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ROLE SUSTAINABLE INVESTMENT TO REDUCE THE INCOME INEQUALITY (SDG-10): STAKEHOLDERS THEORY PERSPECTIVE

Papel do investimento sustentável para reduzir a desigualdade de renda (ODS-10): perspectiva da teoria dos stakeholders

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ABSTRACT

The novel sustainable investment index is introduced in this study to examine the role of sustainable investment in alleviating income inequality in society (SDG-10). The study also highlights the role of channel variables like green finance and green innovation in the relationship between sustainable investment and income inequality. The cluster regression analysis is conducted by using the data of Chinese listed firms from 2010 to 2020. The findings reveal that sustainable investment significantly negatively affects income inequality. We find that green finance faster the influence of sustainable investment on income inequality. Finally, the results indicate that green innovation accelerates sustainable investment by promoting new startups and job opportunities, which contribute to combating income disparity in society. Hence, this study underlines the pivotal role of sustainable investment practices in promoting green finance and encouraging green innovation to effectively reduce income inequality in society.

Keywords: Green finance; Green innovation; Income inequality; Sustainable investment
JEL classification: D63, Q56, G11

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PAPEL DO INVESTIMENTO SUSTENTÁVEL PARA REDUZIR A DESIGUALDADE DE RENDA (ODS-10): PERSPECTIVA TEÓRICA DAS PARTES INTERESSADAS

Role sustainable investment to reduce the income inequality (SDG-10): stakeholders theory perspective

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RESUMO

O novo índice de investimento sustentável é introduzido neste estudo para examinar o papel do investimento sustentável na redução da desigualdade de renda na sociedade (ODS-10). O estudo também destaca o papel de variáveis de canal como finanças verdes e inovação verde na relação entre investimento sustentável e desigualdade de renda. A análise de regressão de clusters é realizada utilizando dados de empresas chinesas listadas de 2010 a 2020. Os resultados revelam que o investimento sustentável afeta significativamente negativamente a desigualdade de renda. Percebemos que as finanças verdes aceleram a influência do investimento sustentável na desigualdade de renda. Por fim, os resultados indicam que a inovação verde acelera investimentos sustentáveis ao promover novas startups e oportunidades de emprego, que contribuem para combater a disparidade de renda na sociedade. Assim, este estudo ressalta o papel fundamental das práticas de investimento sustentáveis na promoção das finanças verdes e no incentivo à inovação verde para reduzir efetivamente a desigualdade de renda na sociedade.
Palavras-chave: Finanças verdes; Inovação verde; Desigualdade de renda; Investimento sustentável
JEL classification: D63, Q56, G11

INTRODUCTION

The traditional investment strategies switched to sustainable investment practices by creating value both for stakeholders and shareholders. Sustainable investment strategies prioritize investment practices that are beneficial both for investors and other stakeholders by upholding high ethical standards (Renneboog et al., 2008). (Acquah et al., 2023) argue that sustainable investment practices align the Environmental, Social, and Governance (ESG) disclosures, green finance, and green innovation with their business operations. Further, Arner et al. (2020) explain that ESG practices directly or indirectly support in pursuing the SDG-10, which aims to reduce income inequality in society.

This transformative approach replaced the traditional investment policy toward sustainable investment practices that especially helpful in targeting the SDG-10. Barauskaite and Streimikiene (2021) explain that firms' ESG activities perform an important role in promoting sustainable investment practices by generating value for stockholders and positively impact on firm investment decisions. The firm ESG practices emphasizes to maintain a balance between financial gains and environmental & Social considerations for long-term sustainability (Cort & Esty, 2020). This business policy assists to integrate profit-generating activities with sustainable business practices and social well-being.

Ng et al. (2023) report that the sustainable investment is closely aligned with the reduction of income disparities within societies. The firms that adopt the ESG compliance are regularly reviewing the ESG factor in pursuit of a more sustainable future and effectively target SDG-10 (Clementino & Perkins, 2021). Sustainable business practices prefer to take preemptive measures to address the environmental issues and contribute positively to society.

Alkaraan et al. (2022) explain the firms that integrate ESG activities with their investment strategy creates value for investors and other stakeholders contribute a meaningful impact on a society actively targeting SDG-10.

Green finance is an emerging source of financing for sustainable investment that aims to address the numerous stakeholders and focus on long-term sustainability (Cheng et al., 2023). Its primary goal is to finance sustainable investment projects for long-term sustainability by offering financial products and services that encourage environmental responsibility for future sustainability (Clementino & Perkins, 2021). Firms financing through green finance can generate numerous benefits like stable growth and creating value for stockholders' committees by adopting sustainable investment practices which help to reduce the SDG-10 (Montiel et al., 2021).

