CHINA'S BELT AND ROAD INITIATIVE AND HOST COUNTRIES' GREEN INNOVATION

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Overview

China has launched the "Belt and Road Initiative" (BRI) since 2013. The initiative includes increasing China's outward foreign direct investment especially in fields of infrastructure along the Silk Road Economic Belt – the "Belt" – and the New Maritime Silk Road – the "Road", which connect Asia, Europe and East Africa. However, China's oversea investment has also been accused from negative environmental and climate impact on host countries, i.e. building coal-fired power plants for transportation infrastructure poses ecological risks, etc. Realized from it, China announced "green BRI" guidance in 2017, and has been paying increasing attention to the environmental and climate impact of its oversea projects. Aside from that, given China owns leading technologies in renewable energies and experiences in climate change mitigation, it may also generate positive technology spillover in host countries in such fields.

In this paper, we test whether the BRI induce host countries green innovation, as well as its heterogenous effects and possible mechanisms. We build a country-year panel data includes 96 countries, from year 2003 to 2016. The green innovation is indicated by green patents listed by OECD. Other country level variables come from World Bank, PWT, UNCTAD, WTO, IEA, Statistical Bulletin of China's Foreign Direct Investment, etc. We use Differences-in-Differences method to identify the impact of BRI on green innovation in countries along the "Belt and Road" and its internal mechanisms. To fit the count data structure for green patents, we use negative bionomial mode in regression.

Methods

Differences-in-Differences method has been applied to identify the BRI effect. Countries along the "Belt and Road" are in treatment group, while other countries in control group. For the time point of BRI policy, we use the earliest year that a country cooperate with China instead of the official BRI year in 2013.

In recent years, many scholars have used the Differences-in-Differences method to estimate the policy effect. For example, Miyamoto et al. (2019) used the Differences-in-Differences method to explore the impact of the signing of Kyoto Protocol on the green patents of member countries.As a quasi-natural experiment method, it requires policy shocks to be exogenous.The "Belt and Road" follows the concept of the ancient Silk Road, and whether each country is located along the route is mainly determined by historical and geographical factors.Not only that, the timing of the "Belt and Road" strategy and the actual time for the "Belt and Road" cooperation between countries along the route and China are not self-selected. Therefore, the Differences-in-Differences estimator in this paper satisfies the exogenous hypothesis.The main regression model, heterogeneity analysis model and mechanism model of the influence effect will be designed separately in the following.

Due to the discrete characteristics of the dependent variable, the Differences-in-Differences estimation is based on the negative binomial model in this paper.Commonly used counting models are Poisson model and negative binomial model. Poisson model requires the mean and variance of variables to be close, otherwise the negative binomial model is more appropriate.It can be seen from Fig. 1 that the distribution of green patent data in this article is more discrete and does not meet the requirements of the Poisson model, so the negative binomial model is adopted for regression.The negative binomial model has also been widely used in processing patent data (Brunel, 2019;Miyamoto et al., 2019;Su and Moaniba, 2017).In addition, in the processing of patent data, some scholars used zero-inflated negative binomial model for research (Qi et al., 2019), but the number of 0 of patent data in this paper only accounted for about 19%, and according to the information criterion test, the AIC and BIC values of zero-inflated negative binomial model were both greater than those of the negative binomial model.That's mean, the data in this paper is more suitable to use the negative binomial model for regression.

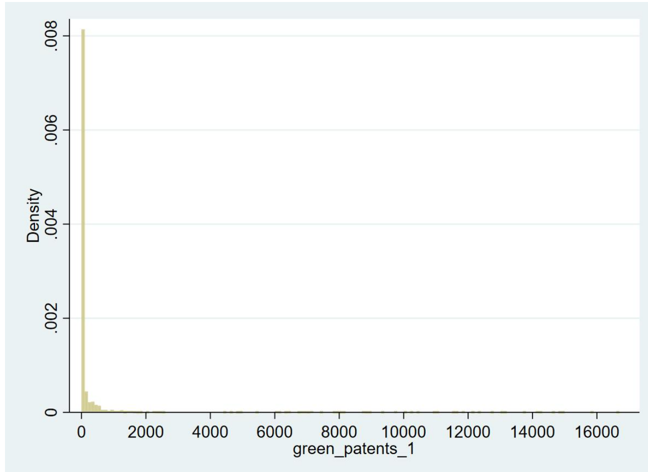

Fig. 1 Distribution map of green patent density with a patent family size 1

The main regression model of the impact of the BRI on green innovation in countries along the "Belt and Road" is as follows:

$$lnE(Green\_pat\_s_{it}) = \beta_0 + \beta_1 \cdot DID + \delta X'_{it} + \mu_i + \gamma_t + \varepsilon_{it} \qquad (1)$$

