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### Advancing Green Investment through Financial Development: Evidence from Chinese Corporations

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#### Chronicle

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#### Abstract

This research examines the influence of financial development on corporate green investment in China over the period from 2010 to 2022. Utilizing advanced econometric techniques, specifically Feasible Generalized Least Squares (FGLS) and a two-step system Generalized Method of Moments (GMM). The study effectively mitigates concerns related to heteroskedasticity and endogeneity, which ensures a rigorous and nuanced analysis. The analysis uncovers a pronounced positive correlation between the advancement of financial institutions and markets and both the Green Investment Revenue Ratio (GIRR) and the Green Investment Asset Ratio (GIAR). Well-developed financial institutions facilitate greater access to capital for green investments, which enhances firms' capacity to allocate resources toward environmental initiatives. Moreover, sophisticated financial markets offer more diverse and innovative financial instruments that support sustainable investments, which increases the overall financial commitment to environmental protection. These results accentuate the role of advanced financial systems in enhancing corporate commitment to green investments. The study offers valuable implications for policymakers and managers, emphasizing the necessity of fostering financial development to promote sustainable corporate practices and drive environmental innovation. This research provides new understandings into how financial development can promote sustainable corporate practices and foster environmental innovation by examining the interaction between financial institutions, financial markets, and green investment metrics.

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**Keywords:** ESG Investments; Corporate Green Investments; Financial Development; Country Governance; Rule of Law.

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## INTRODUCTION

The transition to a sustainable, low-carbon economy is one of the defining challenges of the 21st century. As the global community intensifies its efforts to combat climate change, the necessity for substantial green investments has become increasingly critical. (Hao , Umar, Khan, and Ali, 2021). The transition from a carbon-intensive economy to a sustainable and resilient future hinge on the strategic allocation of capital towards environmentally sustainable projects, known as corporate green investments (Zhu, Zhang, and Duan, 2022). Central to this transformation is the shift towards sustainable business practices. While the urgency for such investment is undeniable, the reality is that many economies, particularly those with large carbon footprints, are lagging behind in their transition towards a

greener future. In particular, the world leading brown economy (China) faces a unique challenge and opportunity in this regard. The economic and environmental implications of accelerating green investments within such a substantial and traditionally carbon-heavy economy cannot be overstated. Corporations, with their vast resources, innovative capacities, and global reach, uniquely position to catalyze large-scale investments in green technologies, renewable energy, and carbon-neutral business practices. Yet, unlocking this potential remains a formidable challenge, particularly in economies where brown industries continue to dominate the economic perspective. In the wake of this, this study researches into the pivotal role that financial development plays in this context, postulating that the expansion and advancement of financial institutions and markets are integral to providing the capital and innovative financial instruments for supporting green projects.

China is a country that is fighting with two opposing forces of environment sustainability and economic development. Although the country has been experiencing high economic development, heavy industries coupled with the use of fossil fuels have led to the country having a high environmental load (Bai, et al., 2022). Relying on industries that consume a lot of carbon has caused severe cases of air and water pollution, deforestation, and an increased risk of climate-driven calamities. Although the government has put in place numerous policies to facilitate green investment, rate of transition is very slow. This slow pace can be attributed to a number of factors, including a lack of access to affordable capital, limited awareness of green technologies, and a lack of clear regulatory frameworks. As a result, we posit that understanding the factors that can accelerate this critical transition is of not only academic interest but also carries profound implications for policymakers, managers, and the global community at large. Furthermore, the country's financial system, while robust in its support of traditional industries, has not yet fully adapted to the demands of the green economy. This is a serious gap that should be filled.

This research seeks to understand the complex liaison between financial development and corporate green investment in the context of China. Extant literature has identified range of factors from regulatory frameworks and market incentives to technological advancements and consumer preferences (Song, Wang, & Zhang, 2020; Li, Wang, & Xie, 2022; García , Herrero, Quirós, & Quirós, 2023). However, one critical element that has received relatively less attention is the role of financial development in shaping corporate green investment decisions. In economies where access to capital, risk management tools, and sophisticated financial instruments are limited, the ability of firms to undertake large-scale, long-term green investments may be significantly constrained (Agrawal, et al., 2024). Furthermore, years of high-rate industrialization, as well as urbanization, have caused a serious degradation of the environment that puts the nation at the top of the emitting rates of greenhouse gases in the world. With this end in mind, we will seek to address the following research questions:

To what end does the financial development impact corporate green investment in Chinese A-shares listed corporations? What specific financial development indicators are most strongly associated with corporate green investment? What are the main challenges and opportunities to promote the financial development to facilitate green investments? This paper examines how financial development affects corporate green investment regarding China and over the years 2010 to 2022. We have controlled heteroskedasticity and endogeneity in analysis by using

the advanced econometric methods, which are Feasible Generalized Least Squares and two-step system Generalized Method of Moment. The outcomes show that there is a positive relationship between the financial institution's development index and the financial market development index and the green investment revenue ratio. Further, the identical positive correlation that was noted between the above financial development indices and the green investment asset ratio. These findings indicate that the formulation of Chinese financial system, including institutional as well as the market-based elements has been facilitative in encouraging green investment activities in corporations. The green investment and the positive correlation between financial development can be explained by various reasons. Firstly, the enhancement of financial institutions' capabilities, e.g., improved risk assessment, monitoring, and lending practices, can provide corporations with greater access to funding for environmentally friendly projects. This, in turn, incentivizes firms to allocate more resources towards green investments. Secondly, the deepening of financial markets can facilitate the mobilization of capital towards sustainable ventures, enabling corporations to tap into a wider pool of financing sources for their green initiatives. Additionally, the development of specialized green finance instruments, e.g., green bonds and green loans, may have further catalyzed the flow of capital towards corporate green investments. Overall, these results underline the status of financial system development in supporting the transition towards a more sustainable corporate domain in China.

This study contributes theoretically, empirically, and practically by addressing research queries. Theoretically, this research adds to the fact that the nexus between finance and environmental sustainability is a growing body of literature. It examines how financial development can act as a catalyst for green investment, providing understandings into the mechanisms through which this relationship operates. Empirically, the research offers a unique case study of a large, developing economy with a significant carbon footprint, providing valuable data and visions for legislators and scholars interested in thoughtful the challenges and opportunities of greening economies. Moreover, the paper has a strong methodological framework, which involves a combination of firm-based data and country-based measures of financial development to give a detailed insight into the dynamics involved. Practically, the findings of this study can inform the development of effective policies and strategies to accelerate corporate green investment in world leading brown economy. Furthermore, the findings of this research offer valuable intuitions for policymakers and corporate decision-makers seeking to design and implement effective strategies for promoting green investment and accelerating the transition towards sustainable economic growth. These strategies could include targeted financial incentives, capacity-building programs for financial institutions, and the growth of green financial markets.

The rest of the paper will be organized in the following way: Section 2 and 3 will be devoted to a thorough analysis of theoretical and empirical literature that can be applied in the research. Section 4 provides an in-depth description of the computational methodologies employed in the research. The results given and discussed in the sections 5 and 6 respectively, where Section 5 does the presentation of the results and the section 6 indulges in a thorough discussion of the results presented. The concluding section contains the final remarks and gives policy recommendations on the findings of the study.

## THEORETICAL LITERATURE REVIEW

### Financial Development Theory and Resource Dependence Theory

In the case of a theoretical literature review, a number of theories can be examined to give a complete picture as to the connections between financial development and environmental investments. According to Financial Development Theory presented by Fry, (1989), financial development improves the economic growth by increasing the efficiency of financial intermediation processes, lessening information asymmetry, and the allocation of resources. A well-developed financial system provides better access to financing, which is crucial for investment in various sectors, including green technologies. This theory is pertinent to this research as it suggests that advancements in financial institutions and markets should positively affect corporate investments in environmental protection.

Improved financial infrastructure can lower the cost of capital and reduce barriers to funding green projects, thus encouraging more firms to invest in sustainable practices. Resource Dependence Theory established by Pfeffer and Salancik, (1978) defines that organizations are dependent on external resources to achieve their objectives and thus seek to manage their resource dependencies by establishing relationships with key stakeholders. This theory highlights how firms' behavior is influenced by their need to secure critical resources from external sources. In the context of corporate green investment, this theory implies that firms may seek to align themselves with financial institutions that support environmental initiatives to secure the necessary capital for such investments. Financial development can reduce firms' dependence on less suitable financing options and facilitate access to funds specifically aimed at green projects.

