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# The Nexus among Green Financing: Companies in G20 Emerging Market Countries

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**Abstract**

**Research Originality:** This study addresses an urgent research gap by examining not only the relationship but also the underexplored role of national R&D capacity as a moderating factor, highlighting how emerging economies' innovation limitations may dilute the benefits of green capital inflows.

**Research Objectives:** This study analyzed the impact of green financing and FDI on firm profitability and productivity in G20 emerging markets, and assess how R&D expenditure moderates these effects.

**Research Methods:** Panel data from 57 multinational companies across ten G20 emerging market countries during 2016–2021 were analyzed using fixed-effect regression.

**Empirical Results:** Green financing and FDI both show significant positive impacts on firm profitability and productivity. However, R&D negatively moderates the green finance–profitability link and has no significant moderating effect on productivity or the FDI relationship, suggesting structural inefficiencies in R&D systems within emerging economies.

**Implications:** The findings call for urgent policy interventions to enhance R&D infrastructure and efficiency in G20 emerging markets. Redirecting subsidies from fossil fuels to green innovation, fostering public-private R&D collaboration, and strengthening institutional frameworks can help unlock the full potential of green finance and FDI in supporting a sustainable economic transformation.

**Keywords:**

green investment; green finance; profitability; productivity; emerging countries

**How to Cite:**

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## INTRODUCTION

Climate change poses escalating threats to global development, with 20-40% of the world's population experiencing warming above 1.5°C in at least one season (Intergovernmental Panel on Climate Change, 2014). This warming has triggered severe consequences, including extreme weather events, rising sea levels, biodiversity loss, and increased socioeconomic vulnerability across nations (D'Orazio, 2022; Füssel & Klein, 2006). In response, the 2015 Paris Agreement established commitments to limit global temperature increases to well below 2°C, with aspirations to cap at 1.5°C. Over 100 local governments and 800 cities have pledged to achieve net zero emissions by 2050 (Black et al., 2021), while countries have agreed to progressively strengthen their climate commitments through Nationally Determined Contributions (NDCs) (Kuramochi et al., 2021).

As the world's largest economies, G20 countries bear significant responsibility for reducing carbon emissions. Recent G20 summits, including the one held in Bali, Indonesia, have prioritized environmental concerns and energy transitions, focusing on energy accessibility, clean technology advancement, and green financing mechanisms. However, this transition requires substantial investment capital and coordinated policy frameworks.

Green financing—defined as investments yielding environmental benefits within sustainable development contexts (Yasmeen et al., 2020)—faces several implementation challenges. These include developmental hurdles in green technologies compared to established fossil fuel alternatives (Boye & Arcand, 2013), limited access to affordable conventional financing sources (Wang et al., 2020), information asymmetry regarding environmental data (Ng & Tao, 2016), lower returns on green investments due to high technology costs (Adams et al., 2011), and socio-demographic barriers in emerging markets. Notably, green finance development manifests differently across developed and emerging economies due to variations in education levels, environmental awareness, legal frameworks, and economic conditions (Ganda, 2019; Hafner et al., 2020; Prieur & Bréchet, 2013).

Foreign direct investment (FDI) offers another pathway to environmental improvement through technology transfer and innovation diffusion. FDI can positively impact both firm profitability (Cui & Xu, 2019) and productivity (Tong et al., 2022) while encouraging environmentally responsible practices. However, empirical evidence suggests FDI may sometimes increase carbon emissions, particularly when fossil fuel-intensive methods are employed (Shahbaz & Sinha, 2019).

Previous research has established that green finance positively influences firm productivity in emerging economies like China (Jiakui et al., 2022; Tong et al., 2022). Studies have also shown that Research and Development (R&D) significantly affects both profitability (Zhao, Cao, et al., 2022) and productivity (Holzner & Wagner, 2022). Green finance policies can enhance innovation capabilities by reducing financial constraints on green initiatives (Yu et al., 2021), while environmental regulatory policies encourage environment-driven R&D (Zhang, 2021). Similarly, the quality of FDI—characterized by


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low pollution, low energy consumption, and high efficiency—influences host countries through technology spillover, demonstration effects, and industry correlation (Liu et al., 2022; Zhu, 2010).

While considerable research has explored aspects of green finance and FDI separately, significant research gaps remain. First, most existing studies have focused narrowly on green total factor productivity (Jiakui et al., 2022; Tong et al., 2022; Zhao et al., 2022), while overlooking the comprehensive interplay between green financing, FDI, R&D, profitability, and productivity from multiple methodological approaches. Second, the potential moderating role of R&D in amplifying the effects of green investments on firm-level outcomes remains underexplored, despite evidence suggesting that R&D can yield greater returns than traditional innovation when applied to green technologies (Kudratova et al., 2018; Romano et al., 2017).

This research addresses these gaps by examining how R&D moderates the relationship between green financing, FDI, and firm performance metrics. This integrative approach provides a more nuanced understanding of how these mechanisms interact within different economic contexts. Additionally, while previous studies have extensively documented the environmental benefits of green financing, our research investigates explicitly its economic viability at the firm level—a critical consideration for encouraging broader adoption among corporate stakeholders.

This study makes three principal contributions: (1) expanding the literature on green financing by examining its impact on both profitability and productivity using novel measurement approaches; (2) investigating the moderating role of R&D in enhancing the effectiveness of green investments; and (3) providing empirical evidence to inform policy development for green financial systems and sustainable economies, particularly in emerging markets currently struggling with environmental financing challenges. These insights are crucial for convincing stakeholders of the economic and environmental benefits of transitioning to sustainable business models.

## METHODS

The empirical estimation uses panel data for 57 companies in all G20 emerging market countries spanning the period 2016 to 2021. The G20 emerging market countries in this study refer to the following countries: Argentina, Brazil, China, India, Indonesia, Mexico, Russia, Saudi Arabia, South Africa, and Turkey (Adams-Kane & Lopez, 2019). This study's population consists of G20 emerging market corporations listed on the 2020 Forbes Global 2000 list of the world's largest companies. The population in this study consists of G20 emerging market companies listed in the 2020 Forbes Global 2000. This list ranks the largest companies in the world and has a significant impact on the global economy, as it includes the top well-established companies in each country.

The study uses explicitly the 2016–2021 period for four main reasons: first, this timeframe reflects the post-ratification implementation of the Paris Agreement (2015),

where G20 emerging countries began aligning policy and business practices with their Nationally Determined Contributions (NDCs), making it an ideal window to examine green financing activities. Second, relevant firm-level data for key indicators—such as green financing, R&D, and FDI—became consistently available and reported during this period, enhancing the reliability and comparability of observations across countries and firms. Third, this timeframe encompasses significant policy evolution regarding environmental regulations and green investment incentives across G20 emerging markets. Lastly, it allows comparison between pre-pandemic (2016-2019) and pandemic-affected (2020-2021) periods, offering insights into how green finance and FDI relationships with firm performance adapt under different macroeconomic conditions.

