DOES THE BELT AND ROAD INITIATIVE AFFECT THE ENERGY INTENSITY OF COUNTRIES ALONG THE ROUTE?

Banban Wang, Huazhong University of Science and Technology, +86 13971210462, wangbanban@hust.edu.cn
Yuxuan Liu, Huazhong University of Science and Technology, +86 13836643460, toliuyuxuan@hust.edu.cn

Overview

The “Belt and Road Initiative”(BRI) was proposed by China in September 2013 with the aim of promoting regional cooperation and economic integration. The initiative focuses on "The Five-Connectivity" as the main content, in addition to it, outward foreign direct investment (OFDI) can also affect countries along the route through economic development, structural change, and technological progress(Fan et al., 2019; Qi et al., 2019; Chen et al., 2021).

Yet, there is a growing concern over whether the initiative is “green.”. First, as China’s BRI investments are concentrated in energy and transportation infrastructure, which will increase the BRI countries’ energy demands and carbon emissions(Zhang et al., 2017). Second, China is one of the most important participants in transnational coal-fired power projects(Gallagher & Qi, 2018), some worry that China’s overseas energy investments might work against the global trend of energy transition. Third, some studies argue that the BRI is to exports the excess capacity in China’s high-polluting and high-energy-consuming industries. However, the above questions did have not consider the following certain factors. One factor is the development status and demands of the BRI countries. Most of which simultaneously deal with a large development potential and energy consumption demand. Second, there has been increasing attention on China’s green BRI policies and growing reserves in clean energy technologies. There is a need to evaluate whether the BRI is becoming green in terms of energy consumption in countries along the route.

To this end, we conduct the following research design. We study the effect of China’s BRI on the energy intensity of host countries along the route with a dataset of 125 countries from 2003 to 2017. Adopting a relatively new counterfactual estimation method, which can control for time-varying confounders indicating country-level features, thus better capturing the features of development status among host countries. Furthermore, the overall effect of BRI on energy intensity has been decomposed into the direct effect through “connectivity”, and the indirect effect via the economic development, structural change, and technological progress of countries. The above effects will also vary according to the development status and demands of BRI countries. We thus study the heterogeneous impact of the Initiative accordingly.

Our potential contributions are as follows. We adopt a relatively new counterfactual analysis method, it does not require a pretreatment parallel trend assumption between control and treatment groups as the DID does, which are often invalid with country-level data, and thus more suitable for policy evaluation at the country level. In addition to the direct effect of the BRI via connectivity, this paper also analyzes its possible indirect effects, which makes our evaluation more comprehensive than the existing ones. Upon designing the evaluation process, we consider the development status and needs of the host countries.

Methods

The synthetic control method based on interactive fixed effects proposed by Gobillon and Magnac (2016), which is a relatively new approach for policy evaluation. It can be used for multiple treatment groups and doesn’t require the parallel trend assumption.

We identify the direct and indirect effects of BRI on energy intensity through by carefully select the control variables.

Results

First, the overall effect of the BRI reduces the energy intensity of BRI countries by 0.0152 toes per thousand dollars, of which the direct effect via connectivity reduces it by 0.0125 (82.2% out of the total). This is much larger than the indirect effect through development.

Second, the indirect effect through development in the current status is limited (-0.0027). This is mainly due to the contradictory effects of promoting economic growth and the tertiary industry. Through the former, the BRI could reduce energy intensity by 0.0033, while through the latter, it increased it by 0.0007. Channels through energy structure adjustment and technology spillover are not significant.

Third, country-level characteristics generate heterogeneous results. The overall and direct effects of the BRI on reducing energy intensity are stronger in countries with lower levels of development, more abundant energy endowments, less stringent environmental regulations, and higher levels of environmental technology.

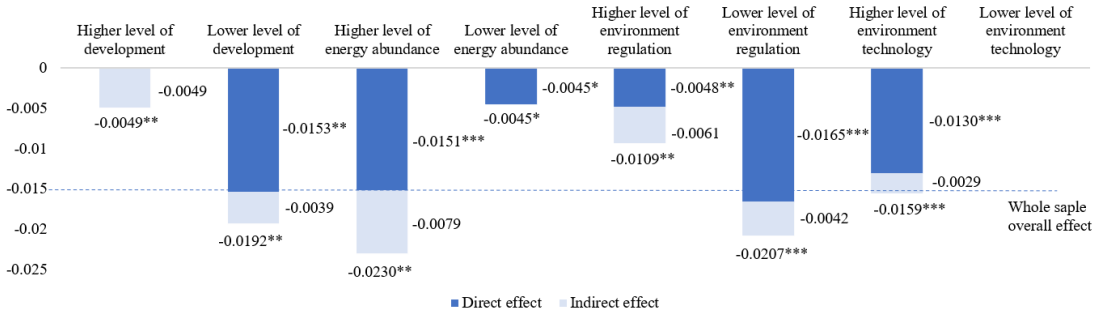

Figure 1 Heterogeneity Analysis Results

Conclusions

Generally, our empirical results show that in terms of reducing energy intensity, the BRI could play a positive role, which may partially alleviate the concerns over the climate and environmental impact of the initiative. Currently, the direct effect via connectivity contributes to a larger proportion, while the indirect effect is limited. As the development effect of the BRI is fully revealed, the indirect effect may play a more important role in the future. Nevertheless, there are still concerns regarding the BRI's long-term impact. Therefore, please note that the channel through industrial structure adjustment is still unfavorable in reducing the energy intensity, and the energy structure change induced by the BRI still favors the use of fossil fuels. This calls for more policy support in the field of building a green Belt and Road. In addition, some country-specific effects deserve further consideration. For example, in countries with less abundant energy endowments and lower levels of environmental technology, the overall effect of the BRI on energy intensity is small, while these countries may be more vulnerable to climate and environmental problems and require investments to foster their clean and sustained development.

References

Fan, J. L., Da, Y.B., Wan, S. L., et al., 2019, Determinants of carbon emissions in "Belt and Road initiative"countries, a production technology perspective[J], Applied Energy, 239, 268~279.

Qi, S., Peng, H., Zhang, X., et al. 2019, Is energy efficiency of Belt and Road Initiative countries catching up or falling behind? Evidence from a panel quantile regression approach[J], Applied Energy, 253, 113~581.

Chen, Z., Yan, T., Zhao, W., et al., 2021, Capacity utilization loss of the Belt and Road countries incorporating carbon emission reduction and the impacts of China's OFDI[J], Journal of Cleaner Production, 280, 123~926.

Zhang, N., Liu, Z., Zheng, X. M., and Xue, J. J., 2017, Carbon footprint of China's Belt and Road[J], Science, 357(6356),1107.

Gallagher, K. S., Qi, Q., 2018, Policies governing China's overseas development finance, im-plications for climate change[J]. The Center for International Environment & Resource Policy, Tufts University, March.

Gobillon, L., Magnac, T., 2016, Regional policy evaluation, Interactive fixed effects and synthetic controls[J], Review of Economics and Statistics, 98(3), 535~55.