### Theory of Market Efficiency and Stakeholder Theory

The first theory that Fama, (1970) has discussed is the Theory of Market Efficiency which assumes that financial markets are informationally efficient, that is, at any one point, the prices of assets represent all the available information. In an efficient market, resources are allocated optimally based on this information. This theory is relevant as it implies that a well-developed financial market will lead to more accurate pricing of green investment opportunities. If financial markets are efficient, the true value of environmental investments will be reflected in market prices, encouraging firms to pursue these investments if they are perceived as valuable and profitable. The theory of Stakeholders acknowledged by Freeman, (1984) that states that organizations should take into account the interests and welfare of all the stakeholders and not only the shareholders. This theory is based on the need to consider the concerns of other stakeholders such as issues concerning environmental sustainability. This theory applies to the idea of why companies may choose to invest more in green activities in reaction to the goals of the stakeholders, and the stakeholders could include investors, customers and the regulatory authorities. Financial development may help firms to fulfill these expectations of the stakeholders in a better way by availing them the resources needed in making environmental investments.

### Green Finance Theory

Green finance theory is not attributed to a single founder but it has developed over time through the collaborative efforts of numerous scholars, institutions, and international organizations (Dyer, 2018; Sharma, Verma, Shahbaz, Gupta, & Chopra,

2022; Frimpong, Adeabah, Ofose, & Tenakwah, 2022). An important early contribution to the field originated from the United Nations Environment Program (UNEP) through its "Green Economy" initiative, which started in the mid-2010s (UNEP, 2011). Scholars like Sandor, (2016), renowned for pioneering environmental finance and the development of carbon markets, have also played a significant role. Furthermore, the notion has been streamlined by an assortment of scholarly research and policy documents on the integration of environmental, social and governance (ESG) problems in financial decision-making. The theory is interested in the inclusion of the environmental, social and governance (ESG) requirements in the financial decision-making. It also highlights the significance of financial markets and financial institutions in supporting investments that will result in environment sustainability. Therefore, it directly relates to our research by furnishing a model of insight into how financial development, including advancements in green finance, influences corporate investment in environmental protection. It suggests that as financial systems evolve to better support green investments, firms are more likely to allocate resources towards environmentally sustainable projects. As a result, it provides a foundational understanding of how financial development can influence corporate green investment. It offers insights into the mechanisms through which economic foundations and markets affect firms' investment decisions in environmental protection.

In summary, Green Finance Theory is most relevant because it directly ties the concepts of financial development and corporate green investment, providing a robust theoretical foundation for this study.

## EMPIRICAL LITERATURE REVIEW

Corporate green investment has emerged as a pivotal focus in the debate surrounding sustainable development, as firms increasingly recognize the importance of aligning their operations with environmental objectives. Over recent years, research has expanded on various determinants of corporate green investment, reflecting the growing complexity and interdisciplinary nature of the field. In the wake of this, regulatory frameworks and policy incentives have consistently identified as critical drivers of corporate green investment. The role of government interventions, including subsidies, tax incentives, and stringent environmental regulations, has been extensively explored in recent literature. For instance, a study by Chen and In his study, Ma, (2021) investigates the influence of the green investment on the firm performance based on micro-level data of the energy-listed firms in China in the timeframe of 2008-2017.

The results show that there is a positive and significant relationship between the green investment and the financial performance, and significant gains are realized in the third year of investment. It is found that government subsidies, environmental taxes, and technological innovation positively moderate this relationship, especially as a long term financial profitable outcome. Also, green investment minimizes the environmental offences and improves the environmental performance, which further increases the financial outcome in the long-term. These findings imply that environmental investments should be an element of long-term strategies of firms. In the same manner, Huang and Lei, (2021) explores the effects of three categories of environmental regulation on corporate green investment based on the data of Chinese listed companies in the years 2008 to 2016. Using an instrumental variable approach to overcome endogeneity, its results show that command-control regulation and green investment have an inverted U-shaped relationship, whereas

market-based and public-participation regulations have a positive impact on green investment. The study also states that non-state-owned enterprises (NSOEs) allocate more funds to green initiatives and respond more to regulation as compared to state-owned enterprises. Also, regional marketization process increases the impact of the environmental regulation on green investment especially among NSOEs. These perceptions can be used as good pointers in streamlining environmental regulation policies in China.

Financial institutions, especially the banking sector, are very instrumental in easing the corporate green investment. As an example, Long, Yang, and Liu, (2023) assesses the effect of green credit policy (GCP) on green innovation in renewable energy enterprises (REEs) by comparing the results of a difference-in-differences (DID) model using Chinese listed companies between 2008 and 2021. The research concludes that GCP can contribute considerably to the quantity, quality, and quantity of green innovation by decreasing the green agency costs and increasing the R&D investment. The impacts of the policy are more pronounced in companies with tighter environmental laws and larger subsidies which have more benefits in the less polluted and economically disadvantaged areas.

The results indicate the importance of GCP to enhance the enterprise value and environmental performance and provide important understandings to develop green development strategies and a low-carbon economy. This paper examines the role of green insurance, as well as science and technology insurance, in influencing corporate green innovation, after the inclusion of the so-called dual-carbon strategy in the 2021 Government Work Report disseminated in China. The paper analyses the individual and interactive impacts of these types of insurance on green innovation using the data of Shanghai and Shenzhen A-share listed companies (2014-2015). The results provide new visions and empirical data of speeding up green transformation of corporations in China to improve the positive outcomes of green innovation efforts. The evolution of financial markets, especially the expansion of green bonds, has emerged as a central eventuality on the corporate green investment.

In a study by Yeow and Ng, (2021) the authors explore the influence of green bonds on the environmental and financial performance of the issuers, in the face of greenwashing. The research uses propensity score matching and difference-in-differences designs to compare performance changes based on the analysis of the data on green and conventional bond issuances (2015-2019) in different countries. The results show that green bonds enhance environmental performance to a significant level, but when certified by third parties, and it has no effect on financial performance. The findings indicate that externally socially certified content throws light on the greenwashing problem in a developing green bond market.

Zequiraj, Sohag, Soytaş, (2020) explores how the development of the stock market (SMD) affects the low-carbon economy (LCE) through the two channels of renewable energy and technological innovation based on cross-sectional autoregressive distributed lags (CS-ARDL) of panel data of 1980-2016 in EU countries. Results have found that although SMD negatively impacts LCE in the long-term, technological innovation and renewable energy have a positive impact on LCE. The results, consistent across short- and long-run analyses, highlight important policy implications for integrating financial market development with sustainability goals. In the context of venture capital, Jeong, Kim, Son, and Nam, (2020) investigates how venture capital (VC) investment impacts the sustainable growth and performance of startups, focusing on the effects at different growth stages. Analyzing a sample of

363 firms from 2000 to 2007, the research finds that initial-stage VC investment positively enhances startup performance and sustainability. The findings, grounded in signaling theory and information asymmetry, highlight that potential absorptive capacity strengthens this relationship, whereas realized absorptive capacity does not significantly affect it. The corporate governance and leadership and their role in green investment decision-making have also attracted significant research interest in the recent past. Strong adherence to environmental, social, and governance (ESG) principles through the use of effective governance structures is linked with increased amounts of green investment. A study on the correlation between the board composition and the corporate green investment was carried out by Arayssi, Jizi, and Tabaja, (2020) and Suttipun, (2021). The findings showed that companies that had more independent directors and those with eco-driven committees had more chances of making sustainable investments. This paper has highlighted how governance mechanisms can be used to align the corporate strategies and environmental goals. The leadership commitment has also been found to be a decisive choice determinant of green investment. The article by Li, Guo, and Wang, (2024) examines how CEO green experience affects the environmental performance of corporations and the authors analyze the data of the A-share companies of China that were listed between 2010 and 2021.

It concludes that green experience of CEOs has a significant positive impact on environmental performance due to such factors like devotion to environmental ethics, environmental protection investment and innovation of green technologies. The beneficial impacts are stronger in the case of female CEOs, older and highly education CEOs, and non-state-owned firms, those sectors with high environmental pollution, and areas with high environmental protection pressure. The results provide useful perspectives to managerial practice and the environmental policy formulation. In a recent study, Khan, Chenggang, Hussain, and Kui, (2021) assess the short-term and long-term outcomes of technology innovation, finance, and foreign direct investment (FDI) on renewable energy, non-renewable energy, and CO2 emission in 69 countries of the Belt and Road Initiative (BRI) in 2000-2014.