**Table 1. Size of Company Sample Quotas**

| Rank | Country | Annual GDP (USD)* | % of GDP G20 Emerging Market Countries | Company Sample Quotas Size | Company Sample Quotas Size (Adj)* |
|---|---|---|---|---|---|
| 9 | Argentina | 491,492 M | 2% | 2 Company | 1 Company |
| 4 | Brazil | 1,608,981 M | 5% | 5 Company | 4 Company |
| 1 | China | 17,734,062 M | 60% | 60 Company | 21 Company |
| 2 | India | 3,173,397 M | 11% | 11 Company | 9 Company |
| 6 | Indonesia | 1,186,092 M | 5% | 5 Company | 5 Company |
| 5 | Mexico | 1,293,037 M | 4% | 4 Company | 4 Company |
| 3 | Russia | 1,775,799 M | 6% | 6 Company | 6 Company |
| 7 | Saudi Arabia | 833,541 M | 3% | 3 Company | 3 Company |
| 10 | South Africa | 419,946 M | 1% | 1 Company | 1 Company |
| 8 | Turkey | 815,271 M | 3% | 3 Company | 3 Company |
| **G20 Emerging Market Countries** | | **29,331,618 M** | **100%** | **100 Company** | **57 Company** |

*Note:* (*) Sample quota size is determined by the number of each percentage represented by the country's GDP contribution proportion towards the total amount of G20 Emerging Market Countries GDP. Furthermore, the sample size chosen for research is based on the company report's English version availability and accessibility.

Due to the novelty of this research, which is in its initial phase, the data availability constraint becomes a consideration in selecting the sample size. The sample selection was carefully selected through the following steps: Initially, all G20 emerging market countries were sorted and ranked based on their GDP share. Based on the percentage contribution of each sample country and looking at the number of companies represented, a sample size quota of companies for each country will be drawn and distributed proportionally based on the GDP portion (see Table 1). Each percentage of GDP contribution becomes a proxy for the number of companies selected to represent from each country. Furthermore, top companies listed in the 2020 Forbes Global 2000 are selected based on the quota sample size from each country and assessed based on data availability and English version report accessibility. Finally, a total of 57 companies is selected, representing all G20


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emerging market countries. All the targeted companies in the study are multinational companies that receive foreign capital.

**Table 2. Definition of variables**

| Variables | Definitions | Source |
|---|---|---|
| **Dependent variables** | | |
| Return on Asset (ROA) | Net income to average total asset, which shows the capacity of a firm to earn a profit by the utilization of its assets | Company Website |
| Asset Turnover (ATO) | Gross Revenues to total assets, which shows how efficiently a company generates its revenue from its assets | Company Website |
| **Independent variables** | | |
| Green Financing | Investment flows on the energy sources or technologies that can help lower greenhouse-gas emissions (renewable energy technologies) | Bloomberg NEF |
| Foreign Direct Investment | Foreign direct investment refers to investments made by foreign investors with the aim of becoming major shareholders in domestic companies. | CEIC Data |
| **Moderating Variable** | | |
| Research & Development (R&D) | Expenditures (both public and private) on research and development, which covers basic research, applied research, and experimental development, expressed as a percentage of Gross Domestic Product (G.D.P.). | The Global Competitiveness Report 2016-2021 |
| **Control variables** | | |
| Firm Size | Natural logarithm of the total assets | Company Website |
| Firm Age | The natural logarithm of a company's operating time in years | Company Website |
| Firm Growth | Firm growth posits the annual percentage increment in the sale volume of a company | Company Website |
| Labor Productivity Growth | Labor productivity growth is measured by the ratio of the value of changes in economic output per hour worked during a certain period | CEC Data |

Note: **(1) Macroeconomics (Country) Data:** Green Financing, Foreign Direct Investment, Labor Productivity Growth, R&D; **(2) Firms Level Data:** ROA, ATO, Firm Size, Firm Age and Firm Growth.

The selection of companies, variables, and periods in the econometric models is based purely on data availability. Data on variables observed in this study are collected annually from companies' websites (ROA, ATO, firm size, firm age, and firm growth); Bloomberg NEF (Green Financing); CEIC Data (foreign direct investment and labor productivity growth); and R&D (The Global Competitiveness Report). This study follows Xu et al. (2022) in determining the proxies. Profitability is proxied by ROA, and the ATO captures productivity to reflect how efficiently a company generates revenue from its assets. In addition, green finance is measured by investment flows in renewable energy technologies; foreign direct investment is also considered another predictor. R&D is a moderator variable as measured by the national expenditures on research and development. Next, this study follows Xu et al. (2022) and Wen et al. (2021) in using the control

variables in the regression, such as firm size, firm age, firm growth, and labour productivity growth. Table 2 briefly defines these variables.

This research employs a systematic analytical approach using EViews (version 12) econometric software through four sequential steps. First, descriptive statistics analysis is conducted to understand variable distributions (mean, median, standard deviation, minimum, and maximum values) and identify potential outliers, along with correlation analysis to examine preliminary relationships between variables and detect potential multicollinearity issues. Second, panel data model selection tests are performed, including the Hausman Test to determine whether fixed or random effects models are more appropriate, Breusch-Pagan Lagrange Multiplier Test to evaluate between pooled OLS or random effects models, F-test for Fixed Effects to assess joint significance of firm-specific effects, and Panel Unit Root Tests to check for stationarity in the panel data variables. Third, based on these specification test results, panel data regression with appropriate estimators is implemented, including one-way Fixed Effects Models controlling for time-invariant unobserved heterogeneity, Two-way Fixed Effects accounting for both firm-specific and time-specific effects, and Three-way Fixed Effects incorporating firm, country, and year fixed effects, all using robust standard errors clustered at the firm level to address heteroskedasticity and autocorrelation concerns. Finally, moderation analysis employs interaction terms to test how R&D moderates relationships between green financing, FDI, and firm performance, with the significance of these interaction terms assessed using t-tests for individual effects and F-tests for evaluating the overall significance of the moderation effects. The two models are established to distinguish indicators of profitability and productivity.

$$\begin{aligned} ROA_{i,j,t} = {} & c + \beta_1 GRF_{i,j,t} + \beta_2 FDI_{i,j,t} + \beta_3 R\&D_{i,j,t} + \beta_4 (GRF_{i,j,t} * R\&D_{i,j,t}) + \beta_5 (FDI_{i,j,t} * R\&D_{i,j,t}) \\ & + \beta_6 Control_{i,j,t} + \text{Firm Fixed Effects} + \text{Country Fixed Effects} + \text{Year Fixed Effects} \\ & + \varepsilon_{i,j,t} \end{aligned} \quad (1)$$

$$\begin{aligned} ATO_{i,j,t} = {} & c + \gamma_1 GRF_{i,j,t} + \gamma_2 FDI_{i,j,t} + \gamma_3 R\&D_{i,j,t} + \gamma_4 (GRF_{i,j,t} * R\&D_{i,j,t}) + \gamma_5 (FDI_{i,j,t} * R\&D_{i,j,t}) \\ & + \gamma_6 Control_{i,j,t} + \text{Firm Fixed Effects} + \text{Country Fixed Effects} + \text{Year Fixed Effects} \\ & + \varepsilon_{i,j,t} \end{aligned} \quad (2)$$

Where in the above Equations (1)-(2) above, the dependent variables are profitability (ROA) and productivity (ATO) for the selected firms throughout the study. Furthermore, the independent variables abbreviated as GRF. and FDI denote green finance and foreign direct investment. The moderator variable R&D means research & development at the macro level data where the firms are selected. Meanwhile, control reflects the control variables entitled firm size, firm age, firm growth, and labor productivity growth to comprehend the theoretical framework. The data for variables were collected and used on an annual basis during the study period. In conducting extensive estimates results, we separated our sample between groups of nations that implement carbon taxes and those that do not.


