

# China's Economic Initiatives and their Impact on Environmental Governance of Global Infrastructure Projects

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## Abstract

The Belt and Road Initiative (BRI) and the Asian Infrastructure Investment Bank (AIIB) have raised concerns among critics about their potential negative impact on global environmental governance. These China-led initiatives may lower the environmental and social safeguard standards of their infrastructure investments abroad to outcompete other international financial institutions (IFIs) like the Asian Development Bank (ADB) and the World Bank. This could trigger a race to the bottom in the global infrastructure investment market. The study found that while the BRI may have a significant influence on the norms and standards of development finance, the AIIB has only had limited impact. The market has become more concentrated rather than intensified competition. The ADB's standards have not been affected, but the World Bank may have been negatively impacted and reduced its project-level environmental safeguards. The negative impact extends beyond BRI countries to other countries. The most concerning finding relates to the substantial global investments in coal power projects under the BRI. To improve global sustainability, China and developed countries must collaborate to provide cleaner and more affordable infrastructure investment to developing countries.

**Keywords:** *Belt and Road Initiative, Asian Infrastructure Investment Bank, international financial institutions, race to the bottom, China*

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## 1. Introduction

When Chinese President Xi Jinping proposed the construction of the “One Belt One Road” initiative, later renamed the Belt and Road Initiative (BRI), and the Asian Infrastructure Investment Bank (AIIB) to finance infrastructure in Asia, many people were skeptical that the impact of these two mega-projects would be entirely positive. Before the emergence of the BRI and the AIIB, major international financial institutions (IFIs) in Asia, such as the Asian Development Bank (ADB) and the World Bank, had been raising environmental and social standards for the infrastructure projects they financed. Such efforts can encourage host countries to protect the environment and society from extreme pollution and exploitation while implementing infrastructure projects, and thus, they can encourage a race-to-the-top effect. After Xi launched his grand proposal, critics were concerned that given China’s poor record on environmental and social policies in building domestic infrastructure, the Beijing-led BRI and AIIB would negatively impact participating countries. Low-and middle-income countries (LMICs) would no longer depend on project loans from major IFIs, which require fund-recipient countries to comply with costly and stringent conditions or standards. Alternatives proposed by China that impose lower standards provide more attractive and cheaper options. With the emergence of the AIIB and the BRI making the market more competitive, major IFIs might no longer insist on strict standards (Katada and Liao, 2020). Given that the BRI and the AIIB are considered China’s grand economic initiatives that complement each other, the emergence of both initiatives may have brought even more negative impacts on other IFIs’ environmental safeguard standards. To retain their dominant position, they may be forced to dilute environmental and social safeguards to compete with China’s initiatives. Rather than a race to the top, the emergence of China in the development finance market could lead to a race to the bottom among host countries and IFIs. Whether this outcome will materialize has become an important question, as well as a challenge, for global environmental governance.

This paper primarily focuses on whether the emergence of the AIIB and the BRI has increased competition in the infrastructure finance market and whether such heightened competition will lead to detrimental environmental and social impacts, resulting in an environmental race-to-the-bottom phenomenon. To investigate these questions, this paper compares environmental and social impact assessments of all infrastructure projects

financed by the ADB and the World Bank before and after the emergence of the BRI and AIIB. Additionally, it compares the impacts in AIIB vs. non-AIIB and BRI vs. non-BRI countries to identify any country-specific differences resulting from China's grand initiatives. The findings of this study are mixed. Rather than raising the level of competition, the emergence of the BRI and the AIIB has made the market more concentrated. The BRI itself may become powerful enough to change the norms and standards of development finance. However, the AIIB has had limited influence. Moreover, the market structure change has not sparked a race to the bottom in the ADB's standards, but the World Bank appears to have been negatively influenced and lowered its environmental safeguards. However, this race-to-the-bottom effect on the World Bank has not been limited to BRI countries but appears to be a more general response. The most alarming finding of this paper is the significant worldwide investments in coal power projects under the BRI, which may pose a potential challenge to global sustainability. The solution requires inputs from both China and high-income countries (HICs) and advanced technology to provide affordable alternatives for power generation in LMICs.

The remainder of the paper initially presents contrasting viewpoints on the current state of the issue under investigation. Subsequently, a section on research design and methodology is presented, along with the exposition of the empirical outcomes and a thorough discussion of the implications of the findings. The final section serves as the conclusion of this study.

## **2. Divergent Perspectives**

The question of the impact of the emergence of AIIB and BRI on global environmental sustainability remains unsolved. Existing literature suggests three different views. First, optimists argue that AIIB can bridge the development finance shortfall in Asia and bring momentum to the evolution of a more efficient global development finance regime (Chen, 2021: 36-40). The AIIB's current governing body is pursuing innovative and transformative methods for sustainable infrastructure investment that can generate positive developmental spillovers (Vazquez and Chin, 2019). Additionally, the presence of several European shareholders in AIIB makes the bank more likely to raise its environmental standards when issuing infrastructure loans (Tracy et al., 2017). At least, the AIIB complements the existing international development finance system and seeks to align with the established norms

and practices of multilateral development banks (Wilson, 2019). Although non-regional members together cannot hold more than 25% of shares, almost half of the bank's senior management officers are from Europe or HICs. All these features suggest that AIIB is more likely to follow or even help improve established global arrangements rather than causing a degradation of global sustainability (Gransow and Price, 2019; Yuan, 2018). Rather than a race to the bottom, AIIB may surprisingly encourage host countries to join in a race to the top. In the case of BRI, one study shows that China's outward foreign direct investment (FDI) has improved BRI countries' institutional quality in terms of regulation and the rule of law. This result further implies that BRI investments can promote national sustainable development (Pan et al., 2020).