Results based on strong standard error regression and dynamic GMM estimators indicate that technological innovation, level of economic growth, and FDI have negative impacts on renewable energy, whereas financial development has positive impacts on renewable energy. The research also demonstrates that these are the factors that positively influence the use of energy and CO2 emissions. According to Granger non-causality tests, there is a two-way causality link existing between renewable energy, technological innovation, finance, and FDI. The findings indicate that renewable energy can be fostered by improving financial markets and investing in R&D in BRI countries to decrease the emission of CO2. Corporate Social Responsibility (CSR) and ethical considerations have also recognized as significant drivers of green investment.

Firms with a strong commitment to CSR are more likely to prioritize environmental sustainability in their investment decisions. A study of Xue, et al., (2022) investigates how corporate social responsibility (CSR) affects the high-quality development of firms using data from Chinese listed companies (2010-2019). Findings reveal that CSR significantly enhances corporate development quality, with mechanisms including improvements in green innovation, environmental investment, and corporate governance. The results are consistent across various models and control for endogeneity. Heterogeneity analysis shows CSR's impact is stronger in non-state-

owned firms and during market upturns. The study offers insights for refining corporate strategies and government policies in China. A study by Baah, et al., (2021) examines how stakeholder pressures drive the adoption of green production practices and their impact on Small and Medium-sized Enterprises (SMEs) in developing countries.

Based on the institutional theory, stakeholder theory, and the natural resource-based view, and on partial least squares structural equation modelling, the study concludes that regulatory pressure has a positive influence on green practices, firm reputation, and environmental as well as financial performance. Green practices and environmental performance are also enhanced by organizational pressures which have a negative effect on financial performance. This paper observes the significance of the stakeholder influence in fostering green programs and gives recommendations to the policy makers and managers. Corporate green investment has not been spared by the process of internationalization and globalization and especially to multinational corporations (MNCs) that are businesses in different regulatory environments. In another study, Long, Luo, Sun, and Zhong, (2023) examine the effects of outward foreign direct investment on the domestic environmental performance of firms with reference to the theories of reverse knowledge transfer and resource crowding. Considering the evidence of Chinese companies, the findings show that the OFDI promotes the environmental performance, which is consistent with the reverse knowledge transfer.

The impact is magnified in case of the OFDI being channeled in to developed nations where environmental laws are strict and long-term orientation and masculinity values are high. In addition, OFDI increases the domestic green patent application and investment by firms in research and development. The article by Ng, Lye, Chan, Lim, & Lim, (2020) explores the impact of financial development on the environmental, social, and governance (ESG) performance in the Asian continent, a major gap in the current literature. The study uses different econometric techniques to examine country-level data after 2013 and 2017 and concludes that the relationship between financial development and ESG outcomes is positive. The financial markets and institutional factors also enhance this effect, which emphasizes financial development as one of the underlying incentives in the increased ESG performance in the region. On the basis of recent abovementioned studies, we hypothesize that:

**H1:** Financial institution development positively and significantly correlates with corporate green investment.

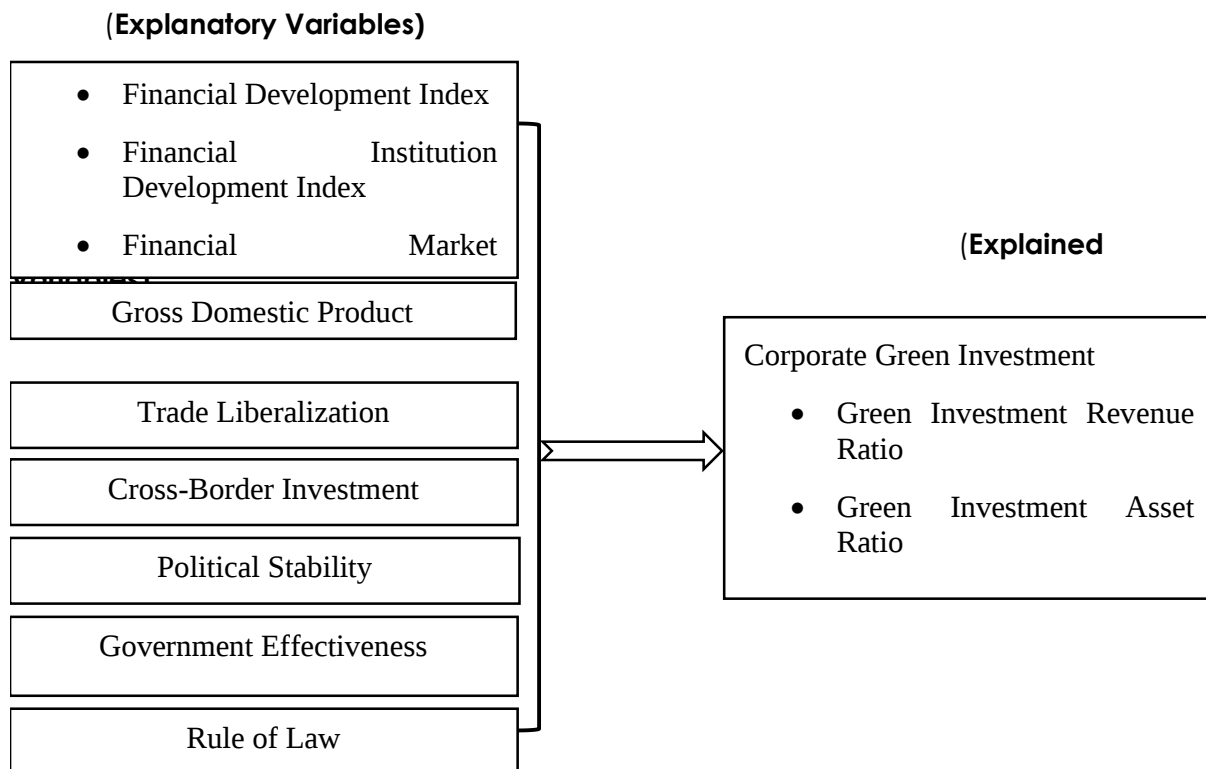
**H2:** The development of financial markets exhibits a positive and significant influence on corporate green investment.

**H3:** Corporate green investment significantly influences by GDP, trade liberalization, cross-border investment, political stability, government effectiveness, and the rule of law.

## CONCEPTUAL FRAMEWORK

Figure 1 outlines the correlation between the variables that are crucial economic and institutional and their influence on corporate green investment. The core of the framework is corporate green investment with two major dimensions of financial development that would affect the process: Financial Institution Development Index (FIDI) and Financial Market Development Index (FMDI). These indices are the ability

of financial institutions and markets to facilitate and encourage environmentally friendly investments. Besides financial development, the framework also brings in a collection of macroeconomic and governance-related variables, such as GDP, trade liberalization, cross-border investment, political stability, government effectiveness, and the rule of law. These factors hypothesize affect corporate green investment by shaping the broader economic and regulatory environment in which firms operate.



**Figure 1.**  
**Conceptual Framework**

## COMPUTATIONAL METHODS

This study undertakes an empirical analysis of corporate green investment among Chinese A-share listed enterprises from 2010 to 2022, utilizing an extensive dataset of 11,596 firm-year observations. The selection of the Chinese economy as the focal point is motivated by its prominent position as a major global economic player and it is rapidly evolving financial markets, which have undergone significant reforms aimed at enhancing sustainability and environmental responsibility. China's unique economic environment, characterized by a blend of state-driven and market-driven mechanisms, can be of specific interest in terms of analyzing the connection between corporate green investment and financial development. The high level of commitment to green finance and the continued endeavors employed by the country to incorporate the aspect of environment in the financial and corporate activities make it a worthy case in this study. The data used in the analysis is obtained on a number of credible sources, such as Thomson Reuters DataStream, China Stock Market and Accounting Research (CSMAR), and the World Development Indicators (WDI). These resources will guarantee the validity and completeness of data, thereby giving a good base of the empirical study. Through this data, the study will serve to help understand the relationship between financial development and corporate green investment in the Chinese context which will

bring significant information about how financial reforms and developments can affect corporate sustainability practices in a rapidly developing economic environment.

## VARIABLES DISCUSSION

This paper explores how corporate green investment in China has been affected by financial development. Financial development plays a vital part in the economic growth and its contribution to the realization of sustainable development is gaining momentum. We will discuss two main aspects of financial development, which include financial institution development and financial market development. Financial institution development is the efficiency and effectiveness used by the financial institutions in mobilizing and allocating capital. These are in terms of size and the scope of banks, quality of the financial services provided, and regulatory environment. Development of financial markets involves the depth and liquidity of financial markets such as the stock market, bond market and other financial instruments.

