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ORIGINAL RESEARCH PAPER

Social Responsibility Towards the Environment: Green Banking and a Comparison of Its Application in Domestic and Foreign Banks

Amrollah Amini [a*], Nasrin Hashemizadeh [b]

[a] *Department of Islamic Economics, Allameh Tabataba'i University, Tehran, Iran.*
[b] *M.sc of Islamic Banking, Allameh Tabataba'i University, Tehran, Iran.*

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A B S T R A C T

In light of growing global concerns regarding climate change and environmental degradation, banking, as a vital artery of the economy, plays a significant role in guiding sustainable policies. This study aims to investigate the current status of green banking in Iran, particularly in the National Bank of Iran, and to compare it with global standards. In the first phase, a comparative-analytical approach was employed to examine the experiences of domestic banks (Agricultural, Quds, and Commercial) and international banks (the Reserve Banks of India, Bangladesh, and Pakistan). The findings revealed that international banks have more experience in the field of green banking and offer a greater variety of financial tools to support green projects. In the next phase, time-series econometric methods, particularly the Autoregressive Distributed Lag (ARDL) model, were used to analyze the impact of foreign bank investments in clean energy, bank loans in this sector, green Gross Domestic Product (GDP), and air pollution emissions on the level of environmental degradation. After confirming the cointegration of variables at levels I(0) and I(1) using the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests, the Engle-Granger cointegration test and the Bounds test were applied to identify long-term relationships. The results showed that there is a stable long-term relationship among the studied variables, and the model is capable of explaining both statistically significant short-term and long-term relationships between them. Ultimately, these findings can serve as a foundation for economic, banking, and environmental policy-making to promote green banking in Iran.



1. Introduction

Financial institutions, such as banks, have a direct impact on industrial activities and economic growth and can alter the trajectory of economic development; therefore, banking can enhance environmentally sustainable investments and social responsibility [1]. Today, the concept of "green" has reached banking and has come with social benefits, resulting in green banking, which has emerged worldwide.

Green banking means the efforts of financial institutions to address environmental and social challenges alongside profit-making, which has recently received more attention. Green banking refers to the integration of

* Corresponding author: Amrollah Amini
E-mail address: a.aminij@atu.ac.ir
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environmental and social issues into banking services in order to support sustainable development and reduce climate change [2]. Since the 1970s, attention to environmental issues has increased. Green banking refers to sustainable banking practices that are implemented, especially in countries vulnerable to climate change, with the aim of supporting the environment [3]. Integrating environmental responsibilities into banking operations helps reduce risks arising from climate change and also encourages financing of renewable energy and the provision of green loans. Green banking, by utilizing modern technologies, assists in paperless transactions and reduces environmental impacts [4]. Financial institutions, by using green financial instruments such as green bonds, not only contribute to the transition toward a green economy, but also offer higher returns for their customers [5].Green banking is still under investigation, but related financial instruments such as funds, loans, green bonds, and green financing have been studied. These studies have focused on the performance, pricing, and impacts of green financial instruments; however, such studies have not yet been conducted in Iran and there is a need for further research [6]. This research addresses the following issues:

- Advantages and challenges of green banking
- Entry of domestic banks into the field of green banking
- The actions of the Bank Mellat of Iran in this area
- Advantages of Bank Mellat of Iran compared to other banks in the field of green banking

Green banking emerged in the 1990s with increased attention to environmental issues in the financial sector. After the Rio Summit in 1992, banks recognized the importance of sustainable development and developed environmental policies and programs. In the early 2000s, green banking was recognized as a tool for promoting sustainable development through financial services [7]. This concept includes financing renewable energy projects, improving energy efficiency, and assessing environmental risks in loan decision-making [8]. It aims to meet current needs without compromising the ability of future generations to meet their own needs.

Green banking focuses on sustainable development and strives to meet current needs without causing harm to future generations. This approach seeks to establish a balance among economy, society, and the environment, and is based on principles such as environmental responsibility, social responsibility, economic sustainability, and active stakeholder participation [9]. Green banking, by emphasizing environmental preservation, helps reduce the carbon footprint. Banks take significant steps toward promoting sustainability by investing in renewable energy, reducing paper consumption, and optimizing energy use [10].