The subscripts i and t represent the country and year respectively.*Green_pat_s* represents the green patents as the proxy variable of green innovation, where s ={1,2,3,4} represents patent family size. The larger the number, the higher the patent value (OECD, 2019).*DID* is the Difference-in-Differences estimator designed in this paper. X is a series of control variables described in the previous section.μ_i represents the country fixed effect, γ_t represents the year fixed effect, and ε_{it} represents the random disturbance term.The coefficient β_1 of the interaction term in the formula is the one we are most concerned about.

We further explore the heterogeneous effect of the BRI on green innovation in host countries. First, the dependent variable in formula (1) is replaced with the specific green patented technology field.In this step, the dependent variable represents each subdivision of the green patent, such as the patent in the field related to climate change mitigation (CCM), and the number of suffix still represents the size of the patent family.As shown in formula (2), where CCM can be replaced by green patents in other segmented fields.In addition, the dependent variables have the same meanings as those represented in the main regression model.

$$lnE(CCM\_s_{it}) = \beta_0 + \beta_1 \cdot DID + \delta X'_{it} + \mu_i + \gamma_t + \varepsilon_{it} \qquad (2)$$

In order to further understand how the BRI affects the host country's green innovation, we explore the inherent path of the impact of the BRI on the host country's green innovation from five aspects: technology gap, absorption capacity, environmental regulation, energy structure and patent cooperation.

$$lnE(Green\_pat\_s_{it}) = \beta_0 + \beta_1 \cdot DID + \beta_2 \cdot DID * M + \delta \cdot X'_{it} + \mu_i + \gamma_t + \varepsilon_{it} \qquad (3)$$

M represents the proxy variables of the above five aspects.

When exploring the influence of technology gap,we calculated the average of the RTA of each country, and defines the average value higher than China as highRTA. M={RTA_25p, RTA_50p, RTA_75p, HighRTA}, which represent RTA's 25%, 50%, 75% and mean values of RTA higher than China's RTA.

When exploring the influence of absorption capacity of the host country, M is a series of proxy variables that can measure absorption capacity.M={R&D Researchers;L.green_patents;Total Patent}, which respectively represent the number of researchers engaged in R&D in the host country, the number of previous green patents and the total number of patents respectively.

When exploring the influence of environmental regulation, M={CO_2 intensity, CO_2 emissions};When exploring the influence of cooperation, M is the number of green patents in cooperation between China and other countries;When exploring the influence of energy structure, M={2nd Industry;Oil power;Coal power}, which respectively represent the percentage of secondary industry in GDP, the percentage of electricity generated from oil and the percentage of electricity generated from coal.

Results

According to Table 1, The coefficient and significance of the treatment effect DID term are different in the four patent size families.The BRI has a significant role in promoting green patents in family size 1, with a coefficient of 0.0825 (column 1), and has no significant impact on green patents in family size 2 and 3 (columns 2 and 3)), has a significant negative impact on green patents in family size 4, with a coefficient of -0.1455 (column 4).