Green finance acts as an accelerator to transfer funds for sustainable investment and plays a catalyst for integrating ESG activities into investment strategies (Maltais & Nykvist, 2020). Furthermore, Arner et al. (2020) explain that green finance supports the alignment of firms' investment strategies with long-term sustainability, thereby contributing to the achievement of SDG-10. Therefore, this dual role of green finance not only assist to integrate ESG practices with firm investment decisions but also transfer the funds into sustainable initiatives to create value for attaining SDG-10 (Úbeda et al., 2022).

Furthermore, Li et al. (2023) argue the firms that adopt the ESG compliance may allocate funds to invest in green innovation initiatives. Green innovation assist firms in introducing environmentally friendly products and technologies that directly or indirectly improve long-term sustainability (Drempetic et al., 2020). Consequently, firms that implement the ESG practices firms have a greater propensity to invest in green innovation products which may contribute to the reduction of income inequality in the society (Cheng et al., 2023).

Additionally, the firms that pursue sustainable investment strategies not only demonstrate to commitment of investment decisions with ESG practices but also faster the introduction of green innovations to address and mitigate the risk aligned with SDG-10 (Chang et al., 2022). Therefore, the firm's integration of ESG practices, green finance, and green innovation provide a comprehensive framework to achieve long-term sustainability, increasing growth, and promote a meaningful contribution to achieve SDG-10.

The aim of this is to examine the significance of sustainable investment in combating income inequality in society (SDG-10). This study contributes to the existing literature in the variety ways. Firstly, this study highlights the pivotal role of sustainable investment, which can generate value for investors and society at large. Secondly, we analyze how green finance intervenes in the relationship of sustainable investment with SDG-10. Thirdly, it explores how green innovation is aligned with a firm sustainable investment policy to reduce the risk of combating income inequality. Fundamentally, this study emphasizes the importance of sustainable investment to address the issues of income inequality in the community. It aligns the emerging approach of sustainable investment with income inequality and channel variables like green finance and green innovation, aiming to explore new avenues for firm future growth and prosperity of society.

The remaining portion of this study is structured as follows. Section 2 discusses the review of literature and hypothesis development. Section 3 describes the data extraction, variables estimation, and model specification. Section 4 presents the results and discussion and section 5 presents the concluding remarks.

1 THEORY, LITERATURE REVIEW, AND HYPOTHESIS DEVELOPMENT

1.1 Stakeholder Theory and SDG-10

The stockholders theory is an emerging concept that addresses the stake of different individual and groups who can influenced by the organization's policies or decisions (Peng & Isa, 2020). Velte (2017) argues that major stakeholders are shareholders and other categorize into customers, suppliers, society, and even the environment in the decision-making process for long-term sustainability. Freudenreich et al. (2020) revealed the positive correlations between stakeholders and firms' decision-making process regarding long-term sustainability and growth. Cheng et al. (2023) propose that stakeholders approach assist in designing the long-term strategy that may result in more well-informed and long-term sustainable choices.

Shad et al. (2019) identifying the significance of numerous stakeholders in sustainable reporting and firms' strategic decision-making process. Therefore, firms that formulate long-term strategic plans and incorporate stakeholders' interests tend to attain consistent financial objectives over time. Okafor et al. (2021) report that promoting relationships with various stakeholders assists the firms to enhance the financial performance of the business. Hence, stakeholders' consideration promotes sustainable investment and fasters long-term sustainability.

Further, Essid and Berland (2018) explores that institutional framework and policies of regulatory bodies influence the businesses long-term sustainability. Research studies find that firms' investment decisions are significantly influenced by different stakeholders, industry operations, and government regulations. For instance, Liao et al. (2018) find that investment policy of environmental sensitive firms are significantly affected by government regulation and industry norms. Further, Schrettle et al. (2014) investigate firms' investment decisions are positively influenced by addressing the interest of numerous stakeholders. Likewise, Berrone et al. (2007) explain that stakeholders theory includes a sustainable investment policy, creating a positive impact on reducing income inequality in society. Shahid et al. (2023) find that sustainable investment policy accelerate economic justice which assist in reducing income inequality and promoting a more sustainable society.

Reducing income inequality is a prime objective of SDG-10, whose fundamental objective is to improve the social, economic, and environmental sustainability of all stakeholders. D'Alessandro et al. (2020) argue that stakeholder theory creates opportunities for deprived part of society by promoting a fairer distribution of wealth and faster a more balanced society for long-term sustainability (D'Alessandro et al., 2020). Therefore, the firm strategy to incorporate stakeholder theory in decision-making process and make sustainable investments are essential drivers in combating income inequality and underlining the objectives marked in SDG-10.