A well-developed financial market facilitates the efficient allocation of capital towards profitable investments, including those with environmental benefits (Ng, Lye, Chan, Lim, & Lim, 2020). Corporate green investment measured through two indicators: green investment revenue ratio and green investment asset ratio. The green investment (revenue ratio) reflects the proportion of revenue allocated to green investments. This indicator provides insight into the financial commitment of firms to environmental sustainability. The green investment (asset ratio) represents the proportion of total assets invested in environmental protection activities. This indicator captures the long-term investment strategy of firms in environmental sustainability (Biddle, Chan, & Joo, 2024). Through the examination of the correlation between financial development and these two indicators of corporate green investment, this paper seeks to make a contribution with regard to how financial development can support sustainable economic growth in China.

**Table 1.**  
**Variables Description**

| Variables                                                                                                                                                   | Used As   | Measurement                                                                                                                                                                                                                                                                                                                                                                     | Reference                         |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|
| <b>Corporate Green Investment</b><br>• Green Investment Revenue Ratio (GIRR)<br>• Green Investment Asset Ratio (GIAR)                                       | <b>DV</b> | • Green investment/Total revenue<br>• Green investment/Total assets                                                                                                                                                                                                                                                                                                             | (Biddle, et al., 2024)            |
| <b>Financial Development</b><br>• Financial Development Index (FDIV)<br>• Financial Institution Development (FIDV)<br>• Financial Market Development (FMDV) | <b>IV</b> | • FDIV depends on the progress of financial institutions and markets in terms of depth, access, and efficiency.<br>• FIDV is a sub-index, which relies on the progress of financial institutions in terms of depth, access, and efficiency.<br>• FMDV is also a sub-component, which depends on the growth of the financial market in context of depth, access, and efficiency. | (Ng, Lye, Chan, Lim, & Lim, 2020) |
| Gross Domestic Product (GDP)                                                                                                                                | <b>CV</b> | It is calculated by GDP per capital (annual %).                                                                                                                                                                                                                                                                                                                                 | (Alshamsi, Hussin, & Azam, 2015)  |
| Trade Openness (TLR)                                                                                                                                        | <b>CV</b> | It is the sum of imports and exports of goods and services calculated as a                                                                                                                                                                                                                                                                                                      | (Zhuang, et al.,                  |

|                               |    |                                                                                                                                                                                                                                        |                        |
|-------------------------------|----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|
|                               |    | shared of GDP.                                                                                                                                                                                                                         | 2021)                  |
| Cross Border Investment (CBI) | CV | Cross border investment represents and investment made by an entity or an individual in one state into business interest located in an-other state.                                                                                    | (Adenuga, 2023)        |
| Political Stability (PS)      | CV | This is an indicator of the probability with which the government becomes unstable or overthrown through unconstitutional or violent means, such as politically motivated violence and terrorism.                                      | (Okara, 2023)          |
| Government Effectiveness (GE) | CV | This is an indicator of the quality of the services provided by the government, its capability of the civil service as well as quality of the policy making and execution as well as the commitment of the government to its policies. | (Mongi & Saidi , 2023) |
| Rule of Law (RL)              | CV | This measures how well laws enforce and uphold, including the fairness of the authorized system, the safety of rights and freedoms, and the extent to which legal decisions are made impartially.                                      | (Wang, 2019)           |

**Acronyms:** CV stands for control variables, DV presents dependent variables, and IV shows independent variables

## Econometric Modelling

The provided equations represent econometric models used to observe the connection among corporate green investment, financial development, and other macroeconomic factors. These equations aim to explore the relationships between corporate green investment, financial development (FD), and other macroeconomic and institutional factors, providing insights into the drivers and determinants of green investments by firms.

$$GIRR_{it} = \beta_0 + \beta_1 FDI_{it} + \beta_2 FIDV_{it} + \beta_3 FMDV_{it} + \beta_4 GDP_{it} + \beta_5 TLR_{it} + \beta_6 CBI_{it} + \beta_7 PS_{it} + \beta_8 GE_{it} + \beta_9 RL_{it} + \varepsilon_{it} \dots \dots \dots (1)$$

Equation 1 models the green investment revenue ratio (GIRR) as a function of financial development directory (FDIV), financial institution development (FIDV), financial market development (FMDV), GDP, trade openness (TLR), cross-border investment (CBI), political stability (PS), government effectiveness (GE), and rule of law (RL).

$$GIAR_{it} = \beta_0 + \beta_1 FDI_{it} + \beta_2 FIDV_{it} + \beta_3 FMDV_{it} + \beta_4 GDP_{it} + \beta_5 TLR_{it} + \beta_6 CBI_{it} + \beta_7 PS_{it} + \beta_8 GE_{it} + \beta_9 RL_{it} + \varepsilon_{it} \dots \dots \dots (2)$$

Equation 2 models the green investment (asset ratio) (GIAR) as a function of the same set of independent variables as in Equation 1.

$$GIRR_{it-1} = \beta_0 + \beta_1 GIRR_{it-1} + \beta_2 FDI_{it} + \beta_3 FIDV_{it} + \beta_4 FMDV_{it} + \beta_5 GDP_{it} + \beta_6 TLR_{it} + \beta_7 CBI_{it} + \beta_8 PS_{it} + \beta_9 GE_{it} + \beta_{10} RL_{it} + \varepsilon_{it} \dots \dots \dots (3)$$

Equation 3 models the lagged green investment revenue ratio (GIRR) as a function of its own lagged value, financial development index (FDIV), financial institution development (FIDV), financial market development (FMDV), GDP, trade openness (TLR), cross-border investment (CBI), political stability (PS), government effectiveness (GE), and rule of law (RL).

$$\begin{aligned} \text{GIAR}_{it-1} = & \beta_0 + \beta_1 \text{GIAR}_{it-1} + \beta_2 \text{FDIV}_{it} + \beta_3 \text{FIDV}_{it} + \beta_4 \text{FMDV}_{it} + \beta_5 \text{GDP}_{it} + \beta_6 \text{TLR}_{it} + \beta_7 \text{CBI}_{it} \\ & + \beta_8 \text{PS}_{it} + \beta_9 \text{GE}_{it} + \beta_{10} \text{RL}_{it} \\ & + \varepsilon_{it} \dots \dots \dots (4) \end{aligned}$$

Equation 4 is identical to Equation 3, as it also models the lagged green investment (revenue ratio) (GIRR) as a function of the same set of variables.

**Table 2.**  
**Co-integration Test**

| Test                                | Model 1    | Model 2    |
|-------------------------------------|------------|------------|
| Wester Lund Test                    |            |            |
| Variance Ratio                      | 14.129***  | -3.291***  |
| Padroni Test                        |            |            |
| Modified Phillips-Perron t          | 32.590***  | 22.236***  |
| Phillips-Perron t                   | 11.923***  | -20.210*** |
| Augmented Dickey-Fuller t           | 17.388***  | -16.102*** |
| Kao Test                            |            |            |
| Modified Dickey-Fuller t            | 14.221***  | -5.313***  |
| Dickey-Fuller t                     | -1.337*    | -17.883*** |
| Augmented Dickey-Fuller t           | 15.111***  | -15.579*** |
| Unadjusted Modified Dickey-Fuller t | -67.266*** | -31.024*** |
| Unadjusted Dickey-Fuller t          | -60.853*** | -32.075*** |
| Note: *** p<0.01,                   |            |            |
| Source: Author Calculation          |            |            |

**Note:** Authors Own Calculations

## METHODOLOGY

To obtain the result on the empirical study of the relationship between financial development and green investments, a sequence of econometric methods was employed to guarantee the soundness and authenticity of the results. The first step was to test cointegration in order to test the long-run relationship between the variables of interest. The test plays a crucial role in determining the existence of a consistent and long-term relationship, which will be the requirement of further regression analyses. Table 2 indicates that both model 1 and 2 support the hypothesis of strong relationship between financial development and green investment in the long-term, and thus, financial policies and enhancement are important in supporting sustainable practices in China. The significant results are continuously at the 1% level ( $p < 0.01$ ). This implies: All the tests reject the null hypothesis of no Co-integration. This implies that in the long run, financial development and green investment in China have a tendency to go in the same direction.

Nevertheless, Co-integration tests do not give the actual coefficients or even the nature of the relationship it was merely showing that there is a long-term relationship present. Based on Co-Integration test, Fixed Effect model was used to explain the unobserved heterogeneity on firm or country level. The fixed effect model findings were given in Table 5. Nevertheless, the model lacks the discussion of possible errors e.g., serial correlation and heteroscedasticity. Then, the Feasible Generalized Least Squares (FGLS) and the two-step system Generalized Method of moments (GMM) techniques were used to improve the strength of the results. FGLS estimators deal

with the problem of heteroscedasticity and autocorrelation that may compromise the findings of the traditional linear regression models. Two-step system GMM estimators, in their turn, are especially handy when it comes to the issues of endogeneity and are extremely efficient when it comes to the analysis of panel data. GMM estimators give consistent and efficient estimates of the relationship between financial development and green investments by placing instrumental variables and moments conditions.