Table 1 BRI Effects on Host Countries' Green Innovation

	(1)	(2)	(3)	(4)
	Green_pat_1	*Green_pat_2*	*Green_pat_3*	*Green_pat_4*
DID	0.0825**	-0.0268	-0.0800	-0.1455**
	(2.39)	(-0.71)	(-1.49)	(-2.33)
L.green_patents_1	0.3367***			
	(9.21)			
L.nongreen_patents_1	0.1675***			
	(4.53)			
L.green_patents_2		0.4140***		
		(11.64)		
L.nongreen_patents_2		0.0320		
		(0.74)		
L.green_patents_3			0.4037***	
			(10.43)	
L.nongreen_patents_3			-0.0303	
			(-0.60)	
L.green_patents_4				0.3751***
				(9.22)
L.nongreen_patents_4				-0.0051
				(-0.10)
Per capita GDP	0.1818**	0.3831***	0.4895***	0.5456***
	(2.43)	(4.48)	(4.43)	(4.65)
Capital stock	-0.0350	0.3994***	0.1703	0.1835
	(-0.50)	(4.50)	(1.53)	(1.62)
Natural Resource	-0.0101**	-0.0103**	-0.0123**	-0.0094
	(-2.28)	(-2.12)	(-1.98)	(-1.37)
Human capital	-0.1101	-0.0884	-0.2993*	-0.3969**
	(-0.98)	(-0.69)	(-1.75)	(-2.17)
FDI stock	0.0843***	0.0310	0.1016**	0.1084**
	(2.88)	(1.05)	(2.47)	(2.47)
Trade	0.0010	0.0016**	0.0003	0.0004
	(1.62)	(2.24)	(0.39)	(0.44)
WGI	0.0377	-0.2075***	-0.1201	-0.1404
	(0.53)	(-2.66)	(-1.15)	(-1.29)
Oil power	-0.2666	-0.4260*	-0.4959	-0.5217
	(-1.11)	(-1.68)	(-1.59)	(-1.60)
Coal power	-0.0568	-0.3073***	-0.2481	-0.2876*
	(-0.46)	(-2.73)	(-1.57)	(-1.71)
2nd Industry	0.0050	0.0105**	0.0128*	0.0157**
	(1.09)	(2.13)	(1.90)	(2.17)
CO_2 Intensity	0.0245	0.1818**	0.2260**	0.2345**
	(0.38)	(2.47)	(2.42)	(2.37)
FTA with China	-0.1133	-0.0731	-0.0945	-0.0816
	(-1.18)	(-0.66)	(-0.85)	(-0.68)
Trade with China	-0.0456	-0.1715***	-0.2850***	-0.3059***
	(-1.00)	(-3.59)	(-4.97)	(-5.03)
Country FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
N	1260.0000	1260.0000	1208.0000	1208.0000
ll	-3375.5182	-2860.0719	-2509.5764	-2319.3126
chi2	2858.7579	3115.7117	2034.3142	1927.3005
p	0.0000	0.0000	0.0000	0.0000

Note:Results in Table 1 are regression results of formula (1). The dependent variable in column 1-4 are the green patents with family size 1-4.

t statistics in parentheses
* p < 0.10, ** p < 0.05, *** p < 0.01

This means that the BRI has a promotion effect on the low-value green patents of the countries along the route, but has no obvious influence on the medium-value green patents, and has a significant negative effect on the high-value green patents.After the BRI was put forward, it has promoted the lower level of green innovation in the host country, and the higher level of green innovation has yet to be improved.

Next, according to formula (2), analyze the heterogeneity of sub-technical fields.Patents in environment-related fields can be subdivided into smaller technical fields, and this paper only studies their classification to the fourth category.The details of green patent segmentation can see the Table 2.

Table 2 Description of variables in patent segmentation fields

Patent Category 1	Patent Category2	Patent Category3	Patent Category4	Variable description
TOT				All technologies (total patents)
	ENV_PAT			Selected environment-related technologies
		CCM		Climate change mitigation
			ICT	Climate change mitigation in information and communication technologies (ICT)
			ENE	Climate change mitigation technologies related to energy generation,transmission or distribution
			WAT_WASTE	Climate change mitigation technologies related to wastewater treatment or waste management
			GHG	Capture,storage,sequestration or disposal of greenhouse gases
			TRA	Climate change mitigation technologies related to transportation
			BUILD	Climate change mitigation technologies related to buildings
			GOODS	Climate change mitigation technologies in the production or processing of goods
		MAN		Environmental management
			MAN_AIR	Air pollution abatement
			MAN_MO	Environmental monitoring
			MAN_SO	Soil remediation
			MAN_WA	Waste management
			MAN_WAT	Water pollution abatement
		WAT		Water-related adaptation technologies
			WAT_DEM	Demand-side technologies (water conservation)
			WAT_SUP	Supply-side technologies (water availability)

Note: The table is collated from the information on the OECD website by authors.

