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**The Impact of Green Finance on Enhancing Banking Competitiveness:
An Applied Study of the Iraqi Banking Sector**

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Abstract: The study sought to identify the impact of Green Finance in competitiveness for private banks in the Iraqi banking sector. The study population was a sample of private banks in Iraq. Therefore, statistical methods were applied through the application of the panel data method, which combines cross-sections and time series, based on annual data that included (10) Iraqi commercial banks and especially for the period between 2014-2023. In addition, the results showed by the Herfindahl-Hirschman index in the sample of Iraqi private banks Search Competition between banks sample it is a high competition, as for the impact Green finance in Competition Sample for banks. Research shows there is a moral impact and my expulsion some green finance indicators include (ROA and ROE) in competition Banking. There is a significant negative impact of the debt cost index on competition. These results were consistent with previous studies, except for the return on investment index, as the relationship was negative but significant. This indicates that for banks Research sample reduces its reliance on investing its assets. The study concluded with a set of recommendations, the most important of which are: reducing reliance on debt by improving the efficiency of operations or reducing their cost in the banks in the research sample to confront the risks that arise from the increase in the cost of financing, which helps in raising banking competitiveness and encouraging competition in the Iraqi banking sector, by creating appropriate conditions in an optimal investment of its assets.

أثر التمويل الأخضر في تعزيز التنافسية المصرفية: دراسة تطبيقية على القطاع المصرفي العراقي

فائز هليل سريح

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المستخلص

سعت الدراسة إلى تحديد أثر التمويل الأخضر في تعزيز التنافسية لدى المصارف الخاصة ضمن القطاع المصرفي العراقي. وقد تمثلت عينة الدراسة بمجموعة من المصارف التجارية الخاصة العاملة في العراق، حيث تم تطبيق أساليب إحصائية باستخدام منهج (Panel Data) الذي يجمع بين بيانات المقاطع العرضية والسلاسل الزمنية، وذلك بالاعتماد على بيانات سنوية شملت (10) مصارف تجارية عراقية خلال الفترة من 2014 إلى 2023.

أظهرت النتائج، من خلال مؤشر هيرفندال-هيرشمان (Herfindahl-Hirschman Index)، أن مستوى التنافس بين عينة المصارف الخاصة العراقية هو تنافس مرتفع. أما فيما يتعلق بتأثير التمويل الأخضر في التنافسية المصرفية لعينة المصارف، فقد بينت النتائج وجود تأثير معنوي لبعض مؤشرات التمويل الأخضر مثل العائد على الأصول (ROA) والعائد على حقوق الملكية (ROE) في التنافس المصرفي. كما أظهرت النتائج وجود تأثير سالب معنوي لمؤشر تكلفة الدين على التنافسية، وهو ما يتوافق مع نتائج دراسات سابقة، باستثناء مؤشر العائد على الاستثمار، إذ كانت العلاقة سالبة ولكنها ذات دلالة إحصائية، مما يشير إلى أن المصارف ضمن عينة الدراسة تقلل من اعتمادها على استثمار أصولها.

وقد خلصت الدراسة إلى مجموعة من التوصيات، كان من أبرزها ضرورة تقليل الاعتماد على التمويل بالدين من خلال رفع كفاءة العمليات أو خفض كلفتها لدى المصارف المشمولة بالدراسة، وذلك لمواجهة المخاطر الناجمة عن ارتفاع تكلفة التمويل، بما يسهم في تعزيز التنافسية المصرفية وتشجيع المنافسة في القطاع المصرفي العراقي، من خلال تهيئة الظروف المناسبة للاستثمار الأمثل. **الكلمات المفتاحية:** التمويل الأخضر، التنافسية المصرفية، البنوك التجارية الخاصة.

Introduction

The banking sector is one of the most important and sensitive economic sectors due to its important role in activating other sectors. It is the main channel for various cash flows. Banks are commercial institutions that aim to make a profit and contribute to economic development. They seek to activate various banking operations and services that enhance the position of banks and enable them to improve the general situation by choosing appropriate (green) financing. This reflects the ability of banks to compete with other banks. Due to the successive crises and the difficulty of obtaining financing, the idea of searching for additional financing called green financing came about it is considered the last The process of directing financial resources toward projects and activities that contribute to protecting

the environment and achieving environmental goals, such as reducing carbon emissions, enhancing energy efficiency, and supporting renewable energy. According to the International Finance Corporation's definition, (IFC, 2016) and Green finance is "financing investments that generate environmental benefits." Its tools include green bonds, green banks, innovative financing, and reliance on financial technologies. Integrating green finance principles into banks' credit and investment policies is a crucial step toward enhancing their competitiveness in the financial market, especially in emerging markets seeking to strengthen their position within the international financial system. The literature confirms that banks' adoption of innovative and sustainable financial practices, such as green financing, can enhance their long-term competitiveness by attracting green investments, reducing future risks, and achieving customer satisfaction with environmental concerns.