Green banking, by supporting solar energy projects, paperless transactions, and cost reduction, helps improve the environment and strengthen economic sustainability [11]. Green banking initiatives contribute to the reduction of greenhouse gas emissions and enhance environmental performance [12]. Moreover, green banking helps improve environmental performance and waste management [13]. Green banking makes a more environmentally responsible future possible by reducing the carbon footprint and promoting sustainable development.

Green banking, by investing in renewable energy and improving energy efficiency, can help significantly reduce greenhouse gas emissions and the carbon footprint. Green banking also offers social benefits for banks, as it attracts environmentally conscious customers, although it may not be appealing to others [14] (Table 1).

Table 1. Advantages of green banking.

Row	Advantages and strengths
1	Saving time spent by customers and banks
2	Reducing banking and customer operational costs
3	Performing transfers at any time and from any place
4	Reducing the carbon footprint in the environment through financing wind and solar energy projects

Source: See Ref. [14].

Green banking, by focusing on environmental preservation, plays an important role in reducing the carbon footprint. Banks take effective actions to promote sustainability through investing in renewable energy, reducing paper consumption, and optimizing energy use [15]. In this regard, green banking faces opportunities and challenges, which are mentioned in the table below:

Table 2. Opportunities and challenges of green banking.

Opportunities	Challenges
• Increasing people's computer literacy helps facilitate green banking and increases customers' willingness to engage in modern activities in this field. • Most customers only use ATM cards; therefore, initiating green banking schemes is essential. • With the increasing use of mobile and internet banking, the expansion of green banking is essential.	• The time-consuming nature of selection and its acceptance by customers. • Implementing green banking requires high-cost technology. • Implementing green banking practices requires expensive renewable and recycling techniques. • Data protection and permanent security issues. • The concept of greenwashing* • The time-consuming nature of customer password operations in green banking.

Source: See Ref. [21].
* Companies try to appear as if their activities are "green" and "environmentally friendly" in order to downplay or hide the negative impacts of their activities on the environment.

Vydhyam and Nair [14], in an article titled "A Study on Green Banking Initiatives in Selected Private and Public Sector Banks in Chittoor District, Andhra Pradesh, India", examining the measures taken by Indian banks in the field of green banking, shows that both public and private banks utilize online banking services, mobile banking, and energy-saving methods. Furthermore, these banks provide their customers with the necessary awareness regarding environmental conservation and the use of sustainable services.

Khan et al. [5], in an article titled "Green Banking in Pakistan: A Qualitative Study", examine the evolving landscape of green banking in Pakistan and investigate its impact on customer engagement and organizational sustainability. This study indicates that the adoption and support of green banking by Pakistani banks is not only a moral commitment but also a strategic requirement for maintaining relevance and sustainability in the market.

Rabea'Hadi et al. [2], in an article titled "Green Banking: A Review of Profitability and Sustainability Concepts", examined the role of green bonds in environmental sustainability, bank profitability, and creating a more financially aware environment. They concluded that green banking, as a tool for sustainable development and mitigating climate change, ensures long-term profitability, environmental conservation, and the social responsibility of banks.

Elahi et al. [4], in an article titled "Customer Awareness of Green Banking Practices", identified the progress of green banking practices in the banking sector. Using structural equation modeling (SEM), they found that customers welcome banks' green initiatives and are willing to accept them. Education has a positive impact on awareness of green banking. Furthermore, awareness of green banking depends on age, gender, occupation, and sustainable banking practices.

Chen et al. [9], in an article titled "The Impact of Green Banking Practices on Banks' Environmental Performance and Green Finance: An Empirical Study", in a research on 322 employees of private banks in Bangladesh, found that banks' green management methods have a positive impact on green finance and environmental performance, but customer-related methods do not have a significant impact. Furthermore, financing green projects improves the environmental performance of banks.