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## RESULTS AND DISCUSSION

This study finds that both green financing and foreign direct investment (FDI) have a significant positive effect on firm profitability and productivity in G20 emerging market countries. However, research and development (R&D) negatively moderates the relationship between green financing and profitability, while showing no significant moderating effect on productivity or the FDI relationship. These findings suggest that although capital inputs like green financing and FDI boost firm performance, the effectiveness of R&D in these countries remains limited due to structural inefficiencies.

Our analysis reveals significant differences in firm performance between countries with and without carbon taxes, providing preliminary evidence of how environmental regulations may influence financial outcomes in emerging markets. Table 3 presents comprehensive descriptive statistics for all study variables across the full sample and subsamples based on carbon tax status.

It is observed that the overall summary output for 57 companies has a mean value of ROA of 0.061 or 6.1%. The mean value of ROA for firms in countries without a carbon tax is 9.2%, higher than that of firms with a carbon tax, which is only 3.4%. The carbon tax referred to is a tax imposed on fuel use based on its carbon content. This result indicates that firms in countries without carbon taxes that utilize their assets are better off than those with carbon taxes. Interestingly, asset turnover (ATO) shows less dramatic variation, with means of 0.555 and 0.516 for countries with and without carbon taxes, respectively. This result suggests that while carbon taxes may impact profit margins through additional compliance costs, they have a minimal effect on firms' operational efficiency in generating revenue from assets. This finding indicates that regulatory environments may influence profitability metrics more substantially than productivity metrics in the short term.

Another notable finding is the substantial difference in green financing and FDI between the two groups. Countries with carbon taxes demonstrate dramatically higher green financing (mean = 226,407) compared to countries without carbon taxes (mean = 14,301). This fifteen-fold difference suggests that carbon taxation policies catalyze green investment flows, creating a potential offsetting benefit to the decreased ROA noted earlier. Similarly, FDI is nearly four times higher in carbon tax countries (mean = 111,019) versus non-carbon tax countries (mean = 28,094), indicating that environmental policy stringency may correspond with higher foreign investment levels in emerging markets. R&D intensity also shows meaningful variation, with carbon tax countries averaging 77.2 compared to 66.2 in non-carbon tax countries. This result suggests that more stringent environmental policies correspond with greater research and development activities, as firms seek innovative ways to reduce carbon emissions and compliance costs. The higher labor productivity growth in carbon tax countries (4.482 vs. 2.384) further supports this interpretation, suggesting that environmental policies correspond with efficiency improvements over time.

Overall, these descriptive statistics reveal that firms in countries with carbon taxes face profitability challenges but maintain similar productivity levels compared to their

counterparts in countries without carbon taxes. They also operate in environments with substantially higher green financing, FDI, and R&D intensity. These preliminary findings provide important context for the subsequent regression analyses examining how green investments influence firm performance metrics across these diverse regulatory environments.

**Table 3. Descriptive Statistics**

| Variables | All countries samples | | | Countries with carbon tax | | | Countries without carbon tax | | |
|---|---|---|---|---|---|---|---|---|---|
| | Mean | Min | Max | Mean | Min | Max | Mean | Min | Max |
| ROA | 0,061 | -0,237 | 0,619 | 0,034 | -0,237 | 0,491 | 0,092 | -0,093 | 0,619 |
| ATO | 0,537 | 0,001 | 2,557 | 0,555 | 0,001 | 2,221 | 0,516 | 0,001 | 2,557 |
| Green Financing | 129657 | 900 | 419866 | 226407 | 900 | 419866 | 14301 | 1200 | 34476 |
| Foreign Direct Investment | 73194 | 1419 | 180957 | 111019 | 2008 | 180957 | 28094 | 1419 | 64072 |
| R&D | 72,2 | 33,2 | 92,1 | 77,2 | 45,3 | 92,1 | 66,2 | 33,2 | 88,1 |
| Firm Size | 8,046 | 1,734 | 14,333 | 8,016 | 3,178 | 12,588 | 8,081 | 1,734 | 14,333 |
| Firm Age | 3,510 | 0,693 | 4,875 | 3,362 | 0,693 | 4,875 | 3,686 | 0,693 | 4,836 |
| Firm Growth | 0,148 | -9,316 | 9,031 | 0,068 | -9,316 | 9,031 | 0,243 | -7,591 | 8,707 |
| Labor Productivity Growth | 3,525 | -16,260 | 11,020 | 4,482 | -4,180 | 8,690 | 2,384 | -16,260 | 11,020 |

Note: **(1) Countries with carbon tax:** Argentina, Brazil, China, Mexico, and South Africa; **(2) Countries without carbon tax:** India, Indonesia, Russia, Saudi Arabia, and Turkey.

**Table 4. Correlation Matrix**

| Variables | [1] | [2] | [3] | [4] | [5] | [6] | [7] |
|---|---|---|---|---|---|---|---|
| [1] Green Financing | 1,00000 | 0.65924 | 0.57373 | 0.13205 | -0.32066 | -0.09712 | 0.61955 |
| [2] Foreign Direct Investment | 0.65924 | 1,00000 | 0.64292 | 0.12141 | -0.30574 | -0.09014 | 0.59896 |
| [3] Research & Development | 0.57373 | 0.64292 | 1,00000 | 0.04804 | -0.22110 | -0.01948 | 0.51372 |
| [4] Firm Size | 0.13205 | 0.12141 | 0.04804 | 1,00000 | -0.02879 | -0.05493 | 0.17470 |
| [5] Firm Age | -0.32066 | -0.30574 | -0.22110 | -0.02879 | 1,00000 | 0.04765 | -0.24837 |
| [6] Firm Growth | -0.09712 | -0.09014 | -0.01948 | -0.05493 | 0.04765 | 1,00000 | -0.03712 |
| [7] Labor Productivity Growth | 0.61955 | 0.59896 | 0.51372 | 0.17470 | -0.24837 | -0.03712 | 1,00000 |

*Note:* Table 4 reports the Pearson correlation between the main variables.

This study investigates the effect of green investment on the profitability and productivity of firms in G20 emerging market countries. Table 4 shows how the variables are correlated. The coefficient of correlation analysis for regressors reveals that there is no multicollinearity problem for all sample firms in the entire study period. The results of the Ordinary Least Squares (OLS.) models are presented in Table 5. First, we analyze the effect of green finance, foreign direct investment, and the moderating role of R&D


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on ROA and ATO. Then the samples are separated based on the applied carbon tax regulations and analyzed in the same way.

Our analysis confirms four key findings. First, green financing positively impacts both firm profitability and productivity. Second, foreign direct investment enhances both profitability and productivity metrics. Third, R&D negatively moderates the relationship between green financing and profitability, but has no significant moderating effect on productivity. Fourth, R&D does not significantly moderate the relationship between FDI and either profitability or productivity in emerging markets. These findings provide critical insights into the complex dynamics of green investment in emerging economies and highlight the contextual differences compared to developed markets.