In order to explore the technical fields in which the BRI promotes green innovation, it is necessary to subdivide patent fields to explore. Based on the results of the main regression model, we only select the green patent subdivision areas with family size 1 for empirical testing.First of all, the empirical results for the category 3 show that the BRI has a significant positive effect on climate change mitigation related patents (CCM) (Table 3, column 1), but has no significant effect on environmental management related patents (MAN) and water-related technology patents (WAT).In recent years, China has gradually begun to play a leading role in tackling climate change,and our results suggest that China’s technological accumulation in tackling climate change also has a positive spillover effect on the “Belt and Road” countries.

Table 3 Heterogeneity in Technology Fields

	(1)	(2)	(3)
	CCM_1	*MAN_1*	*WAT_1*
DID	0.0875^{**}	0.0276	0.0157
	(2.32)	(0.68)	(0.19)
Control Variables	Yes	Yes	Yes
Country FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
N	1234.0000	1204.0000	932.0000
ll	-3256.3748	-2889.3401	-1543.6894
chi2	1715.2328	969.8919	365.9593
p	0.0000	0.0000	0.0000

Note:The results in Table 3 are regression results of formula (2).The dependent variable in column 1-3 are the subdivided green patents with family size 1.
t statistics in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Then, the green patents with patent category 4 in CCM are further analyzed.The results show that the BRI has a significant positive effect on the three fields of climate change mitigation technology: BUILD, ENE, and WAT_WASTE (Table 4).These areas also happen to be the key development directions for China in advancing the BRI cooperation projects.

Table 4 Heterogeneity in Deeper Technology Fields

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	BUILD_1	*ENE_1*	*GHG_1*	*GOODS_1*	*ICT_1*	*TRA_1*	*WAT_WASTE_1*
DID	0.2463^{***}	0.0926^{*}	-0.1085	0.0487	0.1200	0.1084	0.2129^{**}
	(3.01)	(1.67)	(-0.58)	(0.83)	(1.55)	(1.26)	(2.56)
Control Variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	1026.0000	1191.0000	715.0000	1181.0000	881.0000	1078.0000	1000.0000
ll	-1824.9167	-2779.4000	-898.7260	-2213.8189	-1412.3209	-2006.4072	-1785.8721
chi2	1029.3484	2440.1602	569.9151	1252.7691	1230.9053	1325.1254	239.8358
p	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Note:The results in Table 4 are regression results of formula (2).The dependent variable in column 1-7 are the deeper subdivided green patents with family size 1.
t statistics in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Further examine the global position of the host country's green innovation level, and whether the technological gap relative to China affects the green technological innovation effect of the BRI.

It can be seen from Table 5 that the BRI has a weaker effect on the green technology level RTA at the 25% and 50% quantiles, while it is significantly positive at the 75% quantile (columns 1, 2, and 3).

This indicates that with the improvement of green technology level in the host country, the effect of the BRI on its green innovation is getting stronger and stronger.In countries with higher green innovation technology level than China, the total effect of the BRI on green innovation is positive at the significance level of 10%, with a coefficient of 0.1409 (column 4).

It shows that for countries with a higher level of green technology, the BRI has a stronger promotion effect on its green innovation, and can even offset its negative effect on green innovation in low-tech countries. So in the end, the overall promotion effect of the BRI on the host country's green innovation is positive. This result indicates that China's foreign direct investment may be more to adapt to the higher environmental technology level of the host country, or technology-seeking investment.

Table 5 Mechanism:Technology Gap

	(1)	(2)	(3)	(4)
	green_patents_1	*green_patents_1*	*green_patents_1*	*green_patents_1*
*highRTA*DID*				0.1409^{*}
				(1.69)
*RTA_25%*DID*	-0.1323			
	(-0.51)			
*RTA_50%*DID*		-0.2184^{***}		
		(-3.42)		
*RTA_75%*DID*			0.2347^{***}	
			(3.64)	
DID	0.0847^{**}	0.2448^{***}	0.0261	-0.0341
	(2.44)	(4.28)	(0.68)	(-0.44)
Control Variables	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
N	1260.0000	1260.0000	1260.0000	1260.0000
ll	-3375.3825	-3369.9633	-3369.2694	-3374.0195
chi2	2857.2719	2869.3931	2865.4610	2878.3926
p	0.0000	0.0000	0.0000	0.0000

Note:The results in Table 5 are regression results of formula (3).The dependent variable in column 1-4 are the green patents with family size 1. The independent variables in column 1-4 are respectively RTA_25%*DID, RTA_50%*DID, RTA_75%*DID and high RTA*DID.
t statistics in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Introduce the cross-multiplication terms of DID and R&D personnel, previous green patents and total patents respectively for regression, and find that the coefficient of the cross-multiplication term of R&D personnel and DID is 0.0874, which was significantly positive.It shows that the BRI influences the green innovation of the host country through its absorptive capacity.The stronger the absorption capacity of a country, the stronger the impact of the BRI on its green innovation.