Research problem: In light of increasing environmental challenges and regulatory pressures, banking institutions are turning to green financing practices as a sustainable solution that balances profitability and environmental responsibility. Despite Iraqi banks' growing interest in introducing green financing instruments, the impact of these practices on their competitiveness remains unclear, especially in a banking environment characterized by economic fluctuations and multiple operational and regulatory risks. Hence, the research problem emerges in the main question: How does the green finance on banking competitiveness in Iraqi banks, and what does the role of financial innovation, bank size, and institutional reputation play in strengthening this relationship?

Study objectives: This study aims to achieve the following objectives:

1. Clarification the concept, dimensions and tools of green finance in banking.
2. Measurement the level of banking competitiveness in Iraq.
3. Measuring the impact of green financing on banking competitiveness in Iraqi banks
4. Look at how much the size of a bank affects how strong the link is between green finance and competitiveness.

Hypotheses:

1. There is a significant and direct effect of Green finance on banking competitiveness.
2. Through the role Green finance impacts banking competitiveness, in promoting sustainable financial innovation.

3. The bank which obligated to the standards of environmental and social could be contributes to enhancing the association between the green financing and competitiveness in the market.

Literature Review

Green Finance: Finance for the Environment Green finance has been a major focus of global financial policies, especially as countries around the world are trying to reach sustainable development goals and fight climate change. Green finance is a group of financial methods and policies that try to divert money into economic activities that help protect the environment, lower carbon emissions, and encourage the use of clean technologies and renewable energy sources (Zhang et al 2025).

Green finance is a new idea in finance that is getting more and more attention across the world because environmental problems are getting worse and we need to find ways to make the economy grow in a way that is beneficial for the environment. Green financing is the act of channeling money toward initiatives and activities that help protect the environment and reach environmental goals, like lowering carbon emissions, making energy use more efficient, and supporting renewable energy. The International Finance Corporation (IFC) says that green finance is "the financing of investments that generate environmental benefits" (IFC, 2016). Green bonds, green banks, innovative financing, and reliance on financial technologies are some of its tools.

Green financing is crucial for helping the world move toward a low-carbon economy, using less energy, and making the environment cleaner. It is also a smart way to reach long-term goals for carbon neutrality. For instance, as part of its attempts to reach peak emissions and become carbon neutral, China has set up a complete green finance system based on five sub-indicators: green loans, green bonds, green investments, green insurance, and carbon financing (Zhang et al., 2025).

Despite the developments witnessed in green finance, there are still challenges, such as regional disparities in the adoption of green finance tools, weak unified standards, and the lack of sufficient incentives for financial institutions to invest in environmental projects.

Green finance has become an important tool for improving banks' performance by lowering environmental and financial risks, drawing in investors who care about the environment, and boosting banks' reputations

and commitment to social and environmental governance. Banks may become more competitive by using green financing instruments to open up new markets, attract environmentally concerned customers, and better follow international governance and risk requirements. Green finance is "a system of financing that includes loans, bonds, and banking policies that help the shift to a low-carbon, green economy while also considering environmental and social risks when making investment decisions." (Baharudin & Arifin, 2023) According to Zhang et al. (2021), green finance is "any financial activity aimed at supporting projects that contribute to protecting the environment, reducing carbon emissions, and promoting sustainable development. "Recent studies (Gafoor et al., 2024) say that green finance is a smart way to boost financial innovation in the banking sector, especially as the world is moving toward a green transformation. It also helps make banking more competitive by boosting operational efficiency, long-term profitability, and institutional loyalty. It also helps banks' reputations with the public and regulators. So, adding green finance concepts to banks' lending and investment strategies is a key step toward making them more competitive in the financial market, especially in emerging nations that want to improve their standing in the global financial system. According to the literature, banks can become more competitive in the long run by using new and environmentally friendly financial practices like green financing. This is because it attracts green investments, lowers future risks, and makes customers happy with their environmental concerns (Zhang et al., 2021).