Table 6 and 7 showed the results of FOLS and two-step system GMG. Besides these econometric methods, threshold regression was also utilized in order to examine the possible non-linearity of the relationship between financial development and green investments. Multi-regime or multi-threshold threshold regression enables one to identify multiple regimes or thresholds, in which the relationship between the variables of interest will differ based on the value of a variable of threshold. This method is especially applicable in the field of green investments where the connection between financial development and green investments can be different regarding the extent of financial development or the existence of certain regulatory systems. The findings of the Threshold regression provided in Table 8. (Subhani, Farooq, Bhatti, and Khan, 2021; Farooq, Ahmed, Tabash, Anagreh, and Subhani, 2021).

In summary, the choice of these econometric techniques finalized by the underlying assumptions and limitations of each method. Co-integration tests are essential in establishing the occurrence of a long-run relationship between the variables of interest, while Fixed Effect models handle for unobserved heterogeneity at the firm or country level. FGLS and a two-step system GMM technique further enhance the robustness of the findings by addressing potential issues of heteroscedasticity, autocorrelation, and endogeneity. Threshold regression is particularly useful in capturing non-linearity in the relationship between financial development and green investments. By combining these techniques, the empirical study aims to ensure the consistency and validity of the findings. These methodologies have been previously explored across various studies (Farooq, Ahmed, Tabash, Anagreh, & Subhani, 2021; Subhani, Farooq, Bhatti, & Khan, 2021; Farooq, Tabash, Al-Faryan, Işık, & Dogru, 2024).

## Empirical Results Reporting

The summary statistics table provides an overview of the central tendency, dispersion, and distribution of the variables used in empirical analysis.

**Table 3.**  
**Summary Statistics**

|      | Mean  | SD   | Min   | p25   | Med   | p75   | Max    | N     |
|------|-------|------|-------|-------|-------|-------|--------|-------|
| GIRR | .153  | .177 | .001  | .076  | .128  | .194  | 14.569 | 11596 |
| GIAR | .087  | .115 | 0     | .014  | .047  | .112  | 1.41   | 11596 |
| FDIV | .603  | .049 | .515  | .56   | .63   | .634  | .674   | 11596 |
| FIDV | .551  | .069 | .425  | .496  | .585  | .608  | .617   | 11596 |
| FMDV | .631  | .032 | .584  | .602  | .634  | .642  | .705   | 11596 |
| LGDP | .811  | .183 | .35   | .829  | .848  | .896  | 1.027  | 11596 |
| LTLR | 1.575 | .068 | 1.501 | 1.522 | 1.544 | 1.63  | 1.689  | 11596 |
| CBI  | 2.223 | .905 | 1.008 | 1.556 | 1.931 | 2.82  | 4.004  | 11596 |
| PS   | -.472 | .126 | -.657 | -.544 | -.517 | -.441 | -.233  | 11596 |
| GE   | .363  | .242 | -.005 | .092  | .417  | .497  | .809   | 11596 |

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|    |       |      |       |       |       |       |      |       |
|----|-------|------|-------|-------|-------|-------|------|-------|
| RL | -.305 | .176 | -.545 | -.454 | -.325 | -.187 | .011 | 11596 |
|----|-------|------|-------|-------|-------|-------|------|-------|

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**Note:** Authors Own Calculations **Acronyms:** GIRR= Green Investment Revenue Ration, GIAR= Green Investment Asset Ratio, FDIV= Financial Development Index Variable, FIDV= Financial Institution Development Variables, FMDV= Financial Market Development Variables, TLR= Trade Liberalization, CBI= Cross Border Investment, PS= Political Stability, GE= Government Effectiveness, RL= Rule of Law.

Table 3 reveals the descriptive statistics of the variables. The average of GIRR is 0.153, indicates that, on average, about 15.3% of the total revenue of the firms in the sample comes from investments in environmental protection. The standard deviation (SD) is 0.177, suggests a moderate level of variation among firms. The minimum and maximum values indicate a wide range from near zero to 14.569%, showing significant differences in environmental revenue generation across firms. The mean value of GIAR is 0.087, reflects that, on average, 8.7% of firms' assets are dedicated to environmental protection. The SD is 0.115 and the range between minimum and maximum values indicate variability in how firms allocate assets to green investments. FDIV: With a mean of 0.603 and a low SD of 0.049, this index suggests a consistent level of financial development across firms.

The variance inflation factor (VIF) for FDIV is 87.88, indicating a very high level of multicollinearity with other variables. The mean value of FIDV is 0.551, with an SD of 0.069, again showing some variation among firms in terms of the development of financial institutions. The VIF is 90.17, which is also very high, indicating multicollinearity. FMDV: With a mean of 0.631 and an SD of 0.032, this index reflects a relatively uniform level of financial market development.

Moreover, the mean of LGDP is 0.811 and a SD is 0.183, indicate the economic size of the firms in the sample. The VIF of LGDP is 4.77, suggests moderate multicollinearity. The mean value of LTLR is 1.575, with a SD of 0.068, shows the degree of trade openness among the firms. The VIF of LTLR is 51.81, indicates very high multicollinearity. The mean value of CBI is 2.223, and a SD of 0.905, indicate variability in cross-border investment levels among firms. The VIF of 17.60 suggests substantial multicollinearity. The mean of PS is -0.472 suggests a slightly unstable political environment on average, with moderate variability (SD of 0.126). The VIF of PS is 4.44 indicates moderate multicollinearity. GE (Government Effectiveness): With a mean of 0.363 and a SD of 0.242, this variable reflects the effectiveness of governance, with considerable variation across firms. The VIF of PS is 17.09 points to significant multicollinearity.

The mean of RL is -0.305 and SD is 0.176 reflect a generally weak rule of law environment. The VIF of RL is 11.92 indicates substantial multicollinearity. p25 (25th Percentile): The value such that 25% of the observations are below this value giving an insight into the lower quartile of the distribution. p75 (75th Percentile): The value below which 75% of the values are less than the value, which provides an insight into the upper quartile of the distribution. N: The number of observations of each variable which is also equal across variables at 11,596. VIF (Variance Inflation Factor): This parameter indicates the extent of the multicollinearity of the regression model. VIF of more than 10 would indicate high levels of multicollinearity and therefore it would compromise the accuracy of the regression coefficients. 1/VIF: This is the inverse of VIF and indicates the fraction of a given independent variable that cannot be explained by other independent variables. The less the value the greater the multicollinearity.

According to the mean VIF of 35.71, the explanatory variables have a lot of multicollinearities against each other on average. There is a high degree of multicollinearity which may also compromise the regression estimates and hence it is hard to see the individual effects of each independent variable. On the whole, Table 3 offers important information about the distribution, variability of the Chinese A-shares listed enterprises as well as their possible multicollinearity. The VIF values of some of the variables are very high to indicate that there is a possibility of multicollinearity. The results of the correlation coefficient of the different variables are given in table 4. Correlation coefficients can be between -1 and 1; 1 is positive perfect correlation, -1 negative perfect correlation and 0 is no correlation.

**Table 4.**  
**Correlation Matrix**

|             | (1)    | (2)    | (3)    | (4)    | (5)    | (6)    | (7)    | (8)   | (9)   |
|-------------|--------|--------|--------|--------|--------|--------|--------|-------|-------|
| <b>GIRR</b> | 1.000  |        |        |        |        |        |        |       |       |
| <b>GIAR</b> | 0.099  | 1.000  |        |        |        |        |        |       |       |
| <b>FDIV</b> | -0.040 | -0.092 | 1.000  |        |        |        |        |       |       |
| <b>FIDV</b> | -0.048 | -0.095 | 0.097  | 1.000  |        |        |        |       |       |
| <b>LGDP</b> | 0.053  | 0.048  | -0.068 | -0.060 | 1.000  |        |        |       |       |
| <b>LTLR</b> | 0.041  | 0.097  | -0.097 | -0.098 | 0.058  | 1.000  |        |       |       |
| <b>CBI</b>  | 0.036  | 0.088  | -0.091 | -0.095 | 0.062  | 0.0931 | 1.000  |       |       |
| <b>PS</b>   | -0.029 | -0.063 | 0.061  | 0.072  | -0.030 | -0.070 | -0.076 | 1.000 |       |
| <b>GE</b>   | -0.070 | -0.091 | 0.085  | 0.086  | -0.050 | -0.857 | -0.074 | 0.048 | 1.000 |
| <b>RL</b>   | -0.086 | -0.088 | 0.077  | 0.080  | -0.060 | -0.076 | -0.073 | 0.045 | 0.091 |

\* Shows significance at  $p < 0.01$  **Acronyms:** GIRR= Green Investment Revenue Ration, GIAR= Green Investment Asset Ratio, FDIV= Financial Development Index Variable, FIDV= Financial Institution Development Variables, FMDV= Financial Market Development Variables, TLR= Trade Liberalization, CBI= Cross Border Investment, PS= Political Stability, GE= Government Effectiveness, RL= Rule of Law.