**Table 5. Estimation Results**

| Variables | All countries samples | | Countries with carbon tax | | Countries without carbon tax | |
|---|---|---|---|---|---|---|
| | ROA (1) | ATO (2) | ROA (3) | ATO (4) | ROA (5) | ATO (6) |
| C | -36.868*** | -34.459*** | 0.7493 | 11.709 | -17.424*** | -11.259 |
| | (0.0002) | (0.0006) | (0.4547) | (0.2434) | (0.0841) | (0.2625) |
| Green Financing | 39.280*** | 15.302* | 0.2321 | -15.928 | 14.817 | 17.775* |
| | (0.0000) | (0.0970) | (0.8167) | (0.1133) | (0.1411) | (0.0781) |
| FDI | 16.799* | 23.611** | 25.818** | 20.085** | 25.618** | 0.0521 |
| | (0.0940) | (0.0188) | (0.0107) | (0.0463) | (0.0116) | (0.9584) |
| R&D | 21.083** | 19.880** | 26.860*** | 15.711 | 19.542* | 0.8118 |
| | (0.0358) | (0.0477) | (0.0080) | (0.1182) | (0.0531) | (0.4185) |
| Green Financing*R&D | -22.192** | 0.0167 | 0.2273 | 10.943 | 0.8276 | -15.666* |
| | (0.0272) | (0.9866) | (0.8204) | (0.2755) | (0.4095) | (0.0899) |
| FDI * R&D | -16.168 | -11.397 | -27.164*** | -13.542 | -19.686* | 0.0326 |
| | (0.1069) | (0.2553) | (0.0073) | (0.1777) | (0.0514) | (0.9739) |
| Firm Size | 0.8953 | -42.059*** | -43.540*** | -62.633*** | -16.624* | -73.166*** |
| | (0.3713) | (0.0001) | (0.0001) | (0.0001) | (0.0991) | (0.0001) |
| Firm Age | 15.824 | 32.454*** | 25.173** | -61.830*** | 20.611** | 0.2335 |
| | (0.1146) | (0.0012) | (0.0128) | (0.0001) | (0.0415) | (0.8156) |
| Firm Growth | -16.600* | 0.4786 | 0.9491 | 0.0266 | -13.529 | 0.9823 |
| | (0.0979) | (0.6325) | (0.3440) | (0.9786) | (0.1787) | (0.3279) |
| Labor productivity growth | -36.868*** | -34.459*** | 0.7493 | 11.709 | -17.424* | -11.259 |
| | (0.0002) | (0.0006) | (0.4547) | (0.2434) | (0.0841) | (0.2625) |
| Firm effect | Yes | Yes | Yes | Yes | Yes | Yes |
| Year effect | Yes | Yes | Yes | Yes | Yes | Yes |
| R-squared | 0.7986 | 0.9724 | 0.6491 | 0.8081 | 0.6915 | 0.8449 |
| Adj R-squared | 0.7521 | 0.9661 | 0.5578 | 0.7582 | 0.6006 | 0.7992 |
| F-statistic | 17.171 | 15.287 | 71.095 | 16.183 | 76.100 | 18.490 |
| N | 342 | 342 | 186 | 186 | 156 | 156 |

Table 6 presents the empirical results of green financing on ROA and ATO. Columns (1) and (2) use the whole sample as the main estimate. The test results show the impact of green financing on ROA and ATO. This result indicates a positive impact of green financing on a firm's profitability and productivity. In terms of the effect on profitability, green finance will increase efficiency. It demonstrates that financial development enhances liquidity, diversifies assets, and channels financial resources to the most profitable enterprises (Jiakui et al., 2022). This finding also proves the impact of green financing on a firm's productivity. These results are relevant to the findings of Jiakui et al. (2022) and Tong et al. (2022), who state that green finance is a significant positive predictor of green total factor productivity in China. This condition is because green funding can be used by companies to accelerate the transition to a green economy, thereby increasing company productivity. Supported by Lee and Lee (2022) study, stating that green productivity increases due to the maturation of the green finance sector.

**Table 6. Hypothetical Test Results**

| Hypothesis | Correlation | Coefficient | p-value | Decision |
|---|---|---|---|---|
| H1a | Green Financing → ROA | 39.280 | 0.0000** | Accepted |
| H1b | Green Financing → ATO | 15.302 | 0.0970* | Accepted |
| H2a | Foreign Direct Investment → ROA | 16.799 | 0.0940** | Accepted |
| H2b | Foreign Direct Investment → ATO | 23.611 | 0.0188* | Accepted |
| H3a | Green Financing*R&D → ROA | -22.192 | 0.0272** | Accepted |
| H3b | Green Financing*R&D → ATO | 0.0167 | 0.9866 | Rejected |
| H4a | Foreign Direct Investmen*R&D t → ROA | -16.168 | 0.1069 | Rejected |
| H4b | Foreign Direct Investment*R&D → ATO | -11.397 | 0.2553 | Rejected |

Note: *, **, *** represent significance at the 10%, 5%, and 1% levels (2-tailed), respectively.

Additionally, according to endogenous theory, "If the macroeconomics is to be saved from the century-old confusion and obscurantism, a new generation of economists must incorporate the paradigm shift of dynamic endogenous money analysis" (Yamaguchi & Yamaguchi, 2022). This is, of course, very relevant in the concept of the green finance sector. This result also aligns with the study by Hepburn et al. (2020) and Spash (2020), indicating that green expenditure and growth can cultivate a win-win culture for the environment and the economy; therefore, there is an urgent need to encourage green economic growth and recovery. Green finance is a structured financial activity or a strategy that results in significant and positive impacts on the environment and includes the outcomes of better environmental conditions (Park et al., 2018; Qamruzzaman & Jianguo, 2020). This dual benefit is particularly significant for emerging economies navigating the transition to sustainable development paradigms.

As capital resources, foreign direct investment inflows are more stable than portfolio investment because foreign direct investment pursues a long-term motive (Fahri et al.,


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2022). The green economy is a new paradigm that requires a process of transition from fossil-fuel energy to renewable energy. This condition makes the stabilizing effect of foreign direct investment more needed by companies to overcome environmental uncertainties and transition to environmentally friendly technologies. The findings of this study confirm that FDI positively influences both firm profitability, as measured by ROA, and productivity, as measured by ATO. The results of the foreign direct investment test indicate a positive effect on the profitability and productivity of foreign direct investment firms. In line with a study by Choudhury & Khanna (2014), foreign direct investment positively influences the investing firm's profitability through diversifying the supplies of critical resources. The governments of emerging economies may maintain ownership control in specific strategic and sensitive industries such as defense, telecommunications, aviation, etc. In such industries, state-owned firms, as policy vehicles, are expected to produce positive externalities for the economy and society (Doh et al., 2004). However, these results contradict the findings of Cui and Xu (2019); there was some evidence of a positive effect of foreign direct investment on profitability in the short-term (3 years) but not in the medium-term (5 years). As such, firms may realize profits quickly, even only one year after entering a foreign market through foreign direct investment, but their profitability is hard to sustain over three years, as technological advancement in the industry will likely make the firms' existing advantages obsolete.

Meanwhile, foreign direct investment significantly affects a firm's productivity. Previous research findings show that foreign direct investment significantly predicts China's green total factor productivity (Tong et al., 2022). Foreign direct investment firms may still have higher average productivity than local firms because multinational companies have a flatter tail in their productivity distribution than local firms (Han et al., 2022). Foreign direct investment has become a productivity driver because of the substantial positive externalities associated with financial assistance. Through efficiency gains, foreign direct investment can significantly reduce friction in the economic system and contribute to productivity. The current findings are consistent with the study of Rehman Khan et al. (2022), who stated that foreign direct investment primarily influences productivity through technological advancement and capital allocation. Another reason is that the financial advantages and productivity advantages of foreign direct investment firms are interdependent, and this interdependence has strong policy implications. The financial advantages may allow foreign direct investment firms of low productivity to enter host countries (Han et al., 2022). However, this research contradicts the study of Wang et al. (2018), which showed that foreign direct investment has no significant effect on green productivity, and financial success does not always result in favorable capital allocation.