Banking Competitiveness: In today's financial world, banking competitiveness is a key idea because it affects how well banks can survive, grow, and make money in a changing financial and regulatory environment. Banking competitiveness is the ability of a bank to offer financial goods and services that are better than those of its competitors, which leads to higher customer satisfaction and a stronger position in the market. People think that competitiveness is a key part of modern banking strategy. It helps banks deal with risks and opportunities in a world where technology changes quickly and there are many different problems to solve. There are a number of quantitative and qualitative measures that measure how competitive banks are. Some of the most important ones include:

- Profitability: this includes metrics such as return on assets (ROA) and return on equity (ROE).

- Market share: this is the bank's share of all loans or deposits in the sector as a whole.
- Operational efficiency is determined by the ratio of total expenses to total revenues.
- Capital adequacy ratio: a sign of how well the bank can handle risks.
- Net interest margin: to see how well interest is being managed.
- And The literature defines banking competitiveness as: “A measure of a bank’s ability to maintain its position in the market through its operational efficiency, the quality of its services, and its ability to innovate and adapt to environmental and regulatory changes” (Al-Qaisi & Al-Rfou, 2015).

As Porter (1985) suggests that competitiveness stems from an organization's ability to deliver value to customers that exceeds that offered by competitors, making efficiency, innovation, and information technology strategic tools in the banking industry. Shows Recent studies, such as Zhang et al. (2021), show that banking competitiveness is also enhanced by adopting sustainable practices such as green finance, which improves a bank's reputation, reduces environmental risks, and opens up investment opportunities in global markets. The concept of competitiveness in the banking sector is a fundamental and dynamic concept that is constantly evolving in the economic and financial literature, given the unique nature of the banking industry compared to other sectors (Claessens & Laeven, 2004). It is not limited to simply having a large number of banks or low prices; rather, it involves more complex elements related to efficient performance, the level of innovation, service quality, and the ability to adapt to regulatory and technological changes (Schaeck & Cihak, 2012).

Researchers view banks from two main perspectives: the first is the production approach, which assumes that banks play a "producer" role by providing financial services such as generating loans and deposits, and the second is the financial intermediation approach, which highlights the role of banks as intermediaries between savers and borrowers. This way of looking at things impacts how we judge how competitive banks are (Bikker & Haaf, 2002). The academic literature has employed several analytical models to examine the topic of banking competitiveness. The structure-behavior-performance (SCP) model is the most essential. The model says the market structure, bank behavior, and performance are linked. Some of the metrics of this model uses are the Herfindahl-Hirschman index (HHI), the market concentration ratio, and the number of businesses that are currently open in

the market. The New Experimental Industrial Organization (NEIO) is the second school. It uses real market data to look at price behavior and cost efficiency with tools like the Lerner index, the Panzar-Rossi model, and the Boone index (OECD, 2011). These tools are better at figuring out how competitive something really is. So, banking competitiveness is a big-picture way to look at how effectively banks can offer good services at reasonable prices, boost shareholder value, and make the financial system more stable in a world where things change quickly and new technologies are always coming out. Baharudin & Arifin (2023) and Zhang et al. (2021) say that green finance is a big development in the modern financial industry. It's part of a worldwide trend to use money-making methods that are beneficial for both the economy and the environment.

Additionally, Green finance encompasses various financial activities and services that allocate funds to environmentally beneficial projects, including renewable energy, energy efficiency, and eco-friendly transportation. The purpose is to help the environment and minimize carbon emissions. Additionally, competitive banks can remain in business by providing valuable services and generating significant profits. New research also reveals that banks can be more competitive if they use green finance practices. Banks that apply ESG (environmental, social, and governance) standards to decide who to lend will get a lot of good things. These benefits include a stronger reputation for the bank, increased trust from customers, and the ability to attract investors who care about the environment. They also lower the dangers of running their business and getting loans. Banks can also thrive by putting money into green projects in new and rising markets. Such action makes them more competitive and pushes them to come up with new ways to make money. Based on the above, green finance can be viewed not only as a tool for fulfilling environmental and social obligations, but also as a strategic lever that enables banking institutions to strengthen their competitive position in light of the changing regulatory and economic environment.

- ❖ Improving the bank's corporate reputation.
- ❖ Attracting environmentally conscious investors.
- ❖ Improving operational efficiency by adopting low-cost projects in the long term.
- ❖ Compliance with international standards, opening the door to new global markets.