On the other hand, for pessimists, the World Bank has been under tremendous pressure to retain its dominant status in development finance due to the emergence of the AIIB, which might not adhere to established standards. Before the establishment of the AIIB, Washington had raised concerns about the environment, as well as sovereign debts and human rights practices (Etzioni, 2016). As a result, the AIIB may be more attractive to LMICs and dilute the global influence of the World Bank (Priester, 2020; Güneylioglu, 2022). Non-governmental organizations have criticized the AIIB's Environmental and Social Framework (ESF) for not allowing for adequate consultation processes. Critics expect that the AIIB may soon become an accomplice in forced evictions, violations of the rights of indigenous peoples, and environmental degradation (Inclusive Development International, 2015).

The legal wordings adopted in the AIIB's ESF are relatively ambiguous compared to those of its counterparts. For example, the AIIB stipulates that it "will not knowingly finance projects involving" activities or items specified in its Environmental and Social Exclusion List (ESEL). The use of the word "knowingly" weakens its ESEL compared to the standards of other lenders (Chen, 2021: 87-89). Moreover, the AIIB claims that by implementing streamlined and fast-track procedures (Zhao, Gou, and Li, 2019), it has resolved problems related to lengthy and inefficient project evaluations that characterize major lenders. However, others worry that these reforms will encourage inadequate environmental and social assessments of infrastructure projects. When the AIIB joined the game in 2016, the World Bank announced that it had perceived a need to revise its environmental and social safeguards more flexibly to keep up with new and varied development

demands. Some considered these revisions a degradation of standards caused by the need to respond to increasing competition from newcomers, namely the AIIB (Laurance, 2016).

In regards to the BRI in comparison with the AIIB, several studies suggest that although China aims to implement infrastructure projects with higher environmental standards at home, it might not encourage such development with its overseas infrastructure investments. Critics worry that the BRI lacks meaningful environmental and social safeguards to protect local populations from adverse impacts (Tracy et al., 2017). One study shows that trade with China does not promote stringent environmental policies among China's trade partners and may generate a race to the bottom in the environmental policies of trading partners (Gamso, 2018). The investments abroad under the BRI may have adverse effects. The most criticized of these negative impacts is the massive investments in worldwide coal power projects, which make China the dominant exporter and financier in this field. In the pursuit of rapid economic development, private interest groups and domestic political-economic structures of developing countries have welcomed abundant capital from China and other countries into the non-renewable energy sector, leading to hindrances in renewable energy expansion and ecological damage (Lim, 2022). This impact is especially significant given that major IFIs have avoided investments in polluting coal power plants. Although it provides efficient and cheaper power generation options for BRI countries, it creates a significant environmental risk that requires innovative solutions (Lin and Bega, 2021).

There are also quantitative studies showing a possible association of the BRI with a race-to-the-bottom effect. One study shows that the World Bank issues loans with significantly fewer conditions to recipient countries that receive aid or investments from China. This result suggests that LMICs may perceive new donors or investors as an attractive outside option and thus force the World Bank to finance with fewer restrictions to retain its competitiveness in the market (Hernandez, 2017). Another study shows that unlike projects financed by major donors from HICs, infrastructure investment projects in Africa underwritten by China discourage the involvement of trade unions in the local area and have not promoted higher labor standards (Isaksson and Kotsadam, 2018).

Third, there are studies elaborating on and evaluating existing arguments and offering neutral assessments rather than choosing sides in this debate.

Most of these studies do not provide a clear-cut answer and instead consider China to be crucial in determining the environmental standards of investment projects in host countries. Improving global sustainability requires China to construct the BRI in an integrative rather than exploitative manner to protect the environment. Doing so will protect the reputations of both China and the BRI (Teo et al., 2019). In addition, the effectiveness of environmental governance under the BRI will also depend on the host countries' determination to implement stringent environmental laws and regulations (Coenen et al., 2021). In the asymmetric relationships under the initiative, China possesses enough power to compel its BRI partners to adopt greener standards at home.

In summary, existing research suggests that although many are concerned that the AIIB will trigger a race to the bottom, the bank, in practice, has not deviated much from established international best practices. In contrast, existing studies show that the BRI has indeed introduced negative environmental impacts on BRI countries. However, these studies focus more on international trade, labor rights, loan conditionality, or quality of governance. This paper differs from existing studies in at least two aspects. First, it specifically focuses on the field of global environmental standards. Although a few studies have touched upon this dimension, most of them focus on theoretical debates or the evaluation of divergent arguments. Few have empirically tested competing arguments. Second, unlike most research focused on competition among fund-receiving countries, this study is more concerned with competition among financing agencies. Instead of competition, the market can also become more concentrated with China's enormous inputs of investments abroad. If this is the case, then China's growing market share will also increase its influence in shaping the global environmental standard of infrastructure projects. Specifically, this paper asks whether established international financial institutions will degrade their environmental protection standards in loan issuance in the face of China's growing ambition for global economic initiatives. These are the main focuses and contributions of this paper.

### **3. Methods and Data**

This study primarily relies on quantitative data to analyse and draw conclusions. First, it investigates the change in competition level among IFIs after the emergence of the AIIB and the BRI by using the Herfindahl-

Hirschman index (HHI) for total infrastructure investments. The HHI is the sum of squares of the share percentage in a specific market, and a high HHI indicates a highly concentrated market structure. In this case, a high HHI would mean that the distribution of Asia's infrastructure loans is highly concentrated among a few institutions and vice versa. The descriptive statistics of the ADB, World Bank, European Bank for Reconstruction and Development (EBRD), AIIB, and BRI are included in the analysis. The IFI data come from official statistics in annual reports or project-level data.<sup>1</sup> The BRI data come from the China Global Investment Tracker (CGIT), published by the American Enterprise Institute (AEI) and the Heritage Foundation (Scissors 2021).