Table 4 represents the correlation analysis. GIRR and GIAR: The correlation between GIRR and GIAR (0.099) is positive but relatively weak; indicating that firms with higher revenue from green investments also lean towards to have a highest percentage of their assets dedicated to environmental protection, though the relationship is not strong. GIRR and other variables: The correlations with other variables such as FDIV (-0.040), FIDV (-0.048), LGDP (0.053), LTLR (0.041), CBI (0.036), PS (-0.029), GE (-0.070), and RL (-0.086) are very weak, suggesting that these variables have little direct linear relationship with GIRR. GIAR and LGDP: The correlation is positive (0.048), indicating a weak relationship between asset investments in environmental protection and the size of the economy. GIAR and LTLR: A correlation of 0.097 shows a weak positive relationship with trade openness. GIAR and other variables: Similarly weak correlations are observed with FDIV (-0.092), FIDV (-0.095), CBI (0.088), PS (-0.063), GE (-0.091), and RL (-0.088). FDIV and FIDV: A very high positive correlation (0.975) exists between FDIV and FIDV. This shows that financial development and the development of financial institutions are almost perfectly aligned, which is logical given that financial institutions are a crucial component of overall financial development.

LGDP and FDIV/FIDV: The correlations are strongly negative (-0.684 with FDIV and -0.609 with FIDV), suggesting that as the financial development indices increase, the economic size represented by the log of GDP tends to decrease, which could indicate an inverse relationship in the dataset. LGDP and CBI: A positive correlation (0.629) with cross-border investment advises that greater economies are linked with higher points of cross-border investment. LTLR and FDIV/FIDV: Very strong negative

correlations with FDIV (-0.976) and FIDV (-0.983) indicate that greater trade openness is associated with lower financial development in the context of this dataset. LTLR and FDIV/FIDV: Very strong negative correlations with FDIV (-0.976) and FIDV (-0.983) indicate that greater trade openness is associated with lower financial development in the context of this dataset. CBI and FDIV/FIDV: Strong negative correlations (-0.914 with FDIV and -0.952 with FIDV) suggest that higher cross-border investment tends to occur in less financially developed contexts in this dataset, possibly reflecting firms seeking more favorable conditions abroad. PS, GE, and RL: These variables have moderate to strong positive correlations with each other (e.g., 0.912 between GE and RL), which is expected as these indicators often move together. For instance, more politically stable environments tend to have better governance and rule of law.

The high correlation among FDIV, FIDV, and FMDV is due to the conceptual overlap in what these indices measure. Each of these indices represents different facets of the financial system's development: FDIV broadly captures the general progress of the financial system, the institutions as well as the markets. FIDV is narrowly engaged in the growth of financial institutions including banks, insurance firms and pension funds. FMDV would not be directly listed, but would be the growth of financial markets such as bond markets and stock markets. Financial institutions and markets are also important aspects of financial development as they are part of it, it is natural for these indices to be highly correlated. They measure related aspects of financial sector progress, resulting in significant overlap and high correlation coefficients.

**Table 5.**  
**Fixed Effect Robust**

| VARIABLES    | (1)<br>Without CV<br>GIAR | (2)<br>With CV<br>GIAR | (3)<br>Without CV<br>GIRR | (4)<br>With CV<br>GIRR |
|--------------|---------------------------|------------------------|---------------------------|------------------------|
| FDIV         | 0.227***<br>(0.044)       | 0.273**<br>(0.137)     | 0.202***<br>(0.035)       | 0.593***<br>(0.159)    |
| FIDV         | 0.103***<br>(0.031)       | 0.267***<br>(0.061)    | 0.471***<br>(0.053)       | 0.094*<br>(0.050)      |
| GDP          |                           | -0.039***<br>(0.010)   |                           | 0.060***<br>(0.013)    |
| TLR          |                           | 0.003***<br>(0.001)    |                           | 0.293***<br>(0.097)    |
| CBI          |                           | -0.007<br>(0.006)      |                           | -0.015***<br>(0.004)   |
| PS           |                           | -0.025*<br>(0.015)     |                           | -0.060**<br>(0.028)    |
| GE           |                           | -0.004<br>(0.011)      |                           | -0.056***<br>(0.015)   |
| RL           |                           | -0.009<br>(0.015)      |                           | -0.075***<br>(0.018)   |
| Constant     | 0.082***<br>(0.000)       | 0.023<br>(0.127)       | 0.143***<br>(0.001)       | -0.765***<br>(0.212)   |
| Firm (FE)    | ✓                         | ✓                      | ✓                         | ✓                      |
| Year (FE)    | ✓                         | ✓                      | ✓                         | ✓                      |
| Observations | 11,596                    | 11,596                 | 11,596                    | 11,596                 |
| R-squared    | 0.007                     | 0.019                  | 0.023                     | 0.034                  |
| Number of ID | 892                       | 892                    | 892                       | 892                    |

**Note:** Author Own Calculations **Acronyms:** GIRR= Green Investment Revenue Ratio, GIAR= Green Investment Asset Ratio, FDIV= Financial Development Index Variable, FIDV= Financial Institution Development Variables, FMDV= Financial Market Development Variables, TLR= Trade Liberalization, CBI= Cross Border Investment, PS= Political Stability, GE= Government Effectiveness, RL= Rule of Law.

Table 5 unveils the results of the Fixed Effect model highlight that both the FDIV and FIDV have a strong, positive influence on green investments, indicating that financial development is crucial for supporting green investments. GDP and trade liberalization (TLR) also play significant roles, though their impacts vary between the asset and revenue ratios. Cross-border investment (CBI) appears to have a more complex relationship, particularly showing a negative impact on revenue ratios. In brief, these results provide valuable insights into how various economic, financial, and institutional factors shape corporate green investments in China.

**Table 6.**  
**Feasible Generalized Least Squares (FGLS) Analysis**

| Variables    | (1)<br>Full         | (2)<br>Lower         | (4)<br>Full         | (5)<br>Lower         |
|--------------|---------------------|----------------------|---------------------|----------------------|
|              | GIAR                |                      | GIRR                |                      |
| FDIV         | 0.110*<br>(0.064)   | 0.345*<br>(0.192)    | 0.202*<br>(0.105)   | 0.831**<br>(0.379)   |
| FIDV         | 0.179**<br>(0.073)  | 0.203**<br>(0.084)   | 0.471***<br>(0.122) | 0.626**<br>(0.255)   |
| GDP          |                     | -0.004***<br>(0.001) |                     | 0.073***<br>(0.024)  |
| TLR          |                     | 0.212*<br>(0.126)    |                     | -0.038<br>(0.197)    |
| CBI          |                     | -0.006<br>(0.008)    |                     | -0.023*<br>(0.012)   |
| PS           |                     | -0.026<br>(0.020)    |                     | -0.108***<br>(0.038) |
| GE           |                     | -0.002<br>(0.020)    |                     | 0.017<br>(0.029)     |
| RL           |                     | 0.001<br>(0.023)     |                     | -0.132***<br>(0.037) |
| Constant     | 0.083***<br>(0.001) | -0.120<br>(0.275)    | 0.143***<br>(0.002) | -0.053<br>(0.421)    |
| Observations | 10,704              | 10,704               | 10,704              | 10,704               |
| Number of ID | 892                 | 892                  | 892                 | 892                  |

**Note:** Author Own Calculations **Acronyms:** GIRR= Green Investment Revenue Ratio, GIAR= Green Investment Asset Ratio, FDIV= Financial Development Index Variable, FIDV= Financial Institution Development Variables, FMDV= Financial Market Development Variables, TLR= Trade Liberalization, CBI= Cross Border Investment, PS= Political Stability, GE= Government Effectiveness, RL= Rule of Law.

