-EU Investment Agreement is concluded. This committed approach would need policy makers spell out to interconnectedness of the BRI, China-EU Investment Agreement and FTA initiatives, where this only likely to happen if China is satisfied that the EU is a strong, stable and credible partner.

The geopolitical environment is ideal for a shift towards China and the development of a China-EU bloc. Recent elections and referendums have left the trading environment very uncertain. On the other hand, China has shown unwavering support towards the BRI. Our research predicts that both the EU and China will gain from a steady commitment to this infrastructure development project. However, China is likely to be required to develop its discursive power to keep the peace along the belt and road. Furthermore, China may face problems regarding asset-quality risks and further exposing Chinese banks. The EU projects are less risky compared to other steps along the BRI road. Therefore, the EU can capitalize on this opportunity if they can develop stronger strategic oversight of investment flows.

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Appendix A - Belt and Road, key countries

Lead	**China**
Southeast Asia (Group A)	Brunei Cambodia Indonesia Laos Malaysia Myanmar Philippines Singapore Thailand Timor-Leste Vietnam
South Asia (Group B)	Bangladesh Bhutan India Maldives Nepal Pakistan Sri Lanka
Central and Western Asia (Group C)	Afganistan Armenia Azerbaijan Georgia Iran Kazakhstan Kyrgyzstan Mongolia Tajikistan Turkmenistan Uzbekistan
Middle East and Africa (Group D)	Bahrain Egypt Iraq Israel Jordan Kuwait Lebanon Oman Palestine

	Qatar
	Saudi Arabia
	Syrian Arab Republic
	Turkey
	United Arab Emirates
	Yemen
Central and Eastern Europe (Group E)	Albania
	Belarus
	Bosnia & Herzegovina
	Bulgaria
	Croatia
	Czech Republic
	Estonia
	Hungary
	Latvia
	Lithuania
	Macedonia
	Moldova
	Montenegro
	Poland
	Romania
	Russia
	Serbia
	Slovakia
	Slovenia
	Ukraine

Source: Belt and Road Portal, Hong Kong Trade Development Council based on a list compiled by the Chinese Academy of Social Sciences