1.2 Hypothesis Development

The transformation from traditional investment to sustainable investment has obtained significant interest from customers, communities, and investors at large. Cunha et al. (2020) find that sustainable investment firms not only generate a higher return for investors but also influence positively the value of the firm. Sustainable investment firms have higher market ratios and have a better position to secure finance for their investment decisions (Cunha et al., 2020). Barauskaite and Streimikiene (2021) find that sustainable investment firms align the ESG practices which prioritize the equal distribution of wealth and promoting social welfare. This generates a positive social and environmental impact for numerous stakeholders and also seeks financial returns for fund providers.

Li et al. (2023) analyze the firm performance by taking social and environmental elements and consider them as an important factor for the firm future growth and prosperity of society. Barauskaite and Streimikiene (2021) explain that this approach empowers both debt holders and equity holders to support organization projects that actively address inequality in society.

Wang and Wang (2022) argue that sustainable investment firms link their ESG disclosures with their investment policy which contributes to reducing income inequality and promoting social inclusion. Further, Sierra and Rodriguez-Conde (2021) added that potential investors direct their funds toward firms that are addressing income inequality and accelerating social inclusion. Additionally, Montiel et al. (2021) reveal that investors prioritize the firms and initiatives that address the SDGs-10 and promote social inclusion. Hence, sustainable

investment firms integrate their ESG compliance with firms' long-term sustainability potentially contributing to reducing income inequality in society.

Hypothesis 1: *Sustainable investment significantly reduces income inequality by targeting SDG-10.*

The modern approach to finance has shifted from traditional methods to green finance to support sustainable investment. This shift is the result of challenges faced by the organization like environmental issues and promoting sustainable development for long-term sustainability (Cheng et al., 2019). Acquah et al. (2023) document that green finance has a remarkable contribution to long-term sustainability by offering novel financial instruments and investment products to attract investors (Acquah et al., 2023).

Arner et al. (2020) argue that green finance instruments like green bonds, green loans, and green equity aligned with ESG criteria have extended the scope of investment for capital providers for long-term sustainability. As a result, green finance provides an opportunity to align ESG compliance with firm investment decisions to attain the financial objectives (Chang et al., 2022).

Okafor et al. (2021) argue that green finance assists policymakers in designing a sustainable investment strategy for long-term sustainability by addressing income equality through regulatory measures and incentives. Likewise, Li et al. (2023) reveal that green finance promotes an environment for government and businesses to initiate projects that contribute to the equitable distribution of wealth and resources. Therefore, green finance acts as a driving force to accelerate the influence of sustainable investment for reducing income inequality in society (D'Alessandro et al., 2020).

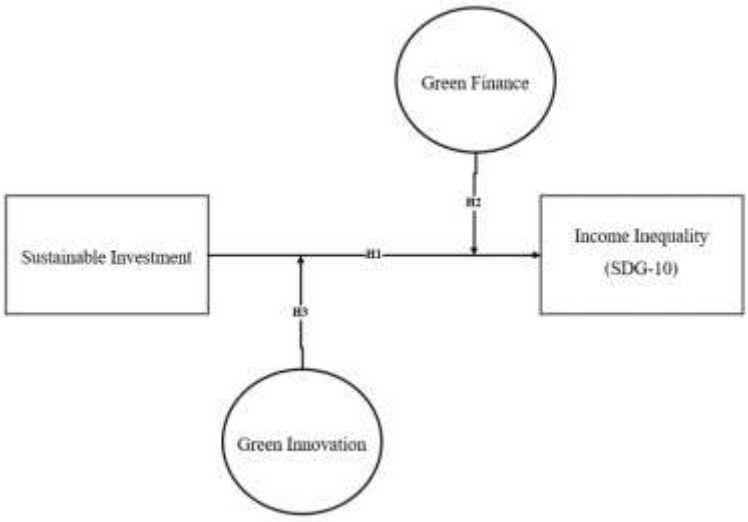
Hypothesis 2: *Green finance plays a moderating role in the relationship between sustainable investment and income inequality for long-term sustainability.*

The channel variables green innovation is rapidly gaining the attention of governments and businesses as the global focus on ESG initiatives and social inclusions. Green innovations provide the solution by offering various environmental friends products and services to address long-term sustainability (Cheng et al., 2019). Shan et al. (2021) explain that green finance encompasses the adoption of sophisticated technologies, products, and services that have a positive impact on the environment and contribute to the reduction of income inequality (Shan et al., 2021).