Other descriptive statistics measure the IFI- and country-level environmental and social safeguards. The IFI-level data calculate the annual average score in the environmental assessment category of all infrastructure projects, with projects in category A, B, and C coded as 1, 2, and 3, respectively. The higher the number assigned to a project, the more it aligns with environmental and social safeguards or the less adverse its impact is perceived to be. The coding strategy applies to the World Bank, ADB, and AIIB projects.<sup>2</sup> For example, if a country's ADB score for 2016 is 3, it means that all of its ADB projects approved in 2016 are categorized as C, with minimal or no adverse environmental impact. In contrast, if a country's average score in 2018 is 1, all the projects receiving IFI investments in 2018 in that country are likely to have significant adverse environmental impacts. The calculation of country-level scores includes only IFI investment projects in a specific country.

Following these descriptive statistics on the level of competition and environmental and social safeguards, the paper uses regression analysis to determine whether the emergence of the AIIB and BRI is associated with changes in national sustainability levels. The related variables include a country's participation in the AIIB and the BRI and its environmental, economic, and national development indicators. Dummy variables are used to code whether a country was a member of the AIIB or a BRI country in 2015. The reason for using 2015 as the separation point is that these countries were early members and partners of China's BRI and AIIB and are therefore the most enthusiastic about them. The World Bank should be subject to the greatest competitive pressures of development finance projects in these countries. Therefore, if an environmental race to the bottom were

to materialize in World Bank projects, it would most likely occur in those countries. The measure of AIIB membership uses official data,<sup>3</sup> and national participation in the BRI is based on data collected by the Council on Foreign Relations (Sacks, 2021).

The environmental variables represent national changes in the sustainability level, acting as a proxy for the race-to-the-bottom effect. The first variable is the country-level score on environmental and social safeguards, as previously mentioned. The second uses the 10-year change in the Environmental Performance Index (EPI) from Yale University (Wendling et al., 2020). The economic variables capture potential changes in the national sustainability level and include the national proportion of IFI financial commitments. The data for this comes from IFI official statistics.<sup>4</sup> Additionally, the national economic performance variables are based on World Bank data, which include national GDP, GDP per capita, GDP growth, and government debt as a percentage of GDP. The variables on national development include a country's level of infrastructure development, based on its World Bank Logistics Performance Index (LPI) value for 2014 or 2016, subject to data availability. In addition, the quality of public governance is measured using the World Bank's Worldwide Governance Indicators (WGIs) (Kaufmann and Kraay 2021). The WGIs adopted in the following sections include control of corruption and government effectiveness, which proxy the public sector's corruption control capability and policy formulation and implementation.

This study considers the practices of AIIB and BRI, which may prompt questions as to whether the financing model of BRI falls within the purview of IFIs and hence should not be incorporated in this research. However, there are several reasons for including BRI in this study. Firstly, both AIIB and BRI have come under criticism from governments and scholars for potentially compromising the environment and social sustainability aspects of development finance. This study directly addresses these concerns by including BRI, despite its possible shortcomings. Secondly, this study argues that although BRI is not formally part of IFIs, it may play a critical role in supporting AIIB. Infrastructure projects that China cannot finance through AIIB or request financing from it could still receive funding from BRI, which has greater autonomy. The BRI shares the AIIB's objective of achieving enhanced connectivity, regional cooperation, and economic development on a trans-continental scale. Its worldwide coverage surpasses



that of the AIIB (Rana and Ji, 2020). Therefore, it is essential to analyse AIIB and BRI together in certain contexts, as these development finance strategies are likely to impact the international development finance order. Thirdly, BRI's flexibility allows China to provide financing for infrastructure projects that major IFIs have previously declined to fund. Consequently, BRI could be seen as a viable alternative to mainstream IFIs in practical considerations for governments. Thus, in reality, BRI may become a major competitor of important IFIs. Finally, the empirical analysis below includes both BRI and non-BRI scenarios at the national level, offering relevant insights for readers who argue against the inclusion of BRI. Based on these reasons, this study incorporates BRI data.

#### **4. AIIB, BRI and the Impacts**

Theoretically, if the competition among International Financial Institutions (IFIs) intensifies, there is a risk of lowering environmental safeguards in infrastructure projects. Therefore, it is crucial to check first whether the infrastructure development finance sector in Asia has become more competitive with the massive inputs of China through AIIB and BRI. If so, how competitive is it? The HHI is used here to measure the competition level of development finance in Asia among the IFIs mentioned above. The HHI is the sum of the squares of the share percentages. A large HHI suggests a concentrated market structure, which means a low level of competition. This research also calculates the effective number of IFIs by using the multiplicative inverse of the HHI.<sup>5</sup> Using these two indices, previous studies have found that the competition intensity of development finance in Asia has become greater, although not significantly, since the establishment of the AIIB. In Asia, the effective number of IFIs increased from approximately 2.5 in 2014 to 3.0 in 2019 (Chen, 2021: 92-93).

Building on previous research, this study incorporates BRI data. Although the BRI operates differently from IFIs, they share similar infrastructure funding goals. Therefore, this paper considers the BRI an important complementary financing arm of major IFIs, and includes the funding opportunities added by the BRI. The results in Table 1 below show that after the BRI entered the market in 2013, the effective number of infrastructure investors increased due to China's initial BRI investments. The BRI became a major competitor in Asia's infrastructure loan market and had the potential to influence other IFIs. Since 2014, the effective number

of financing agencies has dropped to around two as China significantly increased the scale of the BRI. This means that development finance in Asia has become less competitive and more concentrated. The main loan competition may exist between the BRI and the rest of the IFIs. The creation of the AIIB in 2015 slightly raised the level of competition.