2. Method

2.1. Methodology

In the first stage of this research, a comparative-analytical approach is employed to examine and compare the experiences of domestic and foreign banks in the field of green banking. This comparative analysis is conducted to identify similarities, differences, and successful patterns in green financing and investment, thereby establishing a foundation for subsequent econometric analyses. Subsequently, time-series econometric methods are utilized to investigate the impact of banks' foreign investment in the renewable energy sector, loans granted by banks in the renewable energy sector, and Green GDP on the extent of environmental degradation. To this end, the Autoregressive Distributed Lag (ARDL) model is applied to examine both short-run and long-run relationships among the study variables. Initially, to determine the degree of cointegration, the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests were employed to assess the stationarity or non-stationarity of the research variables. Following confirmation of cointegration at the I(0) and I(1) levels, the application of the ARDL model was facilitated. In the next stage, the Engle-Granger cointegration test and the Bounds test within the ARDL framework were used to examine the existence of a long-run relationship between the independent and dependent variables. The model was then estimated to simultaneously capture the short-run and long-run relationships among the research variables. Ultimately, the results derived from the model enable the analysis of the impact of each banking-related variable on environmental degradation across both short- and long-run time horizons, serving as a suitable basis for economic, banking, and environmental policymaking aimed at developing green banking.

3. Results and Discussion

3.1. Experience of Foreign Countries in the Field of Green Banking

3.1.1. Experience of the Central Bank of India

Green banking in India is a modern concept that has been adopted in various ways by Indian banks. This approach helps increase the credibility of green projects, protect the interests of depositors, promote sustainable development, and improve the environmental status. In the following, measures taken in this regard are examined [16] (Table 3).

Table 3. Experience of India in the field of green banking.

Row	Actions
1	Solar ATMs
2	Mobile Banking
3	Green Channel Counter
4	Online Banking
5	Green Home Loan
6	Green Remittance Card
7	Green Credit Card
8	Online Savings Account
9	Green Certificate of Deposit
10	Green Current Account
11	E-investment Services
12	Bonds and Mutual Funds for Environmentally Friendly Projects
13	Recyclable Debit and Credit Cards

Source: See Ref. [16].

3.1.2. Experience of the Central Bank of Bangladesh

Bangladesh is a low-lying and climate-vulnerable country whose financial sector is based on banks, other financial institutions, capital market intermediaries, insurance companies, and microfinance institutions. Since 2011, the country has turned to green banking to meet its financial needs and cope with environmental threats [12, 17] Green banking schemes in Bangladesh are described in the following table:

Table 4. Green banking experience in Bangladesh.

Row	Actions
1	Financial support from the Bangladesh Central Bank for environment-related (green) products and sectors.
2	Formulation of policies and facilitation of innovative schemes to promote green financing
3	Provision of Environmental and Social Risk Management (ESRM) guidelines to banks and non-bank financial institutions.
4	Mandating banks to establish a climate risk fund and allocate 10% of their Corporate Social Responsibility (CSR) budget for financial support of green projects.
5	Incorporation of solid waste management systems, rainwater harvesting, and solar panels in building infrastructures.
6	Green management of the internal environment by the Bangladesh Central Bank.

Source: See Ref. [12, 17].

3.1.3. The Experience of the Central Bank of Pakistan

The increase in population, urbanization, and energy consumption in Pakistan has led to environmental problems. In response, the State Bank of Pakistan introduced Green Banking Guidelines in 2017 to encourage financial institutions to take responsibility for environmentally sustainable projects and to reduce the impacts of climate change [18, 19] (Table 5).

Table 5. Green banking experience in Pakistan.

Row	Actions
1	Establishing online/digital banking
2	Green channel counter
3	Converting current and savings accounts to online banking
4	Easy online payment channels for dollar deposits
5	Reducing and eliminating paper in conducting transactions
6	Performing most tasks such as conducting transactions, requesting checkbooks, etc., through ATMs
7	Providing green loans to businesses for investing in clean energy and smart agriculture
8	Providing green loans to customers for purchasing environmentally friendly equipment, home appliances, and vehicles
9	Green finance
10	Green bonds
11	Allocating capital to startups working on climate and renewable energy issues
12	Creating green funds to finance green projects
13	Facilitating and promoting green investment by buying and selling green bonds and carbon credits on behalf of customers
14	Facilitating the green bond and carbon credit market by using the bank's own accounts for buying and selling
15	Digital archiving system

Source: See Refs. [15, 19].