Table 6 Mechanism:Absorption Ability

	(1)	(2)	(3)
	green_patents_1	*green_patents_1*	*green_patents_1*
*R&D researchers*DID*	0.0874^{***}		
	(3.15)		
*L.green_patents_1*DID*		0.0070	
		(0.35)	
*Total patent*DID*			0.0149
			(0.88)
DID	-0.8498^{***}	0.0449	-0.0337
	(-2.69)	(0.39)	(-0.25)
Control Variables	Yes	Yes	Yes
Country FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
N	647.0000	1260.0000	1260.0000
ll	-2375.2983	-3375.4583	-3375.1347
chi2	2342.3041	2864.5996	2875.2696
p	0.0000	0.0000	0.0000

Note:The results in Table 6 are regression results of formula (3).The dependent variable in column 1-3 are the green patents with family size 1. The independent variables in column 1-3 are respectively R&D researchers*DID, L.green_patents_1*DID, Total patent*DID.
t statistics in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

We took carbon intensity as the proxy variable of environmental regulation and introduced its crossover term with DID. The smaller the carbon intensity value, the stricter the environmental regulation of the host country.According to Table 7, the higher the environmental regulation, the greater positive and significant impact of the BRI on green innovation.In addition, we also test the cross term between DID and the logarithm of carbon dioxide emissions, and find that the higher the carbon dioxide emissions, the stronger the role of the BRI in promoting green innovation.

It can be said that the BRI influences the green innovation of the host country through the way of environmental regulation.The higher the environmental regulations of the host country, the more China is inclined to invest in cleaner projects to adapt to its higher environmental regulations, thus promoting the green innovation of the host country.In addition, from the perspective of carbon dioxide emissions, the BRI can also promote green innovation in host countries with large emission volume.

Table 7 Mechanism:Environmental Regulation

	(1)	(2)
	green_patents_1	*green_patents_1*
*CO_2 Intensity*DID*	-0.1395***	
	(-3.60)	
*$lnCO_2$*DID*		0.0435**
		(1.96)
DID	0.2109***	-0.4611*
	(4.31)	(-1.65)
Control Variables	Yes	Yes
Country FE	Yes	Yes
Year FE	Yes	Yes
N	1260.0000	1260.0000
ll	-3368.7294	-3373.5815
chi2	2773.9563	2897.2570
p	0.0000	0.0000

Note:The results in Table 7 are regression results of formula (3).The dependent variable in column 1-2 are the green patents with family size 1. The independent variables in column 1-2 are respectively CO_2 Intensity*DID and $lnCO_2$*DID.
t statistics in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 8 Mechanism:Green Patents Cooperation

	(1)	(2)	(3)	(4)
	green_patents_1	*green_patents_1*	*green_patents_1*	*green_patents_1*
*co_green_patent*DID*	0.0072			
	(1.13)			
*co_ccm*DID*		0.0067		
		(0.90)		
*co_man*DID*			0.0397*	
			(1.88)	
*co_wat*DID*				0.0317
				(0.58)
DID	0.0585	0.0628	0.0501	0.0744*
	(1.40)	(1.50)	(1.22)	(1.94)
Control Variables	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
N	1148.0000	1148.0000	1148.0000	1148.0000
ll	-3323.7199	-3323.9436	-3322.6630	-3324.1718
chi2	1786.5553	1786.1733	1797.2520	1789.6724
p	0.0000	0.0000	0.0000	0.0000

Note:The results in Table 8 are regression results of formula (3).The dependent variable in column 1-4 are the green patents with family size 1. The independent variables in column 1-4 are respectively co_green_patent*DID, co_ccm*DID, co_man*DID and co_wat*DID.
t statistics in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Through empirical test, it is found that in the overall green patent cooperation, the internal mechanism assumed by cooperative patents for green innovation in the host country is not valid (column 1).However, based on the regression of green patents in its segmented fields, it is found that the cooperative patents in environmental management technology are significantly positive to the host country's green patents at the significance level of 10% (column 3).It shows that the cooperation between China and the host country in environmental management promotes green innovation in the host country to a limited extent.