As a result, after China launched the BRI and AIIB, major IFIs immediately faced a formidable competitor from China's grand economic initiatives, which have the potential to result in a more concentrated market structure. This outcome may have caused traditional IFIs to relax their environmental and social safeguard policies to attract the attention of state leaders. China could be more capable of controlling the financing market for infrastructure projects. If the BRI and AIIB finance more environmentally detrimental projects, other major IFIs are more likely to follow suit. Next, this paper will analyse whether this is the case.

**Table 1. Investment Percentage and Competition Level of Development IFIs in Asia**

Year	ADB	WB	EBRD	AIIB	BRI	Inverse HHI
2012	36.3%	42.4%	21.2%	0.0%	0.0%	2.80
2013	22.1%	25.6%	10.6%	0.0%	41.7%	3.34
2014	9.0%	14.3%	4.7%	0.0%	71.9%	1.82
2015	9.7%	13.3%	4.5%	0.0%	72.6%	1.80
2016	12.1%	13.4%	4.2%	1.1%	69.1%	1.95
2017	14.4%	13.7%	5.0%	1.6%	65.3%	2.13
2018	10.8%	14.1%	4.4%	2.1%	68.6%	1.98
2019	14.6%	12.2%	5.0%	3.2%	65.0%	2.16

*Note: The inverse HHI represents the effective number of competitors.*

Having found a more concentrated structure and China's growing control, in the next step, this paper examines whether these changes have coincided with the environmental and social degradation of infrastructure projects financed by traditional IFIs. To evaluate this question, this paper compares the overall environmental and social safeguard performance of ADB and World Bank projects before and after 2015, the year when the AIIB and BRI emerged. The World Bank's environmental safeguard performance is measured with the average score mentioned above. The exact same measurement applies to the ADB and AIIB projects. The only

difference is that the ADB has safeguard assessments on three dimensions: impacts on the environment, indigenous peoples, and involuntary resettlement.

Table 2 presents the average safeguard performance scores of the AIIB, World Bank, and ADB projects from 2010 to 2020. From 2016 to 2020, the AIIB's projects had a lower average environmental safeguard performance score than those of the World Bank and the ADB, indicating that they were more environmentally detrimental. If negative impacts are observed, this may cause other IFIs to impose even lower standards in an effort to regain their previous advantage. The average environmental safeguard performance score of the World Bank has decreased since 2015, with scores dropping from 2.2 in 2010-2015 to 2.04 in 2016-2020. The score of 2.01 in 2019 suggests that a larger number of the Bank's projects may have caused adverse environmental impacts on average that year, and the situation further worsened in 2020. The percentage of the Bank's category A projects increased from 10.87% in 2014 to 14.3% in 2020, while the percentage of category B projects rose from 66.6% in 2014 to 80.5% in 2020. These results seem to support the criticism that the Bank's new ESF, approved in 2016, led to the financing of more environmentally detrimental infrastructure projects. This trend echoed concerns that the Bank's response to competition from new players such as the AIIB was more environmentally and socially unfriendly (Priester, 2020). In contrast, the ADB's safeguard performance does not appear to have been affected, but rather improved on all three dimensions since 2015. These findings suggest that the race-to-the-bottom phenomenon is only empirically supported at the World Bank, not at the ADB.

**Table 2. Average Safeguard Performance of IFI Projects, 2010–2020**

	<b>AIIB</b>	<b>World Bank</b>	<b>ADB-envi.</b>	<b>ADB-indig.</b>	<b>ADB-rest.</b>
2010	n/a	2.25	2.18	2.73	2.35
2011	n/a	2.30	2.03	2.71	2.16
2012	n/a	2.20	2.18	2.87	2.21
2013	n/a	2.20	2.10	2.75	2.19
2014	n/a	2.16	2.05	2.84	2.26
2015	n/a	2.12	2.18	2.80	2.31
2016	1.67	2.13	2.22	2.82	2.36

	<b>AIIB</b>	<b>World Bank</b>	<b>ADB-envi.</b>	<b>ADB-indig.</b>	<b>ADB-rest.</b>
2017	1.82	2.07	2.19	2.81	2.29
2018	1.63	2.08	2.18	2.79	2.41
2019	1.63	2.01	2.24	2.88	2.46
2020	2.09	1.91	n/a	n/a	n/a
Avg. 10–15	n/a	2.20	2.12	2.78	2.25
Avg. 16–20	1.77	2.04	2.21	2.82	2.38

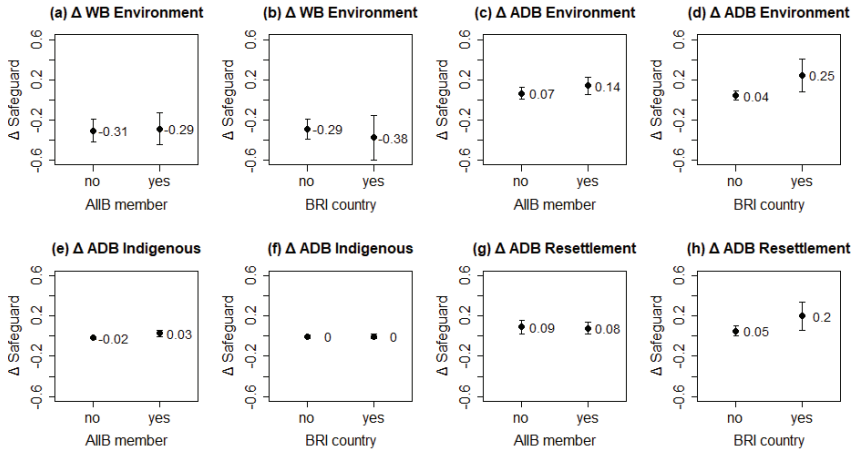
In the next step, this paper investigates country-level data to determine whether negative impacts can be detected in countries that are members of the AIIB and partners of the BRI. Existing studies show that the World Bank has invested less in AIIB member countries. Total World Bank financial commitments per capita to non-AIIB member countries have increased two- to three-fold since 2016, but there has been little change in investments to AIIB members (Chen, 2021: 95-97). This change is country-specific and depends on membership in the AIIB, which suggests that LMICs that have joined the AIIB have reduced their dependence on the World Bank, thus increasing competition among IFIs. If the race-to-the-bottom hypothesis holds, traditional IFIs may approve projects with much more significant potential impacts in those countries due to the new pressures of competition. As a result, IFI projects' environmental and social safeguard performance in such countries is likely to have declined after they joined the BRI and the AIIB.

