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# China's belt and road initiative: A preliminary quantitative assessment

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### ABSTRACT

Using a global computable general equilibrium model, this paper investigates the macroeconomic impact of China's Belt and Road Initiative (BRI). Accounting for the externalities of infrastructure development with respect to trade cost reduction and energy efficiency improvement, the analysis finds BRI would bring sizable benefits to the world economy in terms of welfare and trade, even under conservative assumptions about the size of total investment under the initiative. However, China and other BRI countries need to address several important challenges in order to implement this initiative with success and realize these benefits.

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## 1. Introduction

With rapid economic growth, China has emerged as an important exporter of capital, not only in the form of massive foreign exchange reserves – which are largely invested in US government bonds, but also in direct investment. In 2015, China's outward direct investment (ODI) flow grew by 18% to USD 145.7 billion. It surpassed the foreign direct investment (FDI) inflow of USD 135.6 billion and rendered China the net exporter of direct investment for the first time. China also overtook Japan to become the second-largest country of outbound investment.

The rapid accumulation of official foreign exchange reserves as well as the increased pressures for Chinese firms to secure resources supply and expand market access have provided important economic substance and commercial justifications for China's ODI growth. It has also been facilitated by the government's "Going Out" policy, which was launched in 1999 with the aim to expand China's outbound investment and prompt the internationalization of Chinese enterprises. Looking forward, the government's policies and initiatives will continue to help support the rapid expansion of ODI. Among them, the recent Belt and Road Initiative (BRI) is likely the most important one in China's international economic policy and will provide fresh momentum to the growth of ODI in the coming decades.

BRI, which was first announced in the fall of 2013 by President Xi Jinping, aims to prompt regional integration between China and other Asian, African, and European countries, through enhancing infrastructure and institutional linkages. It ultimately intends to establish an "international community with shared interests, destiny, and responsibility". In its broadest definition, the BRI could cover 65 countries, 4.4 billion in population, and nearly 30% of the global GDP. The BRI carries broad-based economic objectives, including "facilities connectivity, unimpeded trade, and financial integration", and its economic and financial initiatives will be complemented by greater policy coordination and deeper cultural and

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personnel exchanges (NDRC, MFA, & MOC, 2015). The potential scope of BRI projects is vast and its financial scale is huge: the projected investment under BRI ranges from USD 1.4 trillion to USD 6 trillion.

The economic and geopolitical motivations behind the BRI have been widely discussed. For example, Wang (2016) and Yu (2017) argue that the need for facilitating China's domestic economic transition and the response to the US Asia pivot policy have been the key drivers behind Beijing's BRI. They also suggest that the announcement of BRI represented the shift of China's foreign policy stance from passive and reactive to proactive. However, Summers (2016) argues that BRI reflects a natural expansion of China's strategy for sub-national regional development, rather than a new strategy driven by international geopolitical considerations.

So far, the BRI is still a flexible conceptual initiative and far from a well-defined action plan with top-down design. The vagueness of the BRI program leads to difficulties in quantitatively evaluating its economic impact, an interesting topic which only very few studies have addressed. Using a gravity model of world trade with explicit treatment of three transportation modes (i.e., railway, air, and maritime), Herrero and Xu (2016) estimated the trade effects of the BRI with a special focus on Europe. They found that European Union countries, especially landlocked countries, would benefit considerably in terms of expansion of trade from the improvement of transportation infrastructure under the BRI. Eastern Europe, Central Asia, and, to a lesser extent, Southeast Asia, would also expand their trade as a result of the BRI. Villafuerte, Corong, and Zhuang (2016) used an economy-wide global computable general equilibrium (CGE) model to evaluate the impacts of the BRI on Asia's trade and growth. They simulated the BRI scenarios through assuming reductions in international road and sea transport margins, as well as iceberg trading costs in the BRI countries, and found that the BRI brought large but uneven benefits to its members.

This paper aims at quantitatively exploring the global impacts of the BRI. Similar to Villafuerte et al. (2016), this paper also utilizes the CGE approach to assess the economy-wide impact of the BRI. The intersectoral, general equilibrium nature of CGE models enables us to explore the interdependence of economic activities and provides useful information on aggregate welfare and its distribution. However, in comparison with Villafuerte et al. (2016), this paper advances the CGE analysis of the BRI in three particular ways: 1) Given the long-term nature of the BRI, a recursive dynamic version of the CGE model is used to incorporate the dynamic path of BRI-driven infrastructure investment and capture the effects of dynamic capital accumulation; 2) Different from the traditional CGE models with Armington (1969) assumption, the CGE model that was used in this study incorporates the recent new trade theory of firm heterogeneity à la Melitz (2003) to capture the inter-firm resource reallocation and the extensive margin of international trade. This feature enhances the explanatory power of CGE models in addressing modern international trade issues; 3) Rather than making ad-hoc assumptions of trade cost reduction, the model that was used in this paper establishes direct links between the reduction of trade costs and infrastructure investment, based on empirical evidence. This is extremely relevant to the topic of this study, as infrastructure is the most significant component of the BRI.

The paper tries to answer the following questions: What are the externality effects of the development of regional infrastructure along BRI routes? And how much economy-wide benefits can be expected from the investment for BRI infrastructure? This modelling exercises suggest that the countries under the BRI would gain significantly from the expansion of regional infrastructure in transport and communication. With an investment of \$1.4 trillion in regional infrastructure during the period of 2015–2030, the BRI countries as a whole are likely to reap annual welfare gains of \$1.5 trillion (in 2011 price) in 2030, or 2.9% of its GDP. Global trade would also be boosted by the BRI, with an expansion of 5.6% in 2030 in comparison with the baseline. The quantitative analysis suggests that investment in BRI infrastructure holds great promise for the long term development of the region.

The paper is organized as follows. Section 2 provides an overview of the BRI and its recent development. Section 3 describes the modelling approach that was used in this study. Section 4 discusses the impact of the BRI on regional welfare, growth, and trade. Then, the final section offers a conclusion.

## 2. An overview of the BRI: contents, progress, and impact analysis

Inspired by the ancient Silk Route, the Chinese government launched the BRI with the intention to improve regional connectivity and prompt economic cooperation by investing in infrastructure along the two routes of the initiative: the Silk Road Economic Belt and the 21st-Century Maritime Silk Road. The former connects Eastern China with Western Europe through land-based trade routes across inland China, Central Asia, Russia, and the Baltic. It also includes two sideways which link China with the Mediterranean Sea, via the Persian Gulf, and with the Indian Ocean, via South and Southeast Asia. The latter, the 21st-Century Maritime Silk Road, refers to the maritime route linking China to Europe through the South China Sea, Indian Ocean, Persian Gulf, and Mediterranean Sea.

The BRI covers broad areas of economic cooperation. Among them, the BRI identifies three priority areas for implementing the initiative. Infrastructure connectivity is probably the most prominent. Given the low level of infrastructure development in most BRI countries, removing infrastructure bottlenecks would be the most essential prerequisite to regional economic integration and development. Infrastructure construction under the BRI includes the building of railway and highway networks, port facilities, pipelines, airports, and energy and communication infrastructure. Investment in cross-border infrastructure requires massive funding and long-term commitments, and often entails political risks and diplomatic sensitivities. As a result, official investors, such as the newly established Silk Road Fund, Asian Infrastructure Investment Bank, BRICs New Development Bank, and some policy banks in China, are likely to play a leading

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