3.2. The Experience of the Central Bank of Iran

Banks have moved toward adopting green practices due to global competitive pressures. Green banking is an emerging concept in Iran and, considering the country's environmental conditions, the banking system must pay special attention to this issue [20]. Moreover, the experiences of domestic banks in this area have been examined.

3.2.1. Bank Melli Experience

Green banking, meaning paperless, fuel-free, and waste-free banking of time and energy, is a concept that Bank Melli Iran has included the expansion of green activities, utilizing the extensive and growing benefits of information technology, among its modern strategies. The green banking activities of Bank Melli are as follows:

Table 6. Bank Melli experience in the field of green banking.

Row	Actions		Description
1	Renewable and New Energies	Solar Energy	Pars Technology Sadad, a subsidiary of Bank Melli Iran, with the aim of preserving the environment and supplying clean energy, has established 100 solar power plants with a capacity of 5 kW in Molla Ali village, Zabol, and a 250 kW power plant in the central offices of Bank Melli. These projects contribute to supplying clean energy, selling excess electricity, and developing businesses in deprived areas.
		Fuel Consumption Reduction	
2	Paper Consumption Reduction		With the aim of reducing deforestation
3	Development of Electronic Banking Services		With the aim of reducing physical customer visits to bank branches and reducing traffic volume Installation of ATMs
4	Green Management		Aware of energy resource limitations, increasing productivity, and reducing environmental pollution, the organization is committed to implementing ISO 14001, ISO 45001, and ISO 50001 standards.
5	Infrastructure		Bank Melli Iran, by optimizing infrastructure, adhering to green building principles, and utilizing high-efficiency equipment, continuously improves safety, occupational health, environmental, and energy consumption performance.

Source: See Ref. [22].

Since economic development depends on the prosperity of the environment, Bank Melli Iran also needs to place the development of green banking at the top of its policy-making.

3.2.2. Bank Keshavarzi Experience

Bank Keshavarzi, as the first Iranian bank, has applied the principles of green banking to support the environment and sustainable development. This program includes transforming financial systems, providing green services, reducing environmental impacts, and increasing awareness among employees and customers. Its main goal is to combat global warming and align credit policies with environmental criteria and international standards (Table 7).

Table 7. Bank Keshavarzi experience in the field of green banking.

Row	Actions
1	Responsible financing enhances bank efficiency and positive interaction with society.
2	Use of ATMs to reduce physical customer visits to the bank.
3	Bank Keshavarzi, in collaboration with various organizations and bodies, including the United Nations Office for Project Services (UNOPS) and the Ministry of Foreign Affairs, launched the international project "Green Banking for Inclusive Growth and Sustainable Development" in 2013 and successfully concluded it in 2018. These collaborations helped the bank improve its green banking strategy.
4	The bank supports resource management and increased production by providing special facilities and preferred rates for greenhouses, modern irrigation, certified seeds, mechanization, and knowledge-based projects.
5	The implementation of the Bank Keshavarzi Digital Transformation Document, focusing on open innovation and non-presence services, has led to reduced paper consumption, decreased travel and in-person visits, facilitated access to banking services, and reduced related stresses.
6	Bank Keshavarzi contributes to the transformation of the agricultural product value chain and the attraction of a new generation of activists in this field by offering digital and service platforms such as digital checks and promissory notes.

Source: See Refs. [23-26].

To implement the green banking strategy, this bank has taken positive steps regarding the utilization of other organizations' experiences and continues to pursue the following strategies:

Table 8. Bank Keshavarzi green strategies

Row	Strategy	Description
1	Use of Standards and Guidelines	In the direction of protecting natural resources, reducing environmental impacts, and managing waste in the agricultural sector
2	Knowledge Sharing	Sharing knowledge and experiences in the field of green banking between the Agricultural Bank and the Environmental Organization
3	Collaboration in Joint Projects	Collaborating with various organizations to develop sustainable projects in agriculture and the protection of natural resources

Source: See Refs. [23-26].