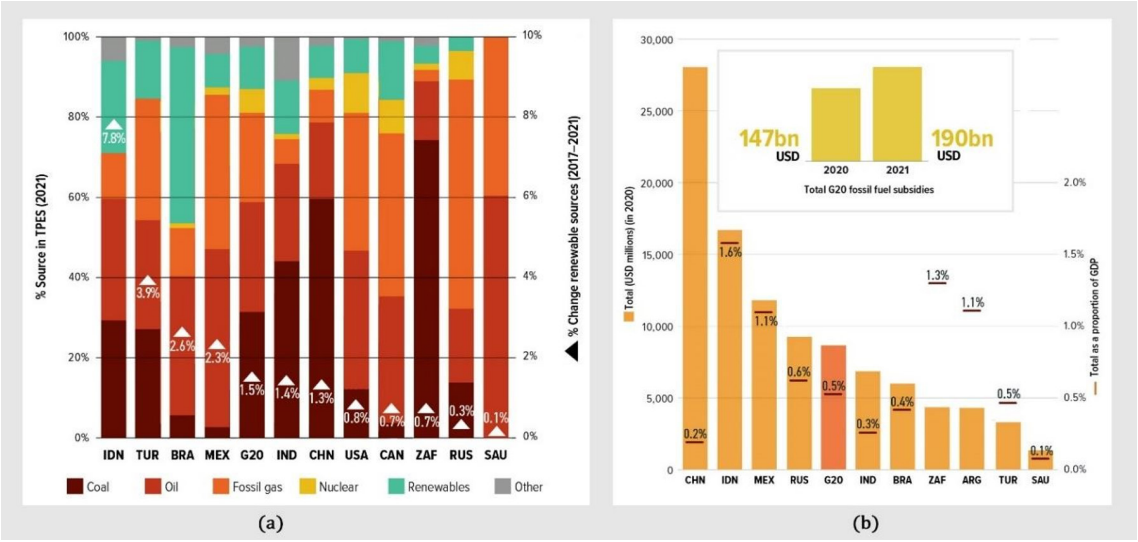
Importantly, our study highlights a critical policy consideration identified by Bermejo Carbonell and Werner (2018): FDI may not necessarily lead to rapid economic growth if funded by the receiving country's banking system. According to financial intermediation theory (Werner, 2014), locally-funded FDI competes for money with domestic investment, potentially offsetting growth benefits. This result suggests that policymakers should design

banking systems that reduce entry barriers, potentially by enabling greater participation of foreign banks in FDI transactions (Gelos & Roldos, 2004).

The results reveal a negative moderating effect of R&D on the relationship between green financing and firm profitability. This finding suggests that R&D expenditures in G20 emerging markets may dilute the returns from green financing due to inefficiencies in R&D systems. As shown in studies like Amores-Salvadó et al. (2014), the profitability of green innovation is higher in developed markets due to better institutional and technical capacities. Moreover, as shown in the Climate Transparency Report (2022), only a few countries in the sample—like Indonesia, Brazil, Turkey, and Mexico—have above-average renewable energy conversion rates. High costs and ineffective implementation, due to poor infrastructure and low-skilled human capital, likely diminish the intended benefits of R&D.

In terms of productivity, the moderating effect is statistically insignificant. This result supports Zhao et al. (2022), who argue that only specific forms of green R&D—like technology with high commercial applicability—can directly influence productivity. In the sample countries, R&D systems are often oriented more toward basic research or are underfunded, which limits their influence on firm-level productivity outcomes. Thus, the results of this study are not in line with the findings of Holzner & Wagner (2022), who found that R&D investment has significantly promoted green productivity, mainly because the research was aimed at developed countries (Germany) with very superior R&D. Therefore, sample selected for this study which focuses on exploring emerging countries resulting a new finding which contrary to the previous studies which were mostly done in developed countries.

**Figure 1. (a) Energy Mix; and (b) Fossil Fuel Subsidies in G20 Emerging Market Countries**




Source: Climate Transparency Report (2022)
Note: TPES (Total Primary Energy Supply)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This study examines the role of R&D in the relationship between foreign direct investment and ROA and ATO. This result indicates that R&D does not play a negative role or weaken the moderating effect of foreign direct investment on a firm's profitability and productivity. See Figure 1 (b), the average fossil fuel subsidies for all G20 members are 0.5% of GDP. 6 of the 10 sample countries subsidize fossil fuels above the average GDP. This condition is a big challenge for the development of R&D, which focuses on renewable energy technology. This figure is also consistent with the study conducted by Shaktawat & Vadhera (2021), which found that many energy subsidies are given to fossil fuel projects rather than those in the green economy. Another challenge considered is the lack of proper knowledge and resources to implement green financing strategies successfully by stakeholders (banks, investors, and governments).

Additionally, most emerging markets have underdeveloped green economy infrastructure compared to developed nations. Following the 2015 Paris Agreement, many emerging economies are still in the early stages of conceptualizing their green economy transition. This transitional state creates challenging conditions for R&D effectiveness, particularly for radical innovations that require time to diffuse and gain market share before becoming profitable. The cost dynamics of innovation in emerging markets further explain our findings. Initially, product development and launch costs exceed earnings, especially for more radical environmental products that may only become profitable after several years. This temporal mismatch between investment and returns explains why R&D does not enhance the performance impact of FDI in our sample.

Fujii and Managi (2019) provide additional theoretical insight, arguing that productivity improvements primarily come from "source reduction" rather than end-of-pipe technologies. The continued heavy subsidization of fossil fuels, shown in Figure 1(b), impedes this source reduction approach by maintaining artificially low prices for conventional energy. Similarly, Figure 1(a) illustrates the still-limited progress in converting to clean energy across our sample countries. These findings contrast with Holzner and Wagner (2022), who found that R&D investment significantly promoted green productivity in Germany. This divergence underscores the importance of contextual factors in shaping the effectiveness of innovation investments across different economic development stages.

We conduct the robustness checks in this section. First, this study uses control variables to manage the role of independent variables on the dependent variable because the control variables were proposed to affect the independent variable. Our study used a control variable as in the previous study by Xu et al. (2022) and Wen et al. (2021), including the following control variables in the regression: firm size, firm age, firm growth, and labor productivity growth. As a result, the control variables were significantly successful in controlling alternately or together in the four main research models. Second, we further utilize two alternative measures: countries with and without carbon taxes, following equations (1) and (2), respectively. Table 5 Columns (3), (4), (5), and (6) present the estimation results of the countries with and without carbon taxes sub-sample during the same period as the main estimation. These estimates imply that the significance and

magnitude of the coefficients are approximately or substantially the same across all four specifications. It confirms the robustness of estimates of the effect of green investment on the profitability and productivity of companies in G20 emerging market countries. Finally, our comprehensive robustness tests validate our core results, providing confidence in the reliability and generalizability of our findings within the context of emerging economies. These tests strengthen our contribution to understanding the complex dynamics of green investment, foreign direct investment, and R&D in shaping firm performance across diverse institutional environments.

## CONCLUSION

The findings show that green finance and foreign direct investment have a significant impact on company profitability and productivity. Companies can use green funding to accelerate the transition to a green economy, thereby increasing company profitability and productivity. Next, R&D is proven to moderate the effect of green finance on company profitability significantly, but not significantly on company productivity. This result is in contrast to efforts to transition the economy to clean energy. Finally, R&D is not significant in moderating the effect of foreign direct investment on company profitability and productivity. This finding is because R&D capacity in emerging market countries is still lacking, particularly in renewable energy technologies. The purpose of this study is to investigate the role of green investment on the profitability and productivity of companies in G20 emerging market countries.