It accelerates the collaboration with numerous stakeholders like investors, financial institutions, and economists to promote the sustainable investment initiative aimed at reducing the income disparity in society (Barauskaite & Streimikiene, 2021). This collaborative approach enhances ESG investment practices and introduces innovative ideas in sustainable investment to target the SDGs 10. Maltais and Nykvist (2020) explain that green innovation promotes the sharing of knowledge and learning to enhance ongoing improvement and research in green innovation projects to link sustainable investment to target the SDGs-10. Therefore, green innovation plays a significant role in promoting sustainable investment, which may assist in reducing income inequality in society.

Hypothesis 3: *Green innovation performs the function of moderating role in the relationship of sustainable investment and income inequality for long-term sustainability.*

Figura 1 - Research Model



2 DATA, METHOD, AND VARIABLES MEASUREMENT

2.1 Data and Sample

For empirical investigation, the data are combined from different sources. First, the data on sustainable investment variables, are collected from the Chinese Wind database[1] developed by SynTao Green Finance, renowned for its comprehensive ESG metrics assessment. Besides, this database is highly regarded by international credit rating agencies and offers valuable insights into ESG ratings and Green Finance. Second, the data regarding green innovation metrics are obtained National Intellectual Property Administration database[2], and finally the China Stock Market and Accounting Research (CSMAR) database[3] is used to collect data regarding investment-related and economic variables. The study focused on Chinese environment-sensitive industries namely Oil and Gas Extraction, Mining (Except Oil and Gas), Automobiles, Energy, Plastic, Chemical, Furniture, Food Manufacturing, Textile, Wood Product Manufacturing, and Tobacco. After matching data from different sources and removing firms with incomplete information, a final sample of 530 firms over the period from 2010 to 2020 yields 5,830 firm-year observations.

2.2 Variables Measurement

2.2.1 Dependent Variable: Income Inequality

The World Inequality Database is used for the Gini coefficient and Theil index as a proxy of income inequality in a society. The Gini coefficient ranges from 0 to 1, indicating the degree of inequality in income distribution (Montiel et al., 2021). A value of 0 signifies perfect equality, while 1 represents perfect inequality. The Gini coefficient enables comparisons, and analysis of socioeconomic conditions, and informs policy-making to address inequality (Úbeda et al., 2022). While Theil index provides the General Entropy category of measures and offers the benefit of additively across diverse subgroups within a nation, unlike the Gini index ((Luo et al., 2023).

2.2.2 Independent Variable: Sustainable Investment (SI)

The independent variable sustainable investment is measured by developing the Sustainable Index (SI), which consists of the investment value and its corresponding ESG score for each firm in our sample. The higher SI score indicates more sustainability in the firms. The following statistical model is used to measure the sustainable investment index value for each investment of a firm.

$$SI_i = W_{F-i} \times (F_i) + (W_{E-i} \times E_i)$$

SI_i represents the sustainable investment index value for investment i.
W_{F-i} represents the weight assigned to the normalized financial value (F) for investment i.
F_i represents the normalized financial value for investment i.
W_{E-i} represents the weight assigned to the normalized ESG value (E) for investment i.
E_i represents the normalized ESG value for investment i.

2.2.3 Moderating Variables: Green Finance (GF) and Green Innovation (GI)

We use Green Finance (GF) and Green Innovation (GI) as channel variables. GF is measured as the proportion of funds obtained from green bonds and green certificates concerning a firm's overall investment (Ma et al., 2023). This metric gauges the level of importance placed by the firm on sustainable investments and the allocation of resources to environmentally conscious initiatives (Acquah et al., 2023). Further, this study provides a comprehensive assessment of GI by considering both its quantity and quality aspects (Abid et al., 2022). The quantity aspect is measured using the natural logarithm of green patent applications in the subsequent period (t+1), while quality is evaluated through the number of citations received by a firm for green patents filed during the same

[1] https://www.wind.com.cn/portal/en/ESG/esgIndex.html?windcode=600654.SH&lan=en
[2] https://english.cnipa.gov.cn/
[3] https://data.csmar.com/

period (Li et al., 2019). By integrating these aspects, the study provides a holistic understanding of green innovation in Chinese companies.

2.2.4 Control Variables

We follow the existing literature to identify the control variables ((Bennouri et al., 2018; Frijns et al., 2016; Huang et al., 2015; Kuang et al., 2021; Ng et al., 2023), among others. These studies use firm size (SIZE) as measured by the logarithm of total assets. Net working capital (NWC) is the difference between current assets and current liabilities divided by current assets. Short-term and long-term debt divided by total assets is used as a proxy for firm leverage (LEV). Firm growth (GRW) is measured by the percentage growth in sales every year. Finally, the operating cash flows divided by total assets are used as a measure of operating cash flows (OCF).