First, we calculate each country's average environmental and social safeguard scores on World Bank projects from 2010 to 2015 and 2016 to 2020, and then compare each country's performance in these two periods. The countries under comparison include 127 countries that received World Bank commitments in both periods. Among them, 31 were AIIB members in 2015, while 96 were not; 22 were BRI countries, while 105 were not. Adopting the same measure, this study identifies 40 countries that secured ADB projects in both periods. Fifteen were AIIB members, 11 were BRI countries, 25 were not AIIB members, and 29 were not BRI countries. The comparisons show whether the negative impact has varied at the country level and allow us to examine the magnitudes of the effects of China's two initiatives.

Figure 1 demonstrates the results of the comparisons. In the case of the World Bank, both AIIB and non-AIIB members, as well as BRI and non-

BRI countries, show negative changes in Figures 1(a) and 1(b), indicating that all groups of countries performed worse on environmental safeguards. This result corresponds to the finding above. For example, Figure 1(a) shows that the average environmental safeguard score of World Bank projects from 2016 to 2020 across 31 AIIB members decreased by 0.29 points from that in 2010 to 2015. This decline is not unique to AIIB members, as non-AIIB members also experienced a similar situation, with their average score dropping by a more pronounced 0.31 points. However, with a 95% confidence interval, the difference is not statistically significant. The same situation remains when comparing BRI and non-BRI countries in Figure 1(b). Although the safeguard score of countries participating in the BRI dropped more, there is no statistical significance. This finding suggests that the degradation in environmental safeguards by the World Bank appears to be a general trend without country-specific variation.

**Figure 1. The Change in Safeguard Scores Before and After 2015**



Figures 1(c) to 1(h) illustrate the changes in ADB projects' environmental and social safeguard scores in different countries. The impacts on the environment, indigenous people, and involuntary resettlement are assessed in Figures 1(c) and 1(d), 1(e) and 1(f), and 1(g) and 1(h), respectively. Compared to the change in World Bank projects, the change in environmental and social impacts of ADB projects after 2015 is relatively

minor. There are also no statistically detectable country-specific differences. For AIIB, non-AIIB, BRI, and non-BRI countries, the changes in ADB projects' environmental and social impacts appear to be trivial. Furthermore, the performance on all three dimensions improved after 2015, albeit at a negligible level. This finding further strengthens existing studies concluding that negative effects have not occurred in the ADB. Instead, when the infrastructure market became more concentrated after the emergence of China's economic initiatives, ADB projects' environmental and social safeguard levels slightly improved.

In summary, the results in Figure 1 indicate that only the World Bank appears to have suffered from the negative effect. Without observing country-specific variation, we see instead that the effect in the World Bank appears to be a general trend applicable to all borrowers. Such effect might not be a result of a race to the bottom but a response to China's growing concentrated power. The bank's changed funding patterns do not appear to discriminate against countries by membership in other IFIs. This may indicate that the bank regards this rising competition in development financing as a global challenge that therefore requires a globally applicable strategy. The new strategy cannot restrict its scope to a specific country or region.

To evaluate the relationship between the degradation of environmental safeguards in World Bank projects and the emergence of the BRI and AIIB, we conducted country-level regression analysis, controlling for the economic and developmental factors discussed in the previous section. In models 1 to 4, the dependent variable is the proportional changes in World Bank financial commitments before and after 2015, and the main independent variables are dummy variables for whether a country was a member of the AIIB or a BRI country in 2015. Economic control variables in the model include national GDP in 2015, national GDP per capita in 2015, GDP growth, and government debt as a percentage of GDP. Unlike national GDP and GDP per capita data, which vary more stably across time, the last two variables are calculated as the average from 2015 to 2019 because national GDP growth and debt levels may fluctuate more drastically in the short term. Using the average as a proxy can better avoid bias resulting from short-term economic shocks.

The models also control for three developmental variables: a country's infrastructure level, the government's capability of controlling corruption, and the change in a country's sustainability status. The corruption level is

measured by the index of corruption control from the World Bank WGI. The change in the national sustainability level is measured with the 10-year change in the EPI in 2020 (Wendling et al. 2020). The regression analysis also investigates the association between the level of competition and World Bank projects' change in environmental safeguards. As the dependent variables are continuous, the ordinary least squares (OLS) estimation method is adopted.

Table 3 presents the results of the regression analysis. Firstly, it shows that BRI countries have received relatively lower World Bank financial commitments compared to non-BRI countries (model 1). The relationship is statistically significant. Although membership in the AIIB appears to be negatively associated with the change in World Bank funds, the association is not statistically significant. Moreover, under the statistical models incorporating economic and developmental variables (models 3 and 4), both the BRI and AIIB variables are statistically nonsignificant. After controlling for other factors, we see that smaller or wealthier economies received a larger proportion of World Bank commitments after 2015. Both economic associations are statistically significant. Although analysing these economic factors is beyond the scope of this paper, this result shows that the competition effect may relate more to economic factors than to participation in the BRI or AIIB. Lastly, models 3 and 4 do not detect a significant association between the national percentage change in World Bank projects' financial commitments and the projects' level of environmental safeguards. This finding further weakens the arguments for the existence of a race to the bottom at the national level.