This study contributes new empirical evidence showing that green finance and FDI significantly enhance both profitability and productivity in G20 emerging market firms. However, the moderating role of R&D is found to be either negative (on profitability) or insignificant (on productivity and FDI relationships). These insights highlight the urgent need for institutional reform and innovation system development in emerging markets to maximize the potential of green and foreign investments. Policymakers should reduce fossil fuel subsidies, improve public-private R&D collaboration, and realign national innovation policies with the goals of a green economy. The implication of this study leads to potential future research on investigating green financing's effect on profitability and productivity in diverse industries within the G20 countries, especially when measured from different approaches and methods.

## REFERENCES

Adams, M., Wheeler, D., & Woolston, G. (2011). A Participatory Approach to Sustainable Energy Strategy Development in a Carbon-Intensive Jurisdiction: The Case of Nova Scotia. *Energy Policy, 39*(5), 2550–2559. https://doi.org/10.1016/j.enpol.2011.02.022.

Adams-Kane, J., & Lopez, C. (2019). Global Opportunity Index 2018: Emerging G20 Countries and Capital Flow Reversal. *Retrieved from: SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.3356867.


https://journal.uinjkt.ac.id/index.php/etikonomi
DOI: https://doi.org/10.15408/etk.v24i2.45322

Akinroluyo, B. I. (2022). Capital Adequacy and Deposit Money Bank's Return on Asset (ROA) in Nigeria. *Finance & Accounting Research Journal, 4*(1), 1–13. https://doi.org/10.51594/farj.v4i1.284.

Aldakhil, A. M., Nassani, A. A., Awan, U., Abro, M. M. Q., & Zaman, K. (2018). Determinants of Green Logistics in BRICS Countries: An Integrated Supply Chain Model for Green Business. *Journal of Cleaner Production, 195*, 861–868. https://doi.org/10.1016/j.jclepro.2018.05.248.

Alfaro, L., Chanda, A., Kalemli-Ozcan, S., & Sayek, S. (2004). FDI and Economic Growth: The Role of Local Financial Markets. *Journal of International Economics, 64*(1), 89–112. https://doi.org/10.1016/S0022-1996(03)00081-3.

Ali, S., Yusop, Z., Kaliappan, S. R., & Chin, L. (2020). Dynamic Common Correlated Effects of Trade Openness, FDI, And Institutional Performance on Environmental Quality: Evidence from OIC Countries. *Environmental Science and Pollution Research, 27*(11), 11671–11682. https://doi.org/10.1007/s11356-020-07768-7.

Al-Qudah, A. A., Hamdan, A., Al-Okaily, M., & Alhaddad, L. (2022). The Impact of Green Lending on Credit Risk: Evidence From UAE's Banks. *Environmental Science and Pollution Research, 29*, 11889–11901. https://doi.org/10.1007/s11356-021-18224-5.

Amores-Salvadó, J., Martín-de Castro, G., & Navas-López, J. E. (2014). Green Corporate Image: Moderating The Connection Between Environmental Product Innovation and Firm Performance. *Journal of Cleaner Production, 83*, 356–365. https://doi.org/10.1016/j.jclepro.2014.07.059.

Anser, M. K., Yousaf, Z., Zaman, K., Nassani, A. A., Alotaibi, S. M., Jambari, H., Khan, A., & Kabbani, A. (2020). Determination of Resource Curse Hypothesis in Mediation of Financial Development and Clean Energy Sources: Go-For-Green Resource Policies. *Resources Policy, 66*, 101640. https://doi.org/10.1016/j.resourpol.2020.101640.

Arawomo, O., & Apanisile, J. F. (2018). Determinants of Foreign Direct Investment in the Nigerian Telecommunication Sector. *Modern Economy, 9*(05), 907–923. https://doi.org/10.4236/me.2018.95058.

Baloch, M. A., Ozturk, I., Bekun, F. V., & Khan, D. (2021). Modeling The Dynamic Linkage Between Financial Development, Energy Innovation, And Environmental Quality: Does Globalization Matter? *Business Strategy and the Environment, 30*(1), 176–184. https://doi.org/10.1002/bse.2615.

Bhattacharyya, R. (2022). Green Finance For Energy Transition, Climate Action and Sustainable Development: Overview of Concepts, Applications, Implementation and Challenges. *Green Finance, 4*(1), 1–35. https://doi.org/10.3934/GF.2022001.

Black, R., Cullen, K., Fay, B., Hale, T., Lang, J., Mahmood, S., & Smith, S. M. (2021). *Taking stock: A global assessment of net zero targets*. Energy & Climate Intelligence Unit and Oxford Net Zero.

Boye, J. I., & Arcand, Y. (2013). Current Trends in Green Technologies in Food Production and Processing. *Food Engineering Reviews, 5*(1), 1–17. https://doi.org/10.1007/s12393-012-9062-z.

Chen, M., Sinha, A., Hu, K., & Shah, M. I. (2021). Impact of Technological Innovation on Energy Efficiency In Industry 4.0 Era: Moderation of Shadow Economy in Sustainable Development. *Technological Forecasting and Social Change, 164*, 120521. https://doi.org/10.1016/j.techfore.2020.120521.

Choudhury, P., & Khanna, T. (2014). Toward Resource Independence–Why State-Owned Entities Become Multinationals: An Empirical Study of India's Public R&D Laboratories. *Journal of International Business Studies, 45,* 943-960. https://doi.org/10.1057/jibs.2014.20.

Climate Transparency Report. (2022). *G20 Response to The Energy Crisis: Critical for 1.5°C*. retrieved from: www.climate-transparency.org

Cui, L., & Xu, Y. (2019). Outward FDI and Profitability of Emerging Economy Firms: Diversifying From Home Resource Dependence in Early-Stage Internationalization. *Journal of World Business, 54*(4), 372–386. https://doi.org/10.1016/j.jwb.2019.04.002.

Delios, A., & Beamish, P. W. (2001). Survival and Profitability: The Roles of Experience and Intangible Assets in Foreign Subsidiary Performance. *Academy of Management Journal, 44*(5), 1028–1038. https://doi.org/10.2307/3069446.

Doh, J. P., Teegen, H., & Mudambi, R. (2004). Balancing Private and State Ownership in Emerging Markets' Telecommunications Infrastructure: Country, Industry, and Firm Influences. *Journal of International Business Studies, 35*(3), 233–250. https://doi.org/10.1057/palgrave.jibs.8400082.

D'Orazio, P. (2022). Mapping The Emergence and Diffusion of Climate-Related Financial Policies: Evidence From a Cluster Analysis on G20 Countries. *International Economics, 169*, 135–147. https://doi.org/10.1016/j.inteco.2021.11.005.

Dunning, J. H. (1992). *Multinational Enterprises and The Global Economy*. New Jersey: Addison-Wesley.

Fahri, L. O., Imamah, N., & Darmawan, A. (2022). Financial Integration, Technology Transfer, Labor Productivity Growth and Economic Growth on Pre-And-During COVID-19 Crisis: Evidence From G20 Countries. *Jurnal Keuangan Dan Perbankan, 26*(3), 615–637. https://doi.org/10.26905/jkdp.v26i3.7923.

Fujii, H., & Managi, S. (2019). Decomposition Analysis of Sustainable Green Technology Inventions in China. *Technological Forecasting and Social Change, 139*, 10–16. https://doi.org/10.1016/j.techfore.2018.11.013.