2.3 Econometric Model

In our baseline model, we test the impact of sustainable investment on income inequality (Hypothesis 1). To this end, we follow Úbeda et al. (2022) and use the following regression equation.

$$\text{Income Inequality} = \beta_0 + \beta_1 \text{SI}_{it} + \beta_2 \text{SIZE}_{it} + \beta_3 \text{NWC}_{it} + \beta_4 \text{LEV}_{it} + \beta_5 \text{GRW}_{it} + \beta_6 \text{OCF}_{it} + \beta_7 \text{Industry FE}_{it} + \beta_8 \text{Year FE}_{it} + \mu_{it} \quad (1)$$

To examine the channel effect of green finance and green innovation in the relationship between sustainable investment and income inequality (Hypothesis 2 and 3), we employ the following regression specification.

$$\text{Income Inequality} = \beta_0 + \beta_1 \text{SI}_{it} + \beta_2 \text{GF}_{it} + \beta_3 \text{GI}_{it} + \beta_4 \text{SI}_{it} \times \text{GF}_{it} + \beta_5 \text{SI}_{it} \times \text{GI}_{it} + \beta_6 \text{Size}_{it} + \beta_7 \text{NWC}_{it} + \beta_8 \text{LEV}_{it} + \beta_9 \text{GRW}_{it} + \beta_{10} \text{OCF}_{it} + \beta_{11} \text{Industry FE}_{it} + \beta_{12} \text{Year FE}_{it} + \mu_{it} \quad (2)$$

In equation 2, the interaction terms ($\text{SI}_{it} \times \text{GF}_{it}$) and ($\text{SI}_{it} \times \text{GI}_{it}$) capture the moderating effects of green finance and green innovation in the association between sustainable investment and income inequality.

3 EMPIRICAL RESULTS

3.1 Descriptive Statistics

In Table 1, panel A reports the descriptive statistics of variables used in this study. The Gini coefficient, with a mean of (0.24), indicates a moderate level of income inequality within the sample distribution. Similarly, the Theil Index also demonstrates a comparable pattern, with a mean of (0.22), further supporting the presence of income disparities. The standard deviation values of Gini (0.17) and Theil Index (0.13), respectively, indicate some variability in the distribution of resources across the observations. Regarding sustainable practices, the mean value of the SI (0.045), along with a lower standard deviation of (0.014), suggest that, on average, firms allocate a small proportion of their investments toward sustainable practices.

Table 1 - Summary Statistics and Univariate Test

Panel A: Descriptive statistics			
Variables	**Observations**	**Mean**	**St. Dev.**
Gini Coefficient	5830	0.24	0.17
Theil Index	5830	0.22	0.13
Sustainable Investment (SI)	5830	0.045	0.014
Green Finance (GF)	5830	0.021	0.013
Green Innovation (GI)	5830	0.037	0.021
SIZE	5830	0.068	0.038
Net Working Capital (NWC)	5830	0.067	0.025
Leverage (LEV)	5830	0.179	0.064
Firm Growth (GWR)	5830	0.183	0.082
Operating Cashflows (OCF)	5830	0.194	0.0621

Panel B: Univariate test			
Variables	**Inequality >= Median**	**Inequality <= Median**	**t-test of difference in mean**
Gini Coefficient	0.18	0.080	8.96***
Theil Index	0.14	0.060	11.38***
Sustainable Investment (SI)	0.09	0.012	11.42***
Green Finance (GF)	0.06	0.013	8.39***
Green Innovation (GI)	0.11	0.022	10.55**
SIZE	0.18	0.034	14.55*
Net Working Capital (NWC)	0.15	-0.020	12.56***
Leverage (LEV)	0.14	0.051	8.46**
Firm Growth (GWR)	0.19	0.077	17.68**
Operating Cashflows (OCF)	0.21	-0.051	13.24*

Note: This reports general descriptive statistics and the distribution of variables above and below the median value. All variables are winsorized at the 1% and 99% levels. ***, **, and * indicate significance at 1%, 5%, and10%, respectively.

In terms of green innovation, the mean value (0.037) indicates a small level of investment in green innovation within the firms. In the case of control variables, SIZE, NWC, LEV, GRW, and OCF, exhibit consistent tendencies within the given sample distribution. Overall, control variables show mean values with lower standard deviations, providing consistent findings as expected. Additionally, in Table 1, panel B shows the distribution of variables above and below the median value and found statistically significant at the mean difference. These findings indicate a significant difference in the case of high and low median values.