Models 5 to 8 were conducted to investigate the factors that may have caused the national environmental safeguard score change before and after 2015, with the dependent variable being the change in environmental safeguard scores between 2011 and 2015 and 2016 and 2020. The independent and control variables were the same as in previous models. The results indicated that none of the above factors had statistically significant associations with changes in environmental safeguards. Therefore, there is insufficient evidence to support that the level of environmental safeguards of World Bank infrastructure projects in AIIB member states or BRI countries has declined in comparison with the level in non-AIIB or non-BRI countries. These findings demonstrate only that BRI countries appear to have received lower World Bank financial commitments since 2015, probably due to the

generosity under the BRI, which is financed by China's state-owned banks and enterprises, making these countries less dependent on the World Bank. However, this declining dependence has not resulted in an environmental race to the bottom by the World Bank in AIIB or BRI countries.

**Table 3. National Changes of World Bank's Funds and Environmental Safeguard Score Before and After 2015**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	$\Delta$ Funds	$\Delta$ Funds	$\Delta$ Funds	$\Delta$ Funds	$\Delta$ Safeguard	$\Delta$ Safeguard	$\Delta$ Safeguard	$\Delta$ Safeguard
BRI country	-0.342**		-0.137		-0.087		-0.093	
	(0.160)		(0.157)		(0.142)		(0.161)	
AIIB member		-0.310		-0.158		0.019		0.078
		(0.201)		(0.182)		(0.120)		(0.187)
$\Delta$ Safeguard			0.019	0.027				
			(0.058)	(0.056)				
$\Delta$ Funds							0.022	0.032
							(0.073)	(0.071)
GDP			-0.165***	-0.159***			0.038	0.028
			(0.058)	(0.048)			(0.059)	(0.070)
GDP/capita			0.028***	0.029***			-0.002	-0.003
			(0.009)	(0.010)			(0.009)	(0.010)
GDP growth			-0.004	-0.001			0.015	0.011
			(0.016)	(0.019)			(0.018)	(0.020)
Debt/GDP			-0.002	-0.001			-0.001	-0.000
			(0.002)	(0.002)			(0.002)	(0.002)
WB LPI			0.004	0.001			-0.105	-0.118
			(0.206)	(0.208)			(0.372)	(0.361)
Corruption			-0.132	-0.126			0.149	0.160
			(0.091)	(0.093)			(0.160)	(0.158)
$\Delta$ EPI			0.009	0.008			0.011	0.0112
			(0.011)	(0.011)			(0.0128)	(0.013)
Countries	152	152	106	106	132	132	106	106

Note: Robust standard errors are reported in parentheses; \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$



Kazakhstan stands out as one of the most prominent cases of increasing reliance on the BRI. Since 2016, when the AIIB and BRI accelerated, Kazakhstan has received minimal funding from either the World Bank or the ADB, as compared to the over US\$1 billion loans received from both IFIs in 2016. However, Astana has secured substantial infrastructure investments from China's BRI (Chen, 2021: 114-116). According to the CGIT dataset, Kazakhstan has received a total of US\$9.45 billion in BRI investments from 2016 to 2022, making the BRI the primary source of funds for Kazakhstan's national development. The majority of BRI funds have been directed towards the energy and transportation sectors, constituting 54% of the total BRI investments. In contrast, there have been almost no investments from the World Bank or ADB in the same sectors since 2016. The change in the structure of foreign financial resources indicates that Astana considers the BRI as the most critical source of external funding, since BRI projects are not required to adhere to universally recognized best practices.

Another aspect of the negative impact relates to the fact that international financial institutions (IFIs) such as the World Bank and the ADB have essentially frozen environmentally detrimental coal-fired power plant projects. As a result, developing countries dependent on cheaper coal-fired power may ask for funds from new IFIs such as the AIIB (Chin, 2016). Indeed, the ADB has stopped funding coal-fired power plants since 2013 (Bin, 2021). Although critics charge that the International Finance Corporation (IFC), the World Bank's private arm, has indirectly supported coal power by financing commercial banks, private equity funds, and hedge funds that have investments in coal, the World Bank itself has not directly financed coal-fired power plants for a long time (Gerretsen, 2020).

In general, developing countries have become less likely to ask for coal power investments from major IFIs. Like the World Bank, the new AIIB has not directly approved coal projects, but it has been a co-financer of the IFC Emerging Asia Fund's equity in coal projects (Freeman, 2019). In terms of governance structure, the AIIB has followed most of the international best practices set up by the established IFIs (Lichtenstein, 2018). The BRI, however, has acted differently and become the largest financer of global coal-fired power, to the detriment of the global climate. Research shows that China's BRI has been involved in at least 240 coal projects in 25 BRI countries. China's coal spree abroad may threaten its partners in high-emissions development (Hilton, 2019). According to CGIT (Scissors, 2021),

approximately 20% of all BRI funds had gone to coal power projects by the end of 2020. Rather than the AIIB, the BRI may be more likely to trigger global competition in financing coal power plants and thus harm the global environment.