Füssel, H.-M., & Klein, R. J. T. (2006). Climate Change Vulnerability Assessments: An Evolution of Conceptual Thinking. *Climatic Change, 75*(3), 301–329. https://doi.org/10.1007/s10584-006-0329-3.

Ganda, F. (2019). The Environmental Impacts of Financial Development in OECD Countries: A Panel GMM Approach. *Environmental Science and Pollution Research, 26*(7), 6758–6772. https://doi.org/10.1007/s11356-019-04143-z.

Gelos, R. G., & Roldos, J. (2004). Consolidation and Market Structure in Emerging Market Banking Systems. *Emerging Markets Review, 5*(1), 39–59. https://doi.org/10.1016/j.ememar.2003.12.002.


https://journal.uinjkt.ac.id/index.php/etikonomi
DOI: https://doi.org/10.15408/etk.v24i2.45322

Gorodnichenko, Y., Svejnar, J., & Terrell, K. (2020). Do Foreign Investment and Trade Spur Innovation? *European Economic Review, 121*, 103343. https://doi.org/10.1016/j.euroecorev.2019.103343.

Hafner, S., Jones, A., Anger-Kraavi, A., & Pohl, J. (2020). Closing The Green Finance Gap–A Systems Perspective. *Environmental Innovation and Societal Transitions, 34*, 26–60. https://doi.org/10.1016/j.eist.2019.11.007.

Han, W., Wang, J., & Wang, X. (2022). FDI and Firm Productivity in Host Countries: The Role of Financial Constraints. *Journal of International Money and Finance, 124*, 102623. https://doi.org/10.1016/j.jimonfin.2022.102623.

Hepburn, C., O'Callaghan, B., Stern, N., Stiglitz, J., & Zenghelis, D. (2020). Will COVID-19 Fiscal Recovery Packages Accelerate or Retard Progress on Climate Change? *Oxford Review of Economic Policy, 36*(Supplement_1), S359–S381. https://doi.org/10.1093/oxrep/graa015.

Holzner, B., & Wagner, M. (2022). Linking Levels of Green Innovation With Profitability Under Environmental Uncertainty: An Empirical Study. *Journal of Cleaner Production, 378*, 134438. https://doi.org/10.1016/j.jclepro.2022.134438.

Hu, J., Wang, Z., Lian, Y., & Huang, Q. (2018). Environmental Regulation, Foreign Direct Investment and Green Technological Progress—Evidence from Chinese Manufacturing Industries. *International Journal of Environmental Research and Public Health, 15*(2), 221. https://doi.org/10.3390/ijerph15020221.

Hu, Khan, S. M., Huang, S., Abbas, J., Matei, M. C., & Badulescu, D. (2022). Employees' green enterprise motivation and green creative process engagement and their impact on green creative performance. *International Journal of Environmental Research and Public Health, 19*(10), 5983. https://doi.org/10.3390/ijerph19105983

Intergovernmental Panel on Climate Change. (2014). *Climate Change 2014: Synthesis Report: Longer Report*. Intergovernmental Panel on Climate Change.

Jiakui, C., Abbas, J., Najam, H., Liu, J., & Abbas, J. (2022). Green Technological Innovation, Green Finance, And Financial Development and Their Role in Green Total Factor Productivity: Empirical Insights from China. *Journal of Cleaner Production, 378*, 135131. https://doi.org/10.1016/j.jclepro.2022.135131.

Kong, D., Zhu, L., & Yang, Z. (2020). Effects of Foreign Investors on Energy Firms' Innovation: Evidence from a Natural Experiment in China. *Energy Economics, 92*, 105011. https://doi.org/10.1016/j.eneco.2020.105011.

Kudratova, S., Huang, X., & Zhou, X. (2018). Sustainable Project Selection: Optimal Project Selection Considering Sustainability Under Reinvestment Strategy. *Journal of Cleaner Production, 203*, 469–481. https://doi.org/10.1016/j.jclepro.2018.08.259.

Kumar, N. (2002). *Globalization and The Quality of Foreign Direct Investment*. Oxford: Oxford University Press.

Kuramochi, T., Nascimento, L., Moisio, M., den Elzen, M., Forsell, N., van Soest, H., Tanguy, P., Gonzales, S., Hans, F., & Jeffery, M. L. (2021). Greenhouse Gas

Emission Scenarios in Nine Key Non-G20 Countries: An Assessment of Progress Toward 2030 Climate Targets. *Environmental Science & Policy, 123*, 67–81. https://doi.org/10.1016/j.envsci.2021.04.015

Latif, B., Ong, T. S., Meero, A., Abdul Rahman, A. A., & Ali, M. (2022). Employee-Perceived Corporate Social Responsibility (CSR) And Employee Pro-Environmental Behavior (PEB): The Moderating Role of CSR Skepticism and CSR Authenticity. *Sustainability, 14*(3), 1380. https://doi.org/10.3390/su14031380.

Lee, C. C., & Lee, C. C. (2022). How Does Green Finance Affect Green Total Factor Productivity? Evidence From China. *Energy Economics, 107*, 105863. https://doi.org/10.1016/j.eneco.2022.105863.

Liu, X., Zhang, W., Liu, X., & Li, H. (2022). The Impact Assessment of FDI On Industrial Green Competitiveness in China: Based on The Perspective of FDI Heterogeneity. *Environmental Impact Assessment Review, 93*, 106720. https://doi.org/10.1016/j.eiar.2021.106720.

Nawaz, M. A., Seshadri, U., Kumar, P., Aqdas, R., Patwary, A. K., & Riaz, M. (2021). Nexus Between Green Finance and Climate Change Mitigation In N-11 and BRICS Countries: Empirical Estimation Through Difference in Differences (DID) Approach. *Environmental Science and Pollution Research, 28*(6), 6504–6519. https://doi.org/10.1007/s11356-020-10920-y.

Ng, T. H., & Tao, J. Y. (2016). Bond Financing for Renewable Energy in Asia. *Energy Policy, 95*, 509–517. https://doi.org/10.1016/j.enpol.2016.03.015.

Pan, C., Abbas, J., Álvarez-Otero, S., Khan, H., & Cai, C. (2022). Interplay Between Corporate Social Responsibility and Organizational Green Culture and Their Role in Employees' Responsible Behavior Towards the Environment and Society. *Journal of Cleaner Production, 366*, 132878. https://doi.org/10.1016/j.jclepro.2022.132878.

Park, Y., Meng, F., & Baloch, M. A. (2018). The Effect of ICT, Financial Development, Growth, and Trade Openness on CO2 Emissions: An Empirical Analysis. *Environmental Science and Pollution Research, 25*(30), 30708–30719. https://doi.org/10.1007/s11356-018-3108-6.

Prieur, F., & Bréchet, T. (2013). Can Education Be Good for Both Growth and The Environment? *Macroeconomic Dynamics, 17*(5), 1135–1157. https://doi.org/10.1017/S1365100512000132.

Qamruzzaman, M., & Jianguo, W. (2020). The Asymmetric Relationship Between Financial Development, Trade Openness, Foreign Capital Flows, and Renewable Energy Consumption: Fresh Evidence from Panel NARDL Investigation. *Renewable Energy, 159*, 827–842. https://doi.org/10.1016/j.renene.2020.06.069.