Table 6 shows the findings of a Feasible Generalized Least Squares (FGLS) analysis, which was conducted to investigate the effect of different independent variables on the Green investment Asset Ratio (GIAR) and the green investment Revenue Ratio (GIRR). It is analyzed in two distinct scenarios which are the Full and the Low model. Full model: FDIV is positive and significant at the 10% level in case of GIAR, meaning that the larger the financial institutions are developing the asset ratio of

green investments the larger it gets. Lower Model: The influence of FDIV is greater and more important (at the 5% level) meaning that in the situation of a lesser restriction or other circumstances, the influence of the development of financial institutions on the green investments is even more conspicuous. Under GIRR Full Model: FDIV, there is a positive and significant relationship at the 10 percent level which signifies that the development of financial institutions increases the revenue of green investments. Lower Model: The significance is higher (at the 5% level), and the coefficient is greater, which means that the development of financial institutions is even more important in the case of the Lower. FIDV (Financial Development Index - Financial Markets Development Index): FIDV in the Full Model: FIDV is positive and significant at the 5% level indicating that development of financial markets is a contributor of higher green investment assets in the case of GIAR. Lower Model: The positive correlation still occurs and it is significant at the 5% level, but with a slightly smaller effect size. In the event of GIRR, Full Model: FIDV is a very strong and significant effect (at the 1 per cent level), which implies that developed financial markets are a great contributor to increase income generated due to green investments. Lower Model: The value is somewhat lower (at the 5% level), yet, the positive effect is rather powerful, which supports the role of financial markets in powering green investment revenue.

**Table 7.**  
**Generalized Method of Moment Analysis**

| Variables      | (1)                  | (2)                  | (4)                 | (5)                  |
|----------------|----------------------|----------------------|---------------------|----------------------|
|                | Full                 | Lower                | Full                | Lower                |
|                | GIAR                 |                      | GIRR                |                      |
| L.GIAR         | 0.589***<br>(0.029)  | 0.586***<br>(0.034)  |                     |                      |
| L2. GIAR       | -0.056***<br>(0.018) | -0.048**<br>(0.022)  |                     |                      |
| L.GIRR         |                      |                      | 0.204*<br>(0.117)   | 0.198*<br>(0.113)    |
| FDIV           | 0.071*<br>(0.038)    | 0.463**<br>(0.235)   | 0.480***<br>(0.046) | 0.834***<br>(0.169)  |
| FIDV           | 0.066***<br>(0.021)  | 0.189*<br>(0.108)    | 0.486***<br>(0.057) | 0.514***<br>(0.109)  |
| GDP            |                      | -0.042**<br>(0.017)  |                     | -0.038***<br>(0.007) |
| TLR            |                      | 0.251**<br>(0.106)   |                     | 0.159**<br>(0.064)   |
| CBI            |                      | 0.009<br>(0.007)     |                     | -0.028***<br>(0.003) |
| PS             |                      | -0.021*<br>(0.011)   |                     | -0.057**<br>(0.022)  |
| GE             |                      | -0.017<br>(0.022)    |                     | 0.048***<br>(0.010)  |
| RL             |                      | -0.089***<br>(0.030) |                     | -0.256***<br>(0.028) |
| Constant       | 0.075***<br>(0.013)  | -0.636**<br>(0.295)  | 0.094***<br>(0.029) | -0.370***<br>(0.139) |
| Country effect | Yes                  | Yes                  | Yes                 | Yes                  |

|              |       |       |        |        |
|--------------|-------|-------|--------|--------|
| Year effect  | Yes   | Yes   | Yes    | Yes    |
| Observations | 9,812 | 9,812 | 10,704 | 10,704 |
| Number of ID | 892   | 892   | 892    | 892    |

**Note:** Author Own Calculations **Acronyms:** GIRR= Green Investment Revenue Ration, GIAR= Green Investment Asset Ratio, FDIV= Financial Development Index Variable, FIDV= Financial Institution Development Variables, FMDV= Financial Market Development Variables, TLR= Trade Liberalization, CBI= Cross Border Investment, PS= Political Stability, GE= Government Effectiveness, RL= Rule of Law.

Table 7 displays the results of a two-step system GMM analysis, focusing on the dynamic relationship between various financial, economic, and institutional variables and their impact on the green investment Asset Ratio (GIAR) and the green investment Revenue Ratio (GIRR). The analysis is conducted for both a "Full" model and a "LOWER" model. L.GIAR (Lagged GIAR): The coefficients for L. GIAR are positive and highly significant in both the Full and LOWER models. This indicates that past values of GIAR have a strong and persistent positive impact on current GIAR, showing continuity in green investment assets over time. L2. GIAR (Second Lag of GIAR): The coefficients for L2. GIAR are negative and significant, suggesting a correction effect where the influence of earlier periods diminishes over time. This might reflect adjustments in investment strategies or diminishing returns on previous investments. L.GIRR (Lagged GIRR): For GIRR, the lagged value has a positive and marginally significant effect, indicating some continuity in revenue generation from green investments, though the effect is weaker compared to GIAR.

FDIV (Financial Institutions Development Index): Full Model: FDIV shows a helpful and marginally significant outcome, indicating that the development of financial institutions supports the accumulation of green investment assets. LOWER Model: The effect is stronger and more significant, suggesting that in this context, financial institutions are very important in the promotion of green investment assets. Full Model: FDIV contributes to GIRR in a highly significant positive manner indicating that the well-developed financial institutions contribute a lot revenue generation from green investments. LOWER Model: The effect is even stronger, highlighting the key contribution of the financial institutions in enabling green investment to take place. Full Model: The effect of FIDV is positive and significantly high in value that developed financial markets contribute significantly to green investment assets. LOWER Model: The effect remains positive and significant, although slightly less pronounced, indicating that financial markets are important but may operate differently in the LOWER model context. Full Model: FIDV is strongly positive and significant, showing that developed financial markets are essential for generating revenue from green investments. LOWER Model: The positive impact persists, emphasizing the consistent importance of financial markets in different scenarios.

In short, GMM analysis provides perceptions into the dynamic relationship between financial, political, economic, and institutional factors and their impact on corporate green investments, specifically within the conceptual Lower model framework.

### Robustness: Table 8.

**Threshold Regression** (Threshold value selected (LGDP = 0.848 Median value))

| VARIABLES | (1)<br>GIAR         | (2)<br>GIAR        | (3)<br>GIRR         | (4)<br>GIRR         |
|-----------|---------------------|--------------------|---------------------|---------------------|
|           | Lower Regime        | Upper Regime       | Lower Regime        | Upper Regime        |
| Lag y     | 0.634***<br>(0.027) | -0.044*<br>(0.025) | 0.076***<br>(0.003) | 0.165***<br>(0.009) |

|              |                     |                     |                      |                     |
|--------------|---------------------|---------------------|----------------------|---------------------|
| FDIV         | 0.018<br>(0.044)    | -0.265**<br>(0.123) | 0.098***<br>(0.019)  | 0.307***<br>(0.053) |
| FIDV         | 0.226***<br>(0.058) | -0.180*<br>(0.096)  | -0.699***<br>(0.034) | 0.389***<br>(0.036) |
| Cons         | 0.277***<br>(0.045) |                     | -0.447***<br>(0.026) |                     |
| Threshold    | 0.842***<br>(0.019) | 0.842***<br>(0.019) | 0.848***<br>(0.003)  | 0.848***<br>(0.003) |
| Observations | 11,596              | 11,596              | 11,596               | 11,596              |
| Number of ID | 892                 | 892                 | 892                  | 892                 |

**Note:** Author Own Calculations **Acronyms:** GIRR= Green Investment Revenue Ration, GIAR= Green Investment Asset Ratio, FDIV= Financial Development Index Variable, FIDV= Financial Institution Development Variables, FMDV= Financial Market Development Variables, TLR= Trade Liberalization, CBI= Cross Border Investment, PS= Political Stability, GE= Government Effectiveness, RL= Rule of Law.

Table 8 signifies the outcomes of the Threshold Regression. The results divided into two regimes: the Lower Regime and the Upper Regime. The threshold regression results suggest that financial development influences corporate green investments differently depending on whether the financial market or institution is below or above a certain development threshold. In the Lower Regime, initial developments in financial markets and institutions support green investments, but beyond the identified threshold, their impact either diminishes or changes direction, potentially due to market saturation or shifts in investment strategies. The positive effects observed in the Upper Regime for GIRR highlight the importance of advanced financial markets in driving the profitability of green investments.

These findings emphasize the subtle dependence between the development of financial processes and corporate green investment, which prioritizes the need to address financial policies financial policies and strategies to the specific stage of market and institutional development.