3.2 Correlation Analysis

Table 2 provides the results regarding the correlation matrix. The findings indicate that a significant negative correlation exists between sustainable investment and income inequality measures, the Gini coefficient (-0.334) and Theil index (-0.358), respectively. These findings suggest that sustainable investment has an essential role in reducing income inequality in a society. Further, we find that the Gini coefficient (-0.251) and Theil index (-0.262) are significantly and negatively correlated with green finance. Similarly, a significant and negative correlation exists between green innovation and income inequality, the Gini coefficient (-0.274), and the Theil Index (-0.293). Our findings exhibit that both green finance and green innovation help to reduce income inequality and are consistent with the existing literature (Ma et al., 2023; Maltais & Nykvist, 2020).

Table 2 - Correlation matrix

Variables	**Gini**	**Theil Index**	**SI**	**GF**	**GI**	**SIZE**	**NWC**	**LEV**	**GRW**	**OCF**
Gini Coefficient	1.00									
Theil Index	0.1840 (0.0420)	1.00								
Sustainable Investment (SI)	-0.3340 (0.0000)	-0.3580 (0.0000)	1.00							
Green Finance (GF)	-0.2510 (0.0000)	-0.2620 (0.0000)	0.2170 (0.0000)	1.00						
Green Innovation (GI)	-0.2740 (0.0000)	-0.2930 (0.0000)	0.2430 (0.0010)	0.2420 (0.0070)	1.00					
SIZE	-0.3260 (0.0010)	-0.5640 (0.0000)	0.1840 (0.0030)	0.1970 (0.0000)	0.2600 (0.0020)	1.00				
Net Working Capital (NWC)	-0.3610 (0.0000)	-0.1850 (0.0020)	0.3520 (0.0020)	0.2530 (0.0000)	0.2600 (0.0030)	0.2510 (0.0430)	1.00			
Leverage (LEV)	-0.4420	-0.2310	0.2810	-0.2420	0.2500	0.1820	-0.2630	1.00		

	(0.0000)	(0.0000)	(0.0020)	(0.0010)	(0.0000)	(0.0000)	(0.0230)			
Firm Growth (GWR)	-0.1630	-0.2730	0.2530	0.2930	0.2320	0.2830	0.2530	0.2140	1.00	
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0210)	(0.0000)	(0.0020)			
Operating Cashflows (OCF)	-0.2410	-0.1950	0.1930	0.2430	0.1830	0.2930	0.2530	0.2310	0.2520	1.00
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0220)	(0.0000)	(0.0000)	(0.0620)	

Conversely, green finance and green innovation are found to be significantly and positively correlated with sustainable investment implying that both green finance and green innovation encourage to adoption of sustainable investment practices, which ultimately contribute to reducing income inequality. Additionally, we observe that control variables show a significant negative correlation with measures of income inequality and a positive correlation with sustainable investment. This suggests that firm-level characteristics, such as large size, high growth, liquidity, and positive cash flows, play a significant role in the adoption of green finance and green innovations, which, in turn, foster sustainable investment in an economy and reduce income inequality.

3.3 Cluster Regression Analysis

Table 3 reports the benchmark results for the impact of sustainable investment on income inequality by using Equation 1. In model 1 and model 2, the findings indicate that sustainable investment has a significant and negative association with the Gini coefficient, both across the years (β = -0.035; t-value = 3.22) and industries (β = -0.034; t-value = 3.54) effect. Similarly, in model 3 and model 4, sustainable investment has a significant and negative impact on Theil Index, both across the years (β = -0.032; t-value = 2.33) and industry effects (β = -0.032; t-value = 2.35). Hence, our first hypothesis is accepted. These findings provide evidence that the adoption of sustainable investment strategies contributes to the alleviation of income disparities and promotes a more equitable distribution of wealth in a society and are in line with existing studies (Alkaraan et al., 2022; Ma et al., 2023).

Sustainable investment strategies have great potential to drive positive transformation and foster a fair and more sustainable global future (Ng et al., 2023). This also prioritizes long-term value creation through improving profits, encouraging companies to integrate social and environmental impacts into their business models, resulting in more stable and resilient enterprises (Chang et al., 2022). The growing influx of capital into sustainable investments serves as a valuable incentive for industries to adapt their practices and meet the rising demand for responsible and sustainable products and services (Ng et al., 2023), such strategies effectively address risks associated with environmental and social issues. Besides, investments in ESG-related practices effectively mitigate a firm's potential risks to their reputation and financial stability (Cheng et al., 2023). The control variables also develop a significant relationship with income inequalities both in model 1 and model 2 respectively.