Rehman Khan, S. A., Yu, Z., Sarwat, S., Godil, D. I., Amin, S., & Shujaat, S. (2022). The Role of Block Chain Technology in Circular Economy Practices to Improve Organisational Performance. *International Journal of Logistics Research and Applications, 25*(4–5), 605–622. https://doi.org/10.1080/13675567.2021.1872512.


https://journal.uinjkt.ac.id/index.php/etikonomi
DOI: https://doi.org/10.15408/etk.v24i2.45322

Romano, A. A., Scandurra, G., Carfora, A., & Fodor, M. (2017). Renewable Investments: The Impact of Green Policies in Developing and Developed Countries. *Renewable and Sustainable Energy Reviews, 68*, 738–747. https://doi.org/10.1016/j.rser.2016.10.024.

Shahbaz, M., & Sinha, A. (2019). Environmental Kuznets Curve for CO2 Emissions: A Literature Survey. *Journal of Economic Studies, 46*(1), 106-168. https://doi.org/10.1108/JES-09-2017-0249.

Shaktawat, A., & Vadhera, S. (2021). Sustainability Assessment of Renewable Energy Technologies in Context to India Using Multicriteria Analysis with and Without Incorporating Risk Analysis. *Journal of Environmental Assessment Policy and Management, 23*(03n04), 2250020. https://doi.org/10.1142/S146433322250020X.

Shu, C., Zhou, K. Z., Xiao, Y., & Gao, S. (2016). How Green Management Influences Product Innovation in China: The Role of Institutional Benefits. *Journal of Business Ethics, 133*(3), 471–485. https://doi.org/10.1007/s10551-014-2401-7.

Spash, C. L. (2020). A tale of three paradigms: Realising the Revolutionary Potential of Ecological Economics. *Ecological Economics, 169*, 106518. https://doi.org/10.1016/j.ecolecon.2019.106518.

Sun, H., Edziah, B. K., Sun, C., & Kporsu, A. K. (2019). Institutional quality, green innovation and energy efficiency. *Energy Policy, 135*, 111002. https://doi.org/10.1016/j.enpol.2019.111002.

Tang, D. Y., & Zhang, Y. (2020). Do Shareholders Benefit from Green Bonds? *Journal of Corporate Finance, 61*, 101427. https://doi.org/10.1016/j.jcorpfin.2018.12.001.

Tong, L., Jabbour, C. J. C., Najam, H., & Abbas, J. (2022). Role of Environmental Regulations, Green Finance, And Investment in Green Technologies in Green Total Factor Productivity: Empirical Evidence from Asian Region. *Journal of Cleaner Production, 367*, 134930. https://doi.org/10.1016/j.jclepro.2022.134930

Wang, X., Han, L., & Huang, X. (2020). Bank Competition, Concentration and EU SME Cost of Debt. *International Review of Financial Analysis, 71*, 101534. https://doi.org/10.1016/j.irfa.2020.101534.

Wang, X., Sun, C., Wang, S., Zhang, Z., & Zou, W. (2018). Going Green or Going Away? A Spatial Empirical Examination of The Relationship Between Environmental Regulations, Biased Technological Progress, and Green Total Factor Productivity. *International Journal of Environmental Research and Public Health, 15*(9), 1917. https://doi.org/10.3390/ijerph15091917.

Wen, J., Farooq, U., Tabash, M. I., el Refae, G. A., Ahmed, J., & Subhani, B. H. (2021). Government Green Environmental Concerns and Corporate Real Investment Decisions: Does Financial Sector Development Matter? *Energy Policy, 158*, 112585. https://doi.org/10.1016/j.enpol.2021.112585.

Werner, R. A. (2014). Can Banks Individually Create Money Out of Nothing? the Theories and The Empirical Evidence. *International Review of Financial Analysis, 36*, 1–19. https://doi.org/10.1016/j.irfa.2014.07.015.

Wu, H. (2022). Trade Openness, Green Finance and Natural Resources: A Literature Review. *Resources Policy, 78*, 102801. https://doi.org/10.1016/j.resourpol.2022.102801.

Xing, C., Zhang, Y., & Wang, Y. (2020). Do Banks Value Green Management in China? The Perspective of The Green Credit Policy. *Finance Research Letters, 35*, 101601. https://doi.org/10.1016/j.frl.2020.101601.

Xu, J., Akhtar, M., Haris, M., Muhammad, S., Abban, O. J., & Taghizadeh-Hesary, F. (2022). Energy Crisis, Firm Profitability, and Productivity: An Emerging Economy Perspective. *Energy Strategy Reviews, 41*, 100849. https://doi.org/10.1016/j.esr.2022.100849.

Xu, Y., Li, S., Zhou, X., Shahzad, U., & Zhao, X. (2022). How Environmental Regulations Affect the Development of Green Finance: Recent Evidence from Polluting Firms in China. *Renewable Energy, 189*, 917–926. https://doi.org/10.1016/j.renene.2022.03.020.

Yamaguchi, Y., & Yamaguchi, K. (2022). The Endogenous Money IS-LM Model of The Debt Money System (Part I). *International Journal of Economic Theory, 18*(2), 155-183.

Yasmeen, H., Wang, Y., Zameer, H., & Solangi, Y. A. (2020). Decomposing Factors Affecting CO2 Emissions in Pakistan: Insights from LMDI Decomposition Approach. *Environmental Science and Pollution Research, 27*(3), 3113–3123. https://doi.org/10.1007/s11356-019-07187-3.

Yu, C.-H., Wu, X., Zhang, D., Chen, S., & Zhao, J. (2021). Demand for Green Finance: Resolving Financing Constraints on Green Innovation in China. *Energy Policy, 153*, 112255. https://doi.org/10.1016/j.enpol.2021.112255.

Zhang, Cherian, J., Abbas Sandhu, Y., Abbas, J., Cismas, L. M., Negrut, C. V., & Negrut, L. (2022). Presumption of Green Electronic Appliances Purchase Intention: The Mediating Role of Personal Moral Norms. *Sustainability, 14*(8), 4572. https://doi.org/10.3390/su14084572.

Zhang, D. (2021). Green Credit Regulation, Induced R&D and Green Productivity: Revisiting the Porter Hypothesis. *International Review of Financial Analysis, 75*, 101723. https://doi.org/10.1016/j.irfa.2021.101723.

Zhao, Cao, Y., Feng, C., Guo, K., & Zhang, J. (2022). How Do Heterogeneous R&D Investments Affect China's Green Productivity: Revisiting the Porter Hypothesis. *Science of the Total Environment, 825*, 154090. https://doi.org/10.1016/j.scitotenv.2022.154090.

Zhao, L., Gu, J., Abbas, J., Kirikkaleli, D., & Yue, X.-G. (2022). Does Quality Management System Help Organizations in Achieving Environmental Innovation and Sustainability Goals? A Structural Analysis. *Economic Research-Ekonomska Istraživanja, 35*(1), 5932-5955. https://doi.org/10.1080/1331677X.2022.2100436.

Zhong, J., & Li, T. (2020). Impact of Financial Development and Its Spatial Spillover Effect on Green Total Factor Productivity: Evidence From 30 Provinces in China. *Mathematical Problems in Engineering, 2020*, 1593742. https://doi.org/10.1155/2020/5741387.

Zhu, Y. (2010). An Analysis on Technology Spillover Effect of Foreign Direct Investment and Its Countermeasures. *International Journal of Business and Management, 5*(4), 178–182. https://doi.org/10.5539/ijbm.v5n4p178.


https://journal.uinjkt.ac.id/index.php/etikonomi
DOI: https://doi.org/10.15408/etk.v24i2.45322