Regression analysis of the power generation structure and industrial structure of the host country shows that the power generation structure of the host country has no significant impact on its green innovation, but the industrial structure has a significant impact on its green innovation.It shows that the BRI has no impact on the green innovation of the host country by affecting its power generation structure.Changes in industrial structure have a direct impact on carbon dioxide emissions. It can be said that the less "clean" the industrial structure of the host country is, the greater the impact of the BRI on its green innovation (Table 9, column 3).

Table 9 Mechanism:Energy Structure

	(1)	(2)	(3)
	green_patents_1	*green_patents_1*	*green_patents_1*
*Coal Power*DID*	0.0831		
	(0.70)		
*Oil Power*DID*		-0.0159	
		(-0.04)	
*2nd Industry*DID*			0.0113^{**}
			(2.37)
DID	0.0112	0.0435	-0.2877^{**}
	(0.19)	(1.09)	(-1.97)
Control Variables	Yes	Yes	Yes
Country FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
N	1260.0000	1260.0000	1260.0000
ll	-3462.4042	-3462.6499	-3459.9587
chi2	1856.3059	1860.6563	1859.1081
p	0.0000	0.0000	0.0000

Note:The results in Table 9 are regression results of formula (3).The dependent variable in column 1-3 are the green patents with family size 1. The independent variables in column 1-3 are respectively Coal Power*DID,Oil Power*DID, and 2nd Industry*DID.
t statistics in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

We used the following methods for robustness testing:fictitious policy presented time, replace the dependent variable, using a different clustering levels.The results are basically consistent with the main regression results.

Table 10 Robust Test:Placebo Test

	(1)	(2)	(3)	(4)
	green_patents_1	*green_patents_2*	*green_patents_3*	*green_patents_4*
DID	-0.0429	0.0132	0.0019	0.0305
	(-1.50)	(0.40)	(0.04)	(0.65)
Control Variables	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
N	1260.0000	1260.0000	1208.0000	1208.0000
ll	-3377.1821	-2860.2414	-2510.7070	-2321.8871
chi2	2797.5545	3125.2745	1989.3239	1889.3930
p	0.0000	0.0000	0.0000	0.0000

t statistics in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 11 Robust Test:Variable Substitution

	(1) Green_patent_ratio_1	(2) Green_patent_ratio_2	(3) Green_patent_ratio_3	(4) Green_patent_ratio_4
DID	0.1273*	0.0112	0.1278	-0.0121
	(1.80)	(0.11)	(1.12)	(-0.10)
Control Variables	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
N	1213.0000	1213.0000	1213.0000	1213.0000
ll	-404.1009	-414.1678	-398.2736	-404.1639
chi2	1188.0755	919.8294	18476.0298	19383.4300
p	0.0000	0.0000	0.0000	0.0000

t statistics in parentheses
* p < 0.10, ** p < 0.05, *** p < 0.01

Table 12 Robust Test:The Different Clustering Levels

	(1) green_patents_1	(2) green_patents_2	(3) green_patents_3	(4) green_patents_4
DID	0.0675*	-0.0404	-0.0444	-0.1282**
	(1.94)	(-1.18)	(-0.93)	(-2.33)
Control Variables	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
N	1213.0000	1213.0000	1161.0000	1161.0000
ll	-3244.9649	-2738.5960	-2404.4621	-2230.1906
chi2	3237.5873	2806.9259	2188.6429	2042.6772
p	0.0000	0.0000	0.0000	0.0000

t statistics in parentheses
* p < 0.10, ** p < 0.05, *** p < 0.01

Conclusions

We find that at the country level, BRI cooperation can induce green innovation in host countries along the "Belt and Road", but only true in patents with lower value. There's insignificant or even negative effect on host countries at higher level green innovation. The positive technology spillover happens mainly in the climate change related technology fields.

Moreover, the technology direction in China's investment show a pattern to meet the host countries needs and features. For countries with higher level of green innovation, better ability of knowledge absorption and stronger environmental regulation, the above effect would be stronger.

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