The role of Artificial intelligence in enhancing banking competitiveness:

Nowadays, become Artificial intelligence is one of the key drivers of digital transformation in the banking sector, directly contributing to enhancing banking competitiveness by improving operational efficiency, accelerating decision-making, and personalizing banking services. Machine learning is one of the most important branches of artificial intelligence, as it enables systems to learn independently from massive amounts of data, leading to fundamental improvements in financial behavior analysis, fraud detection, and providing immediate responses through automated customer support systems such as Kovačević et al., 2023). It pointed out Studies show that banks that have adopted AI technologies have improved their competitiveness, particularly in the face of challenges posed by digital financial institutions and fintech companies, which are developing AI-centric business models (Aithal, 2023). AI applications in banking include predictive analytics, robo-advisors, intelligent cybersecurity, and automated financing systems (Radenković et al., 2023).

Although Despite these advantages, the integration of AI into the banking environment presents significant security challenges, as it opens the door to sophisticated cyberattacks such as data poisoning and evasion attacks that aim to distort the results of intelligent models. Therefore, digital governance and advanced cybersecurity are essential requirements for ensuring a safe and reliable banking environment in the age of AI (Koball et al., 2024).

The relationship between green finance and banking competitiveness:

According to The et al. (2019) and Urban & Wójcik (2019), there is a strong linking between green finance and how well banks do in business. Green finance is a new way to make money and benefit the environment at the same time. through paying for programs that protect the environment and lower the risks of climate change to achieving the goal. Green financing is when the company invests into programs to protect the environment, reduce climate change, promote renewable energy, and use resources wisely. This expenditure is the approach to reach the Sustainable Development Goals (SDGs). Moreover, bank need to offer green loans for competitive in the financial business. Banks that pay attention to green financing strategies such as trade green products, backing ecofriendly inventiveness, or invest in green knowledge, could enhance the banks' image. These strategies could lead to

get new investors, and save money on operations in future. The study Baharudin & Arifin, (2023), in Indonesia. showed that by adopting green finance, bank could become more valuable especially if has a lot of money (KBMI 4). Thus, the banks can be well deal with the costs to improve the environment that lead to more competitive.

Furthermore, the previous studies show that for institutional performance, the bank's size, resource strong point, and promise to environmental standards are all critical for accomplishment the most out of green finance. For the green economy, large banks could take advantage of economies of scale, keep their stakeholders satisfied, and win public policy support. Baharudin and Arifin (2023) agreed with Urban and Wójcik (2019) that nowadays, green financing strategy a significant revolution in the banking industry. To use financial strategies, the initiative is a trend around part the world that are good for both the economy and the environment. Green finance covers many financial activities and services investing in environmentally beneficial projects, such as: (i) renewable energy (ii) energy efficiency (iii) and sustainable transportation. The aim is to reduce carbon emissions and promote long-term economic growth.

Results and Discussion

Descriptive statistics for research variables

Table (1): Descriptive statistics for research variables

dependent variable	Independent variables				
Assets	Return on Equity	Debt coverage ratio	Return on Assets	Return on Investment	
Y	X4	X3	X2	X1	The symbol
160605866964	0.626	0.305	0.181	1.086	arithmetic mean
1827505325000	12,357	4,706	5.236	14,573	The largest value
168658246	-0.043	-6,200	-0.016	-0.293	Minimum value
372149247451	1.937	1.583	0.633	2.764	standard deviation
98	100	100	100	100	Number of views

Source: Researcher's own work based on the program's outputs Eviews version 13

Second: Estimating the impact of green financing on banking competitiveness using the generalized moments method for dynamic panel data. Panel Generalized Method of Moments

1. Estimating the banking competitiveness equation according to the first difference method. First Differences.

Table (2): Results of estimating banking competitiveness according to the first differences method.

Dependent Variable: LOG(Y)
Method: Panel Generalized Method of Moments
Transformation: First Differences
Date: 06/15/25 Time: 22:59
Sample (adjusted): 2016 2023
Periods included: 8
Cross-sections included: 10
Total panel (unbalanced) observations: 78
White period (period correlation) instrument weighting matrix
Instrument specification: @DYN(Y,-1)
Constant added to instrument list

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG(Y(-1))	0.398451	0.006345	62.79424	0.0000
X1	-0.019982	0.003499	-5.709994	0.0000
X2	0.187665	0.129493	1.449228	0.1516
X3	-0.078728	0.009336	-8.432401	0.0000
X4	0.404037	0.084817	4.763649	0.0000

Effects Specification

Cross-section fixed (first differences)			
Mean dependent var	-0.425962	S.D. dependent var	1.868524
S.E. of regression	2.061970	Sum squared resid	310.3756
J-statistic	3.062916	Instrument rank	11
Prob(J-statistic)	0.800910		

Source: Statistical Program Outputs Eviews 13th Edition

The above results show the following:

1. The competitiveness variable for the past period $Y-1$ has a significant direct effect on competitiveness in the current period, as an increase in competitiveness in the previous period by 1% leads to an increase in competitiveness in the current period by 80.39%. This effect is statistically significant at the 5% level. Note that the competitiveness variable represents the dynamic element in the banking competitiveness equation.
2. There is a significant negative impact of the return on investment variable on banking competitiveness, as increasing the return on investment by 1% contributes to reducing competitiveness by 0.019%. This effect is significant at the 5% level.
3. There is an insignificant direct effect of the return on assets variable. In banking competitiveness, increasing the return on assets 1% contributes to increasing competitiveness 0.187. This effect is not significant at the 5% level. This can be justified by the fact that the return on assets rates of the banks in the research sample are weak, with an average of (0.181), and sometimes they achieve a negative return, as the descriptive statistics table shows.
4. There is a significant negative impact of the debt coverage ratio variable on banking competitiveness, as increasing the debt coverage ratio by 1 percentage contributes to reducing competitiveness by 1 percentage. 0.078 and this effect is significant at the 5% level.
5. There is a significant direct effect of the return on equity variable on banking competitiveness, as an increase in the return on equity by 1% contributes to an increase in competitiveness by 0.40%. This effect is significant at the 5% level.
6. Statistics J is not significant at the 5% level, which means that the generalized moments method for panel data is valid for the research sample according to the first differences method.
7. Estimating the banking competitiveness equation according to the orthogonal deviations method. Orthogonal Deviations.

Table (3): Results of estimating banking competitiveness according to the orthogonal deviations method.

Dependent Variable: LOG(Y)

Method: Panel Generalized Method of Moments

Transformation: Orthogonal Deviations

Date: 06/15/25 Time: 22:58

Sample (adjusted): 2016 2023

Periods included: 8

Cross-sections included: 10

Total panel (unbalanced) observations: 78

White period (period correlation) instrument weighting matrix

Instrument specification: @DYN(Y,-1)

Constant added to instrument list

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG(Y(-1))	0.395092	0.004550	86.83615	0.0000
X1	-0.019370	0.001136	-17.05034	0.0000
X2	0.136726	0.496076	0.275614	0.7836
X3	-0.079061	0.004229	-18.69716	0.0000
X4	0.463075	0.064455	7.184474	0.0000

Effects Specification

Cross-section fixed (orthogonal deviations)

Mean dependent var	0.290877	S.D. dependent var	1.774582
S.E. of regression	1.416678	Sum squared resid	146.5094
J-statistic	7.228890	Instrument rank	10
Prob(J-statistic)	0.204166		

Source: Statistical Program Outputs Eviews 13th Edition

The above results show the following:

1. The competitiveness variable for the past period Y-1 has a significant direct effect on competitiveness in the current period, as an increase in competitiveness in the previous period by 1% leads to an increase in competitiveness in the current period by 50.39%. This effect is statistically significant at the 5% level. Note that the competitiveness variable represents the dynamic element in the banking competitiveness equation.
2. There is a significant negative impact of the return on investment variable on banking competitiveness, as increasing the return on investment by 1% contributes to reducing competitiveness by 0.019%. This effect is significant at the 5% level.
3. There is an insignificant direct effect of the return on assets variable. In banking competitiveness, increasing the return on assets 1% contributes to increasing competitiveness 0.136. This effect is insignificant at the 5% level. This can be justified by the fact that the return on assets rates of the banks in the research sample are weak and sometimes achieve negative returns, as the descriptive statistics table shows.
4. There is a significant negative impact of the debt coverage ratio variable on banking competitiveness, as increasing the debt coverage ratio by 1 percentage contributes to reducing competitiveness by 1 percentage. 0.079 and this effect is significant at the 5% level.
5. There is a significant direct effect of the return on equity variable on banking competitiveness, as increasing the return on equity by 1% contributes to increasing competitiveness by 0.46%. This effect is significant at the 5% level.
6. Statistics J is not significant at the 5% level, which means that the generalized moments method for panel data is valid for the research sample according to the orthogonal deviations method.

Conclusions

1. There is a direct and permanent effect of banking competitiveness from the past period on the performance of banks in the current period, and this reflects the existence of a high degree of continuity in the variable under study.
2. The results showed that there is a significant negative impact of green financing on banking competitiveness. By referring to the reports, it was found that some banks reduce their reliance on investing their assets, which

shows the weakness of the relationship between the return on investment and competition in the banks in the research sample.

3. The results showed that return on assets plays an important and negative role on Banking competitiveness, meaning that the increase in achieving returns may increase competition, which has helped