The following OLS regression analysis investigates the potential effects of BRI projects on global sustainability. The dependent variables are the Environmental Performance Index (EPI), the environmental health index (a subcategory of the EPI),<sup>6</sup> and the 10-year change in the EPI. These variables measure the level of national sustainability, the national capability of protecting populations from environmental health risks, and the level of improvement of environmental performance over the past ten years. The main independent variables that measure the national level of BRI involvement are total BRI funds and BRI funds for coal power projects. The control variables include the abovementioned economic and developmental variables. Table 4 presents the results. According to models 1 to 6, countries receiving more total BRI funds or funds for coal power projects appear to perform worse in terms of national sustainability and environmental health risks. However, this performance might not have worsened during the past ten years. This result suggests that BRI coal projects are more likely to go to countries with higher environmental risks *ex ante*, but not necessarily to countries experiencing continuous degradation in national sustainability. The results also show that the level of national environmental sustainability is positively related to economic size (GDP), the level of economic development (GDP/capita), and the quality of public services in policy formulation and implementation (government effectiveness).

**Table 4. National Sustainability and BRI Projects**

	(1)	(2)	(3)	(4)	(5)	(6)
	EPI	EPI-Health	ΔEPI	EPI	EPI-Health	ΔEPI
BRI funds	-0.303*** (0.109)	-0.347*** (0.117)	-0.115 (0.071)			
BRI-coal funds				-1.013*** (0.350)	-1.172** (0.462)	-0.109 (0.277)
GDP	1.343** (0.604)	1.866*** (0.708)	1.007*** (0.356)	0.968* (0.540)	1.440** (0.688)	0.822** (0.323)
GDP/capita	0.352*** (0.110)	0.746*** (0.166)	-0.015 (0.058)	0.342*** (0.120)	0.734*** (0.166)	-0.012 (0.066)

	(1)	(2)	(3)	(4)	(5)	(6)
	EPI	EPI-Health	ΔEPI	EPI	EPI-Health	ΔEPI
Debt/GDP	0.022 (0.018)	0.049 (0.033)	-0.009 (0.017)	0.024 (0.018)	0.0518 (0.031)	-0.007 (0.016)
World Bank LPI	1.511 (2.845)	0.286 (3.536)	-1.625 (1.837)	2.155 (2.834)	1.029 (3.450)	-1.552 (1.881)
Government effectiveness	6.578*** (1.344)	10.32*** (1.945)	1.579 (0.995)	6.506*** (1.347)	10.23*** (1.969)	1.595 (0.998)
ΔWorld Bank commitments	0.486 (1.457)	1.296 (1.852)	0.324 (0.643)	0.484 (1.402)	1.291 (1.783)	0.487 (0.672)
<i>Countries</i>	123	123	122	123	123	122

*Note: Robust standard errors are reported in parentheses; \* p < 0.10, \*\* p < 0.05, \*\*\* p < 0.01*

Furthermore, the analysis in table 5 investigates the potential determinants of the locations of BRI projects, energy projects, and coal power projects. The results show that the amount of BRI funding received is positively related to the national level of infrastructure development, suggesting that countries most in need of infrastructure investments may not be those most likely to secure funds from the BRI. Additionally, the amount of BRI funds does not significantly relate to national economic development (GDP/capita). Instead, countries with lower performance in public policy formulation and implementation and environmental sustainability appear to receive more BRI funds in energy and coal power projects.

**Table 5. BRI Projects and Governance**

	(1)	(2)	(3)
	BRI	BRI-Energy	BRI-Coal
World Bank LPI	9.040*** (2.942)	3.289** (1.485)	1.293** (0.582)
GDP/capita	0.074 (0.097)	-0.004 (0.024)	-0.008 (0.008)
Government effectiveness	-2.723*** (1.004)	-1.380** (0.551)	-0.242** (0.118)
EPI	-0.232** (0.112)	-0.066 (0.044)	-0.032** (0.015)
<i>Countries</i>	145	145	145

*Note: Robust standard errors are reported in parentheses; \* p < 0.10, \*\* p < 0.05, \*\*\* p < 0.01*

## 5. Discussion and Conclusion

Based on the empirical results above, there are six points that are worthy of further discussion. First, if one includes China's BRI as an alternative source of development finance for Asian countries, then after China's state-owned agencies started bankrolling BRI countries in 2013, the level of competition in development finance declined. The market moved toward a concentrated structure nearly dominated by the BRI, with all other financiers competing with the BRI. As a result, the BRI has become powerful enough to change the development finance pattern of other IFIs. After the AIIB emerged in 2016, the market became slightly more competitive, although the situation can still be characterized as China initiatives vs. the rest of the IFIs. If one combines the BRI and the AIIB, the market has become even more concentrated since 2013, giving China a dominant market standing. Consequently, traditional IFIs have raised their vigilance vis-à-vis China's uncertain next move in the field of regional development finance. In this context, we can interpret why the World Bank relaxed its environmental and social safeguard policy in 2016. Rather than resulting from more intensive competition, the negative impact on the part of the World Bank is more likely a result of its fear of China's monopolizing the development finance market, rather than an environmental race to the bottom.

Second, there is no evidence to suggest that the ADB has suffered a lowering of environmental and social safeguard standards for their funding projects in the face of the emergence of the BRI and AIIB. Instead, the evidence presented in this paper shows that the ADB has responded to the changed market structure by increasing its infrastructure investments. Furthermore, the average level of environmental and social safeguards in ADB projects has remained unchanged since 2015 and has even slightly improved. In contrast to the World Bank, the ADB has taken a different approach to this challenge.

Third, if the role of the BRI is excluded, the emergence of the AIIB has only marginally increased the level of IFI competition and does not appear to have triggered an environmental race-to-the-bottom effect. Instead, the AIIB has acted as a co-financing partner with major IFIs and signed a cooperation memorandum with other IFIs. Up until the end of 2020, the AIIB had followed the environmental safeguards established under international best practices while co-financing infrastructure projects with its partners. Therefore, there is no substantial evidence suggesting that the establishment

of the AIIB has resulted in an environmental race to the bottom.

