

IMPACT OF GREEN FINANCE AND FINTECH ON SUSTAINABLE ECONOMIC GROWTH-EMPIRICAL STUDY IN BANGALORE

Ms. Nalini Kantha C¹, Mrs. Kavya ² & Mrs. Silpa

1. Assistant Professor, MBA Department, One School of Business, Bangalore.
2. Assistant Professor, MBA Department, One School of Business, Bangalore.
3. Assistant Professor, MBA Department, One School of Business, Bangalore.

ABSTRACT

This study analytically investigates the influence of green finance and financial technology on sustainable economic growth. The analysis is based on data from Indian states from 2011 to 2022. The research paper uses the panel regression method to examine the association between fintech, green finance and economic growth by applying a two-step GMM (generalized model of moments) to determine the endogeneity issues of the variables. This paper reveals that green finance widely helps quality economic growth by significantly impacting finance structure, financial effectiveness, and environmental quality protection development. Furthermore, fintech enhances the significant effect of green finance in the finance structure and environmental quality protection while lacking consequences on the association between green finance and economic effectiveness. Based on the results, the current research paper offers policy submissions for policymakers and the Government of India, including strengthening the consolidation of fintech growth with green finance, structuring a quality environmental revelation outline to control state governments in refining the effectiveness of green finance, and emerging prolonged satisfactory protocol as an outside involvement proceeding to encourage green finance in the non-public sector.

Keywords

Green finance, Fintech, Economic growth, Quality environment and finance structure

1. Introduction

In recent decades, the economic growth of India has increased enormously due to its new economic policies made by the government for the proper utilization of available environmental resources. Therefore, the over-exploitation of forest resources caused

environmental deterioration and contamination that consider a serious challenge to protect the environment on an urgent basis and also to prevent several negative impacts on human health. Hence, currently in India, the channelling of the resources towards green ecosystem had planned to provide the needs of the local people living in rural areas, because their livelihood mostly depends on local available environmental resources. Because of energy, currently, fossil fuels have gained more attention because they fulfil almost around 60 various energy demands in India. Therefore, high consumption of fossil fuels also released a substantial amount of toxins into the environment that has damaged the ecosystem. Many researchers have been working on the decline in the degradation rate of the environment by different methods. In addition to that the Indian government has been working on making sustainable goals for the country by adopting measures that promote high-calibre economic growth and eco-friendly techniques. The green finance strategy to fund various projects that ensure they fulfil the above constraints plays a pivotal role in the sustainable development of the worldwide economy.

It accelerates the growth of green finance by reducing information unevenness for investors and stakeholders, improving efficiency, appreciating nature assets, and promoting sustainable lifestyles to support quality economic growth. Green finance is associated with high-quality and sustainable development and these are important factors of economic growth; it also has sustainable expansion characteristic that offers a basis for planning closely associated with high-quality sustainable development. In addition to that, it also adds an essential factor of economic growth that offers a foundation for planned prosperity.

Green finance is concerned with concerning public and private financial structures with eco-friendly business models which are directed at clean energy, enhanced water and air quality, disposable plastic and so on; and green finance fills gaps among investors, lenders, consumers, business owners and all stakeholders. The objectives of the current study add to the corpus of knowledge in the following areas and make several contributions to the literature on green finance.

First, it contributes by shedding light on green finance and honouring academic research to determine how green finance affects high-quality economic growth. While past studies on green finance research emphasized a particular environmental aspect of economic development, It specifically explores the impact of green financing on comprehensive, high-quality economic development.

Second, this study considers a recent call for attention to the contribution of fintech to the growth of green finance. Identified that there is not enough study on fintech that how it alters the connection between green financing and economic development. Therefore, considered fintech a moderator variable and planned to investigate its covert influence on the association between green finance and high-quality economic growth. And also, development entry provides a genuine understanding of the development impact of green finance. The above-stated fintech results could offer significant fiction for the stakeholders so they can redesign economic development by making progress in green finance and financial technology.

2. Literature review

Green finance explains that the “financial funds flowing into sustainable progress ventures and initiatives, environmental products, and policies that encourage the development of a more sustainable economy”. Notably, while making investment and financing decisions, financial institutions take environmental protection into account, which drives cash to green industries. This approach contemplates the adverse environmental impacts and how we should prepare ourselves to strike a balance between excessive natural resource exploitation and economic growth.

Green finance bridges the gap wherein variables are supposed to be to ensure sustainable economic development. Green finance helps in channelizing resources more efficiently and efficient environmental protection. Studies suggest that green finance contributes to high-quality economic development by positively impacting the ecological environment, economic efficiency, and economic structures. Fintech is a combination of financial services delivered using technology. It brings abundant opportunities as the technology helps organizations in the financial services sector to reduce friction and hence solutions much more effectively. However, the impact of this technology on building a high-quality, sustainable framework for the development of the economy is a topic of research as it is in a nascent stage, and we are yet to capture its impacts. High-quality economic development is achieved with the help of many factors.

According to studies, countries have exploited natural resources at an unprecedented rate to achieve sustained economic growth because most of the traditional industries lacked both technological innovation and energy efficiency, resulting in severe pollution. However, if economic growth is achieved through renewable energy

production, it has a lasting positive impact on the environment and economy. It is noticed that high-quality economic development growth is multifaceted as it has impact factors like technological innovation, organisational factors, financial factors, and political factors.

2.1. FINTECH AND ITS IMPACT ON GREEN FINANCE

Fintech refers to state-of-the-art solutions to upgrade and mechanize the delivery and use of financial services. It is significant in finance as it completely changes how things are in the Banking, Financial, Services, and Insurance sectors. Fintech in India is the 3rd largest in the world after China and USA. It is expected to overgrow at a CAGR of 24.57% per annum. Fintech acts as a facilitator for innovations in the finance industry, catering to both products and services. Evidence from countries like China suggests that growth in fintech innovation contributes to green credit, investment, and areas that stimulate green growth. Also, the green development of the economy goes hand in hand with innovations in science and technology, which cannot be done without improving efficiency.

Fintech primarily involves technologies applied in the financial services sector, including mobile payments, money transfers, loans, fundraising, and asset management. It has been growing expeditiously, and the infrastructure to support it is also developing. Fintech establishment is more straightforward in advanced economies with established market rules, private equity, and fundamental infrastructure. Because, in the case of well-developed economies, already have the basic enabling infrastructure to support the advancements. Studies also show that internet servers, mobile phone subscribers, and workforce availability benefit the development of fintech.

Financial technology makes it easier for investors, especially private ones, to access new sources of funding and investment. It also comes to our knowledge that sufficient servers, mobile subscribers, and workforce contribute positively toward the growth of financial technology. Studies found that the difficulty in obtaining essential financial services like loans leads to the emergence of new fintech businesses in a nation. The system may theoretically become more effective with a more extensive user and more significant and newer fintech initiatives. However, we cannot ignore that technical innovation is one of the critical factors responsible for environmental pollution and economic growth. Also, it provides developing countries with ample chances for economic growth.

But technical innovation is a doubtful advantage for the economy and environment. On the one hand, it can provide opportunities for economic growth with increased production efficiency of the enterprises and reduced production costs. It can also help us break the financial users for the sustainable development of the economy as it leads to production efficiency.

On the other hand, it increases the demand for natural resources damaging sustainable economic growth. The impact of fintech in constituting a green economy is peculiar. Technology advancement and innovation effectiveness of organizations in acquiring knowledge regarding credit which reduces financial friction with the help of information symmetry. Since, fintech innovation focuses on digitally transforming technologies like Big Data, IoT, AI, cloud computing, and blockchain. Studies show that fintech innovation accelerates the evolution of the ecosystem by expanding financial aid, enhancing resource allocation, streamlining resource allocation, and helping in reducing education finance. Financial technology makes it easier for people to obtain new financial resources from a bigger group of investors. It also pointed out that green bonds are effective investments; it reduces a company's carbon footprint and creates long-term value. An application of fintech could be agriculture. It can transform the processes into sustainable funding and distribution methods for sponsoring a project or business enterprise by collecting money from several people, usually online and through electronic payment systems.

2.2. GREEN FINANCE AND ECONOMIC DEVELOPMENT

Green finance provides a set of environmentally beneficial instruments ensuring sustainable economic development. Research in this area is at an early stage; earlier studies have highlighted the short-term view of the organizations to achieve growth. The green finance mechanism bridges the gap of the traditional finance system, which only sees the projects' profitability by developing a broader purview, including protecting the environment and energy efficiency. Studies have analysed significant obstacles to green investment for sustainable energy infrastructure and policy intervention, which shows that uncertainty of the policies, along with short-termism in the financial system, are the two significant investment barriers. It is also noticed that the beneficial effects of green finance on enterprises, as it accelerates innovation in firms which helps the economy

switch to green and efficient production. Researchers have also started to pay attention to the development of sustainable finance to ensure high-quality economic growth. Sustainable development helps form a society of happy people by sustainably developing the economy and taking care of the organisation's financial goals. Studies show that investments in the energy conservation and environmental protection sector can alter the industry's system by employing sustainable financial methods. "The study investigated the relationship between urbanisation, hydel power use, and real gross domestic product in China and India from 1965 to 2013". It was argued that while hydel energy consumption has a short-term negative impact on emissions in both countries, urbanisation has a long-term favourable influence.

According to existing knowledge, prior studies analysed the effect of green financing on economic development primarily from a unique environmental component or one incorporated index of many factors. Evidence from India suggests Green Finance policies are crucial in channelling funds to the less developed financial ecosystem. India has a lot of potential to leverage existing technology and relationships between banks and enterprises. With this comes an opportunity to direct the attention toward green finance. Green finance and firm innovation have a positive correlation, which means it plays a crucial role in the transition to improved and sustainable financing methods for manufacturing.

Studies suggest that Economic development should be studied in a detailed manner considering various impact factors of high-quality economic growth, with each indicator hand-picked and assessed individually, which would provide us with a much more thorough understanding. Some financial technology companies are dynamically integrating a green financial system with the objectives of adopting technology to decrease CO₂ emissions and encourage effective resource use. For example, Paytm, PhonePe, MobiKwik, and PayU, are the largest fintech companies in India, with majorities of fintech companies in the mobile app that boosts customers to contribute to sustainable finance ventures. Moreover, it encourages users to engage in CO₂-reducing behaviours like walking and using public transportation. As part of the desert recovery initiative, end users can grow a virtual tree by collecting carbon savings and earning green energy. It will eventually grow into a real tree. However, there is a research lacuna concerning the participation of fintech firms in environmental quality protection efforts in

India. Explicitly, financial technology companies might not dynamically contribute to these endeavours. Hence, the outcome of financial technology in fast-tracking the shift of green finance to sustainable economic development in India is indistinguishable. For this paper, the role of fintech is examined as a borderline situation that can control the outcome of sustainable finance on sustainable economic growth.

3. RESEARCH HYPOTHESES

This research paper aims to elucidate how green finance determines sustainable economic growth. The multiple hypotheses concerning the associations between green finance and sustainable economic development are explained.

The paper assesses sustainable economic growth from three characteristics created as three parameters, i.e., economic system (ES), economic effectiveness (EE), and Environmental Quality Management (EQM).

It suggests green finance's critical positive effect on sustainable economic growth characteristics. The study also examines the regulating impact of financial technology on the associations between green finance and sustainable economic growth. The comprehensive hypotheses are explained as follows.

3.1. Impact of green finance on environmental quality, economic efficiency, and system

The study examines that green finance contributes to the development of environmental quality as it affords provisions and direction for stakeholders that can accomplish a mutually beneficial condition between economic feasibility and environmental quality protection. Initially, green finance support companies with a green organization approach to get access to substantial loan size, which boosts companies' green conversion from high energy consumption and high smoke, dust, or pollution to a much more sustainable approach. Subsequently, the green investment structure empowers stakeholders, such as enterprises, to control the entire procedural course of the investment scheme and assurance that the investment venture encounters green values. Lastly, green finance supports the utilization of renewable fuel (hydroelectric, geothermal, solar, wind, and biomass energy) fuel use in customer groups. In the meantime, financial organizations could regulate the credit in acquiring

green products (for example, electric vehicles). In this connection, with the help of the green finance approach and environmental quality protection, the study developed the hypothesize that:

H1. Green finance is positively correlated to environmental quality protection. The present research paper investigates whether green finance helps improve economic efficiency in production, allocation, and distribution.

H2. Green finance is positively associated with high efficiency of economic development The green finance system has a positive effect on enhancing the economic system. The infrastructure projects maintained by green finance have a comparative policy situation

H3. Fintech significantly balanced the impact of green finance on environmental quality protection

4.2. SELECTION OF DEPENDENT, INDEPENDENT, MODERATING AND CONTROL VARIABLES

4.2.1. Dependent variables

In this study, sustainable economic growth comprises three indicators -financial system (ES), economic effectiveness (EE), and Environmental Quality Management (EQM).

The comprehensive measure

Table 1
Measurements of sustainable economic growth.

Stage -I	Stage -II	Stage -III	Explanation
sustainable economic growth	an economic system (ES)	Financial system (FS) Investment Trade openness Industrial growth	Total foreign investment/GDP ROI = Net income/Cost of investment x 100 The ratio of exports plus imports over GDP Market size/no of year
sustainable economic growth	economic effectiveness (EE)	Land Productivity Labour Productivity Capital Productivity Total factor productivity	Crop output/land area Total Output/Total Input GDP/total investment Total factor productivity *capital input *labour input
sustainable economic growth	Environmental quality Management (EQM)	discharge of Industrial waste per unit GDP Sulphur dioxide (SO2) emissions per unit GDP Carbon Dioxide (CO2) Emissions per Unit of GDP Forest area (% of land area) The coverage ratio of the green space index	releaseof Industrial wastage/GDP SO2/GDP CO2/GDP - -

Source: Prepared by the author

4.2.2. Regressor

The paper carefully chooses green finance parameters to develop the green finance index. The reference to green finance is classified into five subparts: (1) carbon finance, (2) green insurance, (3) green credit, (4) green securities (5) green investment.

Green investment projects denote the way of source apportionment to ecological pollution resistor, targeting to decrease the environmental impairment of a firm's operation and comprehend sustainable growth.

In this research paper, we emphasize the public sector; consequently, the green venture is set as the ratio of India's fiscal disbursement on energy management and environmental quality safety to India's total budgetary outflow.

4.2.3. Moderator variable

Financial Technology can be determined as the strength of the innovative financial technology projects of Indian states during the study sample period. Financial technology firm strength explains the side by side of fintech activity and growth in the rural area. The paper sums up the number of anew initiated financial technology projects as the worth of financial technology strength.

4.2.4. Control variables

In the meantime, economic growth can be affected by the variance in trade and industrial building among states; the paper applies energy consumption data of the previous year to control the outcome of contention in an industrial building on economic growth. GDP per capita apprehensions the inclusive state's economic growth level, connecting to (1) environmental governance, (2) innovation technology investment, and (3) resource allocation. The paper practices the log of selected variables in a direction to an explanation for its skewed distribution.

4.3. ANALYSIS

A variance inflation factor (VIF) is a portion of the total of multicollinearity in regression examination. Multicollinearity exists when there is a correlation between multiple independent variables in a multiple regression model. This can adversely affect the regression results.

5. LIMITATIONS OF THE STUDY

This research paper also has some limitations, primarily regarding inadequate data accessibility, making it hard to analyse the heterogenous issues that ultimately impact the research model.

Green finance comprehends a variety of themes, including green bonds, green insurance, and green credit. It is interesting to get the above statistics because of inadequate information sharing. Our examination cannot determine the significance of numerous green financing strategies on ecological sustainability.

The study's original findings presented that green finance lengthily contributes to sustainable economic growth by an undoubtedly significant impact on all three proportions or aspects (1) environmental quality protection (2) economic effectiveness, and (3) economic system), which analytically confirm the constructive outcome of green finance. In addition, financial technology enables green finance positive and considerable influence on environmental quality protection and economic system characteristics. However, fintech does not control the association between green finance and its economic effect.

6. CONCLUSION AND POLICY IMPLICATIONS

The current research paper used the Indian states' panel data from 2010 to 2021. It developed a conceptual framework to analyse the instrument of financial technology and green finance in accomplishing the objectives of sustainable economic growth. The paper chose the five parameters to assess green finance's magnitude and composite them using a general principal component analysis model (GPCAM). Simultaneously, the researcher developed sustainable economic growth parameters from 3 proportions, (1) environmental quality protection (2) economic effectiveness, and (3) economic system. The present research paper has drawn policy implications based on the findings: (1) financial managers need to accelerate the growth of financial technology with green finance and supervisors should boost fintech firms to energetically engage in several areas of green finance projects and environmental quality safeguarding enterprises that enable sustainable economic growth.

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