Bank Keshavarzi, by leveraging domestic and international experiences, has strengthened its green banking strategy and sustainable performance. This bank is also committed to environmental protection and sustainable development, and supports projects related to these goals through financial assistance and grants.

3.2.3. Experience of Bank Gharzolhasaneh Mehr Iran

Bank Gharzolhasaneh Mehr Iran, as the first bank in the country towards realizing a paperless bank, has taken steps to reform the electronic structure of executive banking operations and establish a fully electronic bank, and this bank can be named the country's first green bank (Table 9).

Table 9. The Experience of bank Gharzolhasaneh Mehr Iran in the field of green banking.

Row	Actions
1	Paper elimination for the purpose of environmental protection, preventing forest destruction, and archiving and protecting bank documents and deeds
2	Installation of ATMs to assist in reducing traffic, fuel consumption, and air pollution
3	Online account opening and non-in-person receipt of bank cards to reduce traffic and air pollution via mobile banking and the bank's website
4	Online account opening and non-in-person receipt of bank cards to reduce traffic and air pollution via mobile banking and the bank's website
5	Electronic granting of bank loans and facilities
6	Remote and electronic customer credit scoring

Source: See Ref. [27].

3.2.4. Bank Tejarat Experien*ce*

In recent years, Bank Tejarat has strived to fulfill its social and national responsibilities while observing professional ethics principles. By aligning its social responsibilities with global ideals, this bank has taken a new step towards the development of green banking. Among the extensive measures taken by this bank are:

Table 10. Bank Tejarat's experience in the field of green banking.

Row	Actions
1	Granting loans and green facilities to non-polluting industrial units
2	Use of ATMs
3	Electronic banking and the development of tools based on it to reduce intra-city trips
4	Renovation of the country's transportation fleet and investment in the rail transport industry as a clean industry

Source: See Refs. [28, 29].

3.2.5. Comparative Analysis of Bank Melli's Experience in the Field of Green Banking with Other Domestic Banks

In this section, the experience of Bank Melli in the field of green banking is compared with Bank Keshavarzi, Gharzolhasaneh, and Tejarat Banks on a comparative basis (Table 11).

Table 11. Comparative analysis of bank Melli's experience in the field of green banking with other domestic banks.

Actions		Melli	Keshavarzi	Gharzolhasaneh	Tejarat
ATMs	solar	✖	✖	✖	✖
	Available	✓	✓	✓	✓
Digital Banking		✓	✓	✓	✓
Green Channel Counter		✖	✖	✖	✖
Green Loan	Corporate Loan	✖	✓	✖	✓
	Personal Loan	✓	✖	✓	✖
	Housing Loan	✖	✖	✖	✖
Green Remittance Card		✖	✖	✖	✖
Green Credit Card		✖	✖	✖	✖
Online Savings and Current Accounts		✖	✖	✖	✖
Green Certificate of Deposit		✖	✖	✖	✖
Green Financing		✖	✓	✖	✖
Electronic Investment Services		✖	✖	✖	✖
Investment in Environmentally Friendly Projects		✓	✖	✖	✓
Green Bonds and Investment Funds		✖	✖	✖	✖
Recyclable Debit and Credit Cards		✖	✖	✖	✖
Reducing or Eliminating Paper from Transactions		✓	✓	✓	✖
Digital Archiving		✓	✖	✖	✖
Utilization of Solar Energy		✓	✖	✖	✖
Green Management		✓	✖	✖	✖
Cooperation with Relevant Organizations		✖	✓	✖	✓

Source: Research findings.

3.2.6. Comparative Analysis of Bank Melli in the Field of Green Banking with Banks of Other Countries

In this section, the experiences of banks in India, Bangladesh, and Pakistan in the field of green banking are compared with each other on a comparative basis (Table 12).

Table 12. Comparative analysis of bank Melli in the field of green banking with banks of other countries.