Fourth, after conducting a series of statistical tests, no strong evidence was found to support that the World Bank's dilution of best practices has country-specific variation. This phenomenon appears to be universal, applying to all countries receiving World Bank funding. Thus, countries not participating in the BRI and the AIIB have experienced the same environmental degradation in World Bank projects as those joining the BRI or the AIIB. This finding suggests that while the BRI may have introduced a negative impact, it is not a BRI-specific effect. It is possible that if another grand plan for infrastructure financing initiated by other countries were to emerge soon, the World Bank might react in the same way and adjust its standards for all financing destinations.

Fifth, the BRI's worldwide massive investments in coal power projects may pose a potential challenge to global sustainability. Although other IFIs have not directly competed with the BRI in coal projects, some have been involved indirectly. Statistical evidence strongly supports that countries receiving more BRI funds as a whole or BRI coal project investments have low national sustainability levels, inferior public governance quality, and a weaker capability of protecting people from environmental health risks. If these countries continue to receive BRI coal project investments not easily available elsewhere or if China with its BRI does not intend to force these fund-recipient countries to implement higher environmental and governance standards, global environmental protection will not improve, leaving the world with significant sustainability challenges.

In the face of mounting diplomatic pressure to discontinue funding for coal-based infrastructure projects overseas and support the objectives of the Paris Climate Agreement to curb carbon emissions, Chinese leader Xi Jinping announced during his speech at the United Nations General Assembly in September 2021 that China would refrain from initiating any new coal-fired power projects abroad (Brant, 2021). According to data from CGIT, as of 2022, China has financed only one coal power project associated with the BRI in Indonesia. This marks a significant reduction from the average of ten coal projects supported by China through the BRI from 2015 to 2020. These developments suggest that China has attempted to address the criticisms directed towards its BRI policy. Nevertheless, the sustainability of China's commitment and the possibility of financing coal power projects through other official or private channels remain uncertain.

Last, in terms of environmental impact, the BRI and the AIIB differ significantly. The former may have caused adverse effects on global sustainability, whereas the latter has not. This difference can be attributed to their divergent policy goals, operations, and governance systems. The BRI not only focuses on infrastructure development in the region but also serves Beijing's multiple geopolitical and geoeconomic objectives that promote China's strategic interests. Its primary financing arms are China's state-owned policy banks and enterprises, which are not subject to external monitoring mechanisms. The BRI projects are facilitated in a state-centric manner, as China implements a state-centric approach with geopolitical ambitions and recipient countries' state-directed public-private partnerships. This could lead to inefficient resource allocation and political bias, compromising appropriate resource and risk management (Liu and Lim, 2022). Additionally, environmental and social sustainability may be compromised in favour of political objectives.

Furthermore, the BRI is sustained by the Chinese government and independent of external interference. These factors have provided the BRI with greater flexibility in adhering to established international best practices in infrastructure project financing. On the other hand, the institutional design of the AIIB has limited China's role. Although Beijing remains the most powerful player in the AIIB, the bank is subject to supervision by sovereign shareholders. In addition, the AIIB must follow established best practices to secure cooperation opportunities with other IFIs. Many of these practices concerning global sustainability originate from Western countries. Much of the AIIB's senior leadership and staff comes from major IFIs and incorporates best practices into the AIIB's investments. As a result, the AIIB, at least thus far, has become an essential complementary financing institution for infrastructure development rather than a trigger for a race to the bottom in environmental standards.

In conclusion, this paper does not find enough evidence to support the criticism that China's BRI and AIIB will result in global environmental degradation. At most, the emergence of the BRI may trigger a vicious cycle of increased investments in coal power projects, which could have an adverse impact on global sustainability in the energy sector. However, the solution to this problem may not rely solely on China's efforts; it also requires HICs and more advanced technology to offer affordable power generation alternatives in LMICs countries. Additionally, the participating

countries need to optimise the benefits and reduce the hazards associated with the BRI projects (Rana and Ji, 2020). If the costs of using renewable energy decrease, the demand for coal power options will decrease, and as a result, the BRI's coal investments will be less attractive in LMICs. If infrastructure projects cannot be both affordable and environmentally sustainable for LMICs, then even if China's BRI exits the market, another supplier is likely to emerge. Consequently, established IFIs, such as the World Bank, would face the same challenge and might make subsequent adjustments to their environmental and social safeguards that move away from international best practices. Rather than criticizing the BRI, it is more crucial to encourage further cooperation between HICs and LMICs in initiating affordable and sustainable global development strategies.

## Notes

1. The World Bank project data is available at <https://datacatalog.worldbank.org/dataset/world-bank-projects-operations> (accessed on 21 July 2021); ADB data is available at <https://www.adb.org/projects> (accessed on 20 July 2021); AIIB data is available at <https://www.aiib.org/en/projects/list/index.html> (accessed on 20 June 2021); EBRD data is available at <https://www.ebrd.com/news/publications/annual-report/annual-review-2020.htm> (accessed on 22 July 2021).
2. Please refer to footnote 1 for data sources.
3. The data can be accessed online via <https://www.aiib.org/en/about-aiib/governance/members-of-bank/index.html> (accessed on 20 June 2021).
4. Please refer to footnote 1 for data sources.
5. The calculation is the same as the widely used effective number of political parties. For example, an HHI of 0.25 for four competitors means that each competitor controls roughly the same 25% market share. The inverse of 0.25 is 4, which suggests that all four of them are effective competitors in the market.
6. The EPI comprises three dimensions: climate change performance, environmental health, and ecosystem vitality. Given the focus of this study, the dimension of environmental health is the most relevant

index. It is worth noting that the EPI is highly correlated with the dimensions of climate change performance and ecosystem vitality; hence, it can be used as a proxy for the other two dimensions.

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