DIRTIER OR CLEANER? AN EMPIRICAL ANALYSIS OF CHINA'S OVERSEAS ENERGY INFRASTRUCTURE PROJECTS

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Overview

In the context of the belt and road initiative (BRI), cooperation in energy infrastructure between China and BRI countries is one of the crucial subjects. China's overseas investments in energy infrastructure may exert great impact on the energy transition and low-carbon development of host countries. Some studies have challenged China's BRI investments in energy infrastructure as it focuses on conventional fossil fuels (Zhang et al., 2017; Ren et al., 2017; Zhou et al., 2018; Li et al., 2020; Gallagher et al., 2019).

The technology type of energy infrastructure projects is largely determined by the demand of host countries. Therefore, to assess whether energy projects invested in by China are cleaner or dirtier than other sources of funding, one should take into account the demand features of host countries. Moreover, China has been paying increasing attention to the environmental impact of its overseas investments under the BRI. It is also necessary to evaluate whether China's overseas investments still tended toward fossil fuels or turned to clean renewable energy after the BRI.

This paper used the World Bank's private participation in infrastructure (PPI) database to address these issues. We performed a regression on a matched, mixed cross-sectional samples to compare whether projects invested in by China were more intended for renewable or conventional energy technology types, given the similar socio-economic conditions of the host countries and project attributes. Moreover, we studied whether projects from China became cleaner or dirtier after the BRI. We also conducted a series of heterogeneity analyses with different host country characteristics in terms of energy supply and demand.

This study makes the following contributions. First, we constructed counterfactual scenarios to provide a relative evaluation of the climate and energy impact of China's overseas investments from the development perspective of the host countries. Second, using the PPI projects database, we provided new micro-level evidence for the evaluation of China's overseas investments. In contrast to existing studies which use project data from the Chinese global investment tracker (CGIT) or the Chinese Ministry of Commerce, the PPI database includes projects funded by other countries besides China, which allows the above-mentioned comparison.

Methods

Propensity score matching (PSM); Fixed effect regression

Results

First, during the sample period of 2006-2019, China's average investment volume was larger in total energy and conventional energy projects, whereas no significant difference in renewable energy projects was found, compared with other funding sources and similar project and host country features.

Second, after the BRI, the volume of projects invested in by China was comparatively less in conventional energy but more in renewable energy projects. The results were reinforced by a series of robustness tests. This implies that China's overseas investments focus more on the low-carbon transition of host countries.

Third, before the BRI, China tended to invest more in conventional energy overseas, on average. This might be a result of the path-dependence effect of both the investment and host countries. On the one hand, China prefers to invest in projects with mature technology in conventional power generation. On the other hand, host countries might

prefer to attract such projects, which are economical and match their own resource endowment and development needs. However, after the BRI, China tended to invest in large renewable energy projects, on average, more than other countries, and smaller conventional energy projects in countries with high energy self-sufficiency rates or high energy intensity. Such countries may face a more urgent need for low-carbon transition. Moreover, China is actively breaking away from such path dependency in conventional energy projects and has begun to invest cleaner, overseas.

Table 1 Overall regression results for the sample period.

	Unmatched Sample			Matched Sample		
	(1)	(2)	(3)	(4)	(5)	(6)
	Total	Conventional	Renewable	Total	Conventional	Renewable
ChinaMainland	0.571***	0.588***	0.143	0.574***	0.690***	0.194
	(0.151)	(0.183)	(0.184)	(0.186)	(0.186)	(0.247)
Control var	yes	yes	yes	yes	yes	yes
Country FE	yes	yes	yes	yes	yes	yes
Year FE	yes	yes	yes	yes	yes	yes
N	1896	734	1162	1593	651	942
R^2	0.273	0.551	0.292	0.265	0.523	0.307

Table 2 Regression results after the BRI

	Unmatched Sample			Matched Sample		
	(1)	(2)	(3)	(4)	(5)	(6)
	Total	Conventional	Renewable	Total	Conventional	Renewable
ChinaMainland* BRIpost	0.217	-0.359	0.321	0.302	-0.678*	1.373***
	(0.271)	(0.384)	(0.279)	(0.363)	(0.397)	(0.413)
ChinaMainland	0.483**	0.710***	-0.005	0.434	0.944***	-0.571**
	(0.208)	(0.249)	(0.210)	(0.284)	(0.223)	(0.282)
Control var	yes	yes	yes	yes	yes	yes
Country FE	yes	yes	yes	yes	yes	yes
Year FE	yes	yes	yes	yes	yes	yes
N	1896	734	1162	1593	651	942
R^2	0.273	0.552	0.293	0.265	0.525	0.314

Notes: Robust standard errors clustered at the country-year level are reported in parentheses. Significance levels are indicated by * for $p < 0.1$, ** for $p < 0.05$, and *** for $p < 0.01$.

Conclusions

Global clean energy investment is becoming a prosperous market sector with the global trend in energy transition. Our empirical results show that China plays a responsible role in its BRI investments. Our study can partly alleviate some concerns about the BRI negatively impacting host countries as “pollution havens” for China. As China pays increasing attention to the climate impact of its overseas investments, we can expect China to play an even more positive role in the future, helping developing countries achieve green and low-carbon development. Nevertheless, it is necessary to choose the appropriate energy technology types for investment and cooperation, according to the host countries’ development status and actual needs.

References

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