Actions		Melli	Central Bank of India	Central Bank of Bangladesh	Central Bank of Pakistan
ATMs	solar	✖	✓	✖	✖
	Available	✓	✓	✓	✓
Digital Banking		✓	✓	✓	✓
Green Channel Counter		✖	✓	✖	✓
Green Loan	Corporate Loan	✖	✖	✖	✓
	Personal Loan	✓	✓	✓	✓
	Housing Loan	✖	✓	✖	✖
Green Remittance Card		✖	✓	✖	✖
Green Credit Card		✖	✓	✖	✖
Online Savings and Current Accounts		✖	✓	✖	✓
Green Certificate of Deposit		✖	✓	✖	✖
Green Financing		✖	✓	✓	✓
Dollar Online Payment Channels		✖	✖	✖	✓
Electronic Investment Services		✖	✓	✖	✖
Investment in Environmentally Friendly Projects		✓	✖	✓	✓
Green Bonds and Investment Funds		✖	✓	✓	✓
Recyclable Debit and Credit Cards		✖	✓	✖	✖
Reducing or Eliminating Paper from Transactions		✓	✖	✖	✓
Digital Archiving		✓	✖	✖	✓
Utilization of Solar Energy		✓	✖	✖	✖
Green Management		✓	✖	✓	✖
Cooperation with Relevant Organizations		✖	✖	✖	✖

Source: Research findings.

Subsequently, in the next step, the Engle-Granger cointegration test was employed to examine the quantitative relationship and the existence of a long-run relationship among banks' foreign investment in the renewable energy sector, loans granted by banks in the renewable energy sector, environmental degradation costs, air pollution emissions, and Green GDP. The results of this test indicated that the probability value is less than 0.05; therefore, the null hypothesis of no long-run relationship is rejected. This finding confirms the existence of a significant long-run equilibrium relationship among the variables under study (Table 13).

Table 13. The results of the Engle-Granger cointegration test among the variables to examine long-term relationships.

Dependent	tau-statistic	Prob.*	z-statistic	Prob.*
Cost of Environmental Degradation	-11.52650	0.0000	-276.5860	0.0000
Bank Loans Received	2.291288	1.0000	6.630181	1.0000
Green gdp	-12.94060	0.0000	-348.4093	0.0000
Foreign Bank Investment in Clean Energy	-3.904161	0.2087	-24.13135	0.1927
Co2 Emissions	-1.754699	0.9702	-4.807538	0.9907
Dependent	tau-statistic	Prob.*	z-statistic	Prob.*

Source: Research findings.

After confirming the existence of cointegration, an autoregressive distributed lag (ARDL) model was estimated to assess both short-term and long-term relationships between the variables. The results of the model estimation indicated that all coefficients of the explanatory variables were statistically significant, indicating the model's strong explanatory power (Table 14).

Table 14: The results of the Autoregressive Distributed Lag (ARDL) model estimation

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
Cost of Environmental Degradation (-1)	-1.758310	0.007588	-231.7352	0.0000
Cost of Environmental Degradation (-2)	-1.334530	0.009485	-140.6942	0.0000
Green gdp	1.305163	0.000579	2254.010	0.0000
Green gdp (-1)	2.513086	0.010677	235.3770	0.0000
Green gdp (-2)	1.791969	0.012909	138.8172	0.0000
Bank Loans Received	-0.059554	0.007837	-7.599218	0.0000
Bank Loans Received (-1)	0.080433	0.011354	7.083922	0.0000
Bank Loans Received (-2)	0.420362	0.056674	7.417170	0.0000
Foreign Bank Investment in Clean Energy	2.24E-06	3.14E-05	0.071120	0.9436
CO_2 Emissions	2.71E-07	1.19E-07	2.271865	0.0283
Constant	-40.75490	0.892775	-45.64967	0.0000

Source: Research findings.