## RESULTS DISCUSSION

The paper examines how Financial Development affects Corporate Green Investment and the sample size includes between 2010 and 2022. The analysis is therefore successful in addressing issues which are associated with heteroscedasticity and endogeneity using advanced methods like Feasible Generalized Least Squares (FGLS) and two step system Generalized Method of Moments (GMM). This stringent methodology will make the results robust and reliable and give insight on the importance of financial sustainability and corporate practices of sustainability. The findings of the GMM analysis give the essential information about the impact of different financial, economic, and institutional factors on corporate green investment, in particular, the impacts on GIAR and GIRR. L.GIAR and L2. GIAR: The analysis shows that there is a significant positive correlation between lagged values of GIAR and the present GIAR, which means that the companies that have previously invested in green assets are more likely to invest in green assets in the future. This persistence can be attributed to the long-term nature of such investments, where firms commit to ongoing projects that require sustained funding over time.

However, the negative coefficient for L2. GIAR suggests a diminishing effect of earlier investments, likely due to firms optimizing their investment strategies or experiencing diminishing returns as projects mature. L.GIRR: Similarly, the lagged

value of GIRR positively affects current GIRR, though the effect is weaker. This reflects the gradual accumulation of revenue from green investments, where returns might take time to materialize but tend to persist once established. Financial Institutions Development Index (FDIV): The positive and meaningful correlation between FDIV and both GIAR and GIRR shows that well-developed financial institutions are instrumental in helping green investments through them. The capital needed is availed by financial institutions and financial products that support corporate investments in environmental protection. This connection is particularly strong in the LOWER model, where the development of financial institutions might be more critical due to emerging market dynamics. These institutions likely offer more accessible financing options, tailored products, and risk management services that enable firms to undertake and sustain green investments.

Financial Markets Development Index (FIDV): A highly significant positive relationship between FIDV and both GIAR and GIRR highlights the position of developed financial markets in driving corporate green investments. Well-functioning financial markets provide firms with access to diverse financing options, including equity and green bonds, which are essential for funding large-scale environmental projects. Moreover, developed financial markets enhance the liquidity and price of green assets, and this makes them more appealing to investors. The fact that the effect is positive both in the models is an indication that one of the fundamental enablers of green investment is the development of the financial market regardless of the overall economic environment. Gross Domestic Product (GDP): The research result is a strong negative correlation between GDP and both GIAR and GIRR. This counterintuitive result may reflect the opportunity cost associated with higher economic growth, where firms prioritize more immediate and profitable ventures over long-term green investments during periods of rapid growth. In rapidly growing economies, resources may be diverted toward sectors that promise quicker returns, rather than toward environmental initiatives, which typically require longer time horizons to realize benefits.

Trade Liberalization (TLR): Trade liberalization positively influences both GIAR and GIRR, suggesting that open trade policies create an environment conducive to green investments. Liberalized trade can lead to increased competition, which might drive firms to adopt more sustainable practices to differentiate themselves in the global market. Additionally, trade liberalization can help the allocation of green technologies and best practices across borders, enhancing firms' capacity to invest in environmental protection. While the impact of CBI on GIAR is positive but insignificant, its negative and significant effect on GIRR indicates that cross-border investments might detract from the revenue generated by green investments. This could be due to firms allocating resources to more profitable international opportunities rather than reinvesting in domestic green projects. Additionally, the complexities and risks associated with cross-border investments might limit their effectiveness in generating returns from environmental protection efforts. Political Stability (PS): Political stability has a marginally significant negative effect on GIAR and a more significant negative impact on GIRR. This finding suggests that political instability could hinder corporate green investments by creating an uncertain environment that discourages long-term commitments to environmental projects. Firms operating in politically unstable regions might be more cautious about investing in green initiatives due to the increased risks of policy changes, social unrest, or economic disruptions that could undermine the viability of such investments.

Government Effectiveness (GE): Government effectiveness positively influences GIRR, indicating that efficient governance supports revenue generation from green investments. Effective governments are likely to implement and enforce policies that promote environmental sustainability, provide incentives for green investments, and ensure that the regulatory environment is conducive to generating returns from such investments. This finding highlights the importance of strong institutions in fostering a sympathetic atmosphere for corporate green investment. Rule of Law (RL): The significant harmful effect of the rule of law on both GIAR and GIRR suggests that stricter legal frameworks might impose regulatory burdens that limit firms' ability to invest in and generate revenue from environmental protection initiatives. While a strong rule of law is generally seen as positive for business, in the context of green investments, it may also introduce compliance costs and constraints that make such investments less attractive or profitable.

The findings from this GMM analysis highlight the critical role of financial development in supporting corporate green investments. Properly developed financial institutions and markets are essential for enabling firms to invest in environmental protection assets and generate revenue from these investments. However, economic growth, political stability, and legal frameworks also significantly influence green investment decisions, often in complex and sometimes counterintuitive ways. Understanding these dynamics is crucial for legislators and corporate managers targeting to promote sustainable investments in a rapidly changing global environment.

## **POLICY IMPLICATIONS AND CONCLUSION**

This paper has investigated into the complex dynamics between financial development and corporate green investment within a sophisticated threshold regression framework. The conclusions reveal a nuanced relationship that shifts depending on the level of financial development, particularly highlighting the differential impacts in the lower and upper regimes of financial market and institutional maturity. In the lower regime, initial stages of financial development appear to stimulate corporate green investments, with financial markets and institutions playing a pivotal role in driving both asset-based and revenue-based green initiatives. However, as the financial sector surpasses a certain threshold, the nature of this relationship transforms. The results suggest that while advanced financial development continues to bolster the profitability of green investments, it may also lead to diminishing returns or even adverse effects on asset-based investments, potentially due to market saturation, strategic shifts, or the reallocation of resources. These insights highlight the critical importance of understanding the stage-specific effects of financial development on corporate green investment. Policymakers, financial institutions, and corporate managers must recognize that the path to fostering sustainable investments is not linear; rather, it requires a tailored approach that aligns with the evolving perspective of financial development.

This study suggests some policy implications. Governments and financial regulators should consider the stage of financial development when designing policies to promote green investments. In emerging markets or early stages of financial development, policies should focus on building robust financial institutions and markets that can effectively channel resources into green investments. As these markets mature, policies must adapt to address potential saturation effects and encourage continued innovation in green finance. As financial markets and institutions advance, there is a need for diversified financial instruments and

investment opportunities that can sustain corporate interest in green investments. Policymakers should facilitate the development of specialized green bonds, equity funds, and other financial products that appeal to firms at different stages of their investment cycle. To maintain the momentum of green investment in highly developed financial markets, governments should incentivize innovation in green finance. This includes supporting research and development of new financial products, as well as fostering public-private partnerships that can drive large-scale sustainable projects. As financial markets mature, regulatory bodies must closely monitor the impact of financial development on green investments. This includes assessing potential risks of market saturation and ensuring that financial markets remain conducive to sustainable investment practices. Regulatory frameworks should be flexible enough to evolve alongside the financial sector, preventing adverse effects on green investment due to overly rigid policies. Corporate managers should be encouraged to integrate sustainability into their core business strategies, particularly as financial markets develop. This involves adopting long-term investment horizons, prioritizing transparency in reporting environmental impacts, and actively engaging with stakeholders to align corporate goals with broader societal objectives.

By adopting these policy measures, both governments and corporations can effectively harness the power of financial development to drive meaningful and sustained progress in green investments, ultimately contributing to global sustainability goals.

## STUDY LIMITATIONS AND FUTURE DIRECTIONS

We face some limitations while conducting this research. The study focuses on specific indicators of financial development, such as the Financial Institutions Development Index (FDIV) and Financial Markets Development Index (FIDV). However, financial development is a multi-dimensional concept that may include other aspects such as financial inclusion, innovation, and technology adoption, which were not fully explored in this analysis. The study's analysis relies on data from specific regions and times, which may limit the generalizability of the findings to other contexts. Data limitations, particularly in emerging markets, can affect the accuracy and comprehensiveness of the analysis, potentially leading to biased or incomplete results.

Future research should explore the relationship between financial development and green investment across a broader range of countries and over longer times. This would help to validate the findings and enhance their generalizability across different economic and financial contexts. Future studies should incorporate a wider range of financial development indicators, including those related to financial inclusion, innovation, and digitalization. These factors are increasingly relevant in the modern financial perspective and may have significant implications for green investment. Future studies should assess the role of government policies and regulatory frameworks in shaping the relationship between financial development and green investment. Understanding how different policy environments influence this dynamic could offer valuable insights for designing effective policy interventions.

By addressing these limitations and pursuing these future research directions, scholars can deepen our understanding of the complex relationship between financial development and corporate green investment, ultimately contributing to more effective strategies for promoting sustainable finance.

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