Table 3 - Impact of Sustainable Investment on Income Inequality

Variables	Model-1 Yearly Effect			Model-2 Industry Effect			Model-3 Yearly Effect			Model-4 Industry Effect		
	Gini Coefficient						Theil Index					
	Coff.	**t-value**	**VIF**	**Coff.**	**t-value**	**VIF**	**Coff.**	**t-value**	**VIF**	**Coff.**	**t-value**	**VIF**
Sustainable Investment (SI)	-0.035	3.22	1.94	-0.034	3.54	1.87	-0.032	2.33	1.87	-0.032	2.35	1.93
SIZE	-0.004	0.57	1.39	-0.003	0.55	1.24	-0.003	1.79	1.29	-0.003	1.78	1.19
Net Working Capital (NWC)	-0.001	3.19	1.73	-0.002	3.13	1.77	-0.002	3.24	1.16	-0.002	3.34	1.44
Leverage (LEV)	-0.006	2.78	1.79	-0.005	2.49	1.74	-0.006	2.17	1.58	-0.005	2.21	1.19
Firm Growth (GWR)	-0.005	0.84	1.19	-0.004	0.85	1.23	-0.004	1.59	1.23	-0.004	1.59	1.17
Operating Cashflows (OCF)	-0.002	2.81	1.49	-0.002	2.73	1.48	-0.001	3.83	1.51	-0.001	3.51	1.51
Const.	0.005	3.22		0.008	3.50		0.004	2.12		0.003	2.00	
Industry				0.005	1.63	1.39				0.004	3.31	1.19
Year	0.003	1.24	1.21				0.002	2.84	1.45			
R-Square	0.33				0.28		0.34			0.29		

Note: Table 3 reports the benchmark results for the impact of sustainable investment on income inequality. This study uses ***the Gini Coefficient*** and ***Theil Index*** as a measure of income inequality. ***Sustainable Investment (SI)*** is the main explanatory variable and is measured by constructing the sustainable investment index, ***SIZE*** is the size of a firm and is measured by the logarithm of total assets. ***Net Working Capital (NWC)*** is the difference between current assets and current liabilities divided by current assets. ***Leverage (LEV)*** is measured as short-term and long-term debt divided by total assets. ***Firm Growth (GWR)*** is measured as the percentage growth in sales each year. ***Operating Cashflows (OCF)*** is operating cash flows divided by total assets.

3.4 Analysis of Channel Variables

Table 4 provides the results regarding the moderating effects of green finance and green innovation in the relationship between sustainable investment and income inequality. To avoid the repetition of results, each regression analysis for channel variables is conducted separately. Firstly, Green Finance (GF) presents a significant negative relationship with the Gini coefficient (β = -0.003; t-value = 2.15) and the Theil index (β = -0.002; t-value = 2.22). This suggests that GF is associated with lower income inequality and a more equitable distribution of wealth.

Moreover, in Table 4 the moderating effect of green finance with sustainable investment (GF×SI) indicates a significant negative relationship with the Gini Coefficient (β = -0.052; t-value = 3.38) and the Theil index (β = -0.053; t-value = 4.25). This implies that when SI and GF are considered together, they have a greater impact on reducing income inequality compared to their individual effects. Hence, our second hypothesis is accepted. This suggests that GF moderates the relationship between sustainable investment and income inequality, influencing the strength and direction of this relationship. This is because green finance and sustainable investment play a crucial role in channeling capital towards projects that uplift underprivileged populations.

Furthermore, the moderating effect of green innovation with sustainable investment (SI×GI) shows a significantly negative influence on income inequalities, as observed in both the Gini Coefficient (β = -0.043; t-value = 2.67) and the Theil index (β = -0.046; t-value = 4.61). Again, the findings suggest that green innovation acts as a moderator in the relationship between sustainable investment and income inequalities. Thus, our third hypothesis is also accepted.

Our findings are consistent with existing literature that supports the positive role of green innovation. It is noted that green innovation has the potential to foster the emergence of new industries, businesses, and job opportunities in fields such as renewable energy, energy efficiency, and sustainable environmentally sensitive industries **(**Ma et al., 2023**)**. Therefore, investments in sustainability flow into these sectors can significantly contribute to reducing income inequalities by generating employment and income opportunities in regions and communities that may have previously faced economic challenges. Moreover, such green financial endeavors can empower women and minority groups, facilitating their active participation in economic activities and decision-making processes, thereby addressing gender and social disparities and fostering more inclusive societies (Lee & Huruta, 2022; Nhamo & Mukonza, 2020; Radović-Marković & Živanović, 2019).

Table 4 - Cluster regression analysis to test the channel effects

	Gini Coefficient			Theil Index		
	Model 1			Model 2		
Variables	**Coff.**	**t-value**	**VIF**	**Coff.**	**t-value**	**VIF**
Green Finance (GF)	-0.003	2.15	1.78	-0.002	2.22	1.75
Green Innovation (GI)	-0.001	1.78	1.45	-0.002	1.75	1.59
Sustainable Investment (SI)	-0.035	2.23	1.94	-0.032	2.33	1.87
Green Finance (GF)×Sustainable Investment (SI)	-0.052	3.38	1.98	-0.053	4.25	1.89
Green Finance (GI)×Sustainable Investment (SI)	-0.043	2.67	1.82	-0.046	4.61	1.75
SIZE	-0.002	0.52	1.37	-0.002	1.78	1.24
Net Working Capital (NWC)	-0.023	3.12	1.72	-0.022	3.23	1.15
Leverage (LEV)	-0.003	2.70	1.78	-0.001	2.08	1.55
Firm Growth (GWR)	-0.002	0.85	1.09	-0.001	1.54	1.03
Operating Cash flows (OCF)	-0.001	2.86	1.48	-0.002	3.81	1.56

Const.	0.007	3.10		0.004	3.00	
Industry	0.013	1.62	1.09	0.012	3.66	1.09
Year	0.014	1.26	1.09	0.012	2.81	1.44
R-Square	0.35			0.36		

Note: Table 4 reports the benchmark results for the impact of sustainable investment on income inequality. This study uses the ***Gini Coefficient*** and ***Theil Index*** as a measure of income inequality. ***Sustainable Investment (SI)*** is the main explanatory variable and is measured by constructing the sustainable investment index. ***Green Finance (GF)*** is the proportion of funds obtained from green bonds and green certificates about a firm's overall investment. In the case of ***Green Innovation (GI)***, this study considers both its quantity and quality aspects. Quantity aspects are measured using the natural logarithm of green patent applications in the subsequent period (t+1), while quality is captured through the number of citations received by a firm for green patents filed during the same period. ***SIZE*** is the size of a firm and is measured by the logarithm of total assets. ***Net Working Capital (NWC)*** is the difference between current assets and current liabilities divided by current assets. ***Leverage (LEV)*** is measured as short-term and long-term debt divided by total assets. ***Firm Growth (GWR)*** is measured as the percentage growth in sales each year. ***Operating Cashflows (OCF)*** is operating cash flow divided by total assets.

CONCLUSION AND FUTURE RESEARCH

This study introduces a novel index of sustainable investment to examine its impact on income inequality, as measured by the Gini Coefficient and Theil Index, to target SDG-10. The study finds that sustainable investment significantly negatively affects income inequality as proposed in hypothesis 1. The findings indicate that sustainable firms align their ESG compliance with the firm long-term investment policy for future growth and prosperity. Further, this study finds that green finance is significantly moderate in the relationship between sustainable investment and SDG-10, particularly in reducing the income inequality in the society as proposed in hypothesis 2. The findings indicate that green finance is an important component of sustainable investment to tackle sustainable investment challenges, create job opportunities, and contribute to the reduction of income disparity in society. Additionally, we find that channel variable green innovation acts as a mediator and significantly assists in reducing the income inequality in society as as proposed in hypothesis 3. The findings indicate that green innovation is an effective instrument to increase sustainable investment by creating entrepreneurial opportunities that assist in reducing the income disparity in society.

This study has important managerial implications for governments and businessmen to combat income inequality. The study identifies that sustainable investment is an effective instrument to reduce the income inequality in the society. The study justifies that by pursuing sustainable investment practices, financing by green finance, and promoting green innovation, economists and businessmen can not only gain financial success but also contribute to a more rational and sustainable future for society. The findings of this research study can also support the policymakers and investors to promote a favorable regulatory environment and sustainable investment practices for future growth and propensity.

Future research steaming from this study could investigate the following areas for further understanding and addressing sustainable investment and income inequality nexus. Firstly, a comparative industry analysis can be conducted for numerous countries and regions that implement different green finance and green innovation practices to combat income inequality. Secondly, in-depth case studies can be conducted among the various industries and sectors that implement sustainable investment practices for future growth and sustainability. Hence, research studies can use it as a case study for future research to refine our findings. Finally, a comprehensive research analysis is equally important to explore the numerous government subsidies and incentives to stimulate sustainable investment to target SDGs 10.

Ethics Declaration

This research did not involve any human participants, animals, or personal data, so ethical approval was not required. All analyses are based on publicly available economic, financial, and sustainability datasets, and no individual-level data were utilized.

Consent for Publication

All authors consent to the publication of this manuscript in its current form, and no conflicts of interest related to authorship or publication exist.

Competing Interests

The authors declare that they have no competing interests in relation to this research. This work is conducted independently and has not been influenced by any financial, political, or personal factors that could bias the results.

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