The model estimation results indicate that the lags of the environmental degradation cost variable have negative and significant coefficients (-231.73 and -140.69), suggesting a moderating effect on environmental degradation; such that increased degradation in past periods leads to a decrease in degradation in the current period. Green GDP in the current period exerts a

positive and highly significant effect on environmental degradation. Furthermore, the lags of this variable have also been positive and significant, indicating the persistence of the increasing effect of Green GDP on environmental degradation in past periods. Results regarding bank loans show that this variable has a negative and significant effect on environmental degradation in the current period, playing a reducing role in environmental degradation; however, its lag coefficients have been positive, indicating an increasing effect of this variable in past periods. In contrast, banks' foreign investment in renewable energy does not show a statistically significant effect on environmental degradation in the present model. Finally, air pollution has a positive and significant effect on environmental degradation, indicating an increase in environmental degradation resulting from the rise in air pollutants, albeit with low intensity. Ultimately, to re-confirm the existence of a long-run relationship among the research variables, the Bounds test within the Autoregressive Distributed Lag (ARDL) framework was employed. The results of this test showed that the calculated F-statistic exceeds the upper bound of the critical values, confirming the existence of a stable long-run relationship among the variables under study (Table 15).

Table 15. The results of estimating the stable long-run relationship among variables (Bounds test).

Bounds Test	10%		5%		1%	
Sample Size	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)
50	2.372	3.320	2.823	3.872	3.845	5.150
55	2.345	3.280	2.763	3.813	3.738	4.947
Asymptotic	2.200	3.090	2.560	3.490	3.290	4.370

Source: Research findings.

4. Conclusions

This study was conducted with the aim of examining the status of green banking in Iran, particularly in the National Bank of Iran, and analyzing the impact of banking activities on environmental degradation. Using a comparative-analytical approach, the experiences of both domestic and international banks in this field were reviewed. The findings revealed that international banks have more experience in the area of green banking and offer a wider range of financial tools to support green projects. As the largest bank in the country, the National Bank plays a significant role in promoting green banking and can serve as a model for other banks.

In the next phase, time-series econometric methods, particularly the Autoregressive Distributed Lag (ARDL) model, were employed to analyze the relationship between variables such as foreign bank investments in clean energy, bank loans in this sector, green Gross Domestic Product (GDP), and air pollution emissions on the level of environmental degradation. The results of the Engle-Granger cointegration test and the Bounds test indicated a stable long-term relationship among the studied variables. Moreover, the model was able to explain both statistically significant short-term and long-term relationships between the variables.

The model findings showed that green GDP and bank loans in the clean energy sector have a significant impact on reducing environmental degradation, while foreign investment in this area did not show a statistically significant effect. Additionally, air pollution emissions had a positive and significant effect on environmental degradation. These results demonstrate that green banking can serve as an effective tool for reducing environmental degradation and promoting sustainable development.

Overall, this study shows that green banking is not only an ethical responsibility but also a strategic opportunity for banks, which can lead to sustainable growth, increased profitability, and responsible environmental stewardship. Given the global environmental challenges, the development of green banking is a necessity that requires the collaboration of banks, governments, and society Since the National Bank of Iran is one of the oldest state-owned banks in the country and operates as the main arm of the Central Bank, and given the increasing global emphasis on environmental protection, it is essential for the bank to seriously engage in this field and set an example for other banks. Therefore, the following recommendations are proposed for the development of green banking in the National Bank of Iran:

Table 16: Strategic Recommendation for Improving the Implementation of Green Banking in Bank Melli

Current Status	Desired Status	
	Actions to Avoid	Actions to Avoid
• **Digital Banking** • **Investing in eco-friendly projects** • **Reducing or eliminating paper from transactions** • **Digital Archiving** • **Utilizing solar energy** • **Green Management**	• Solar ATM • Green Channel Counter • Green Housing and Corporate Loans • Green Draft Card • Green Credit Card • Online Savings and Current Accounts • Green Certificate of Deposit • Green Financing • Dollar Online Payment Channels • Electronic Investment Services • Green Bonds and Investment Funds • Recyclable Debit and Credit Cards • Collaboration with Relevant Organizations • Providing Incentive Policies for Green Customers	• Digital Banking • Investing in eco-friendly projects • Reducing or eliminating paper from transactions • Digital Archiving • Utilizing solar energy • Green Management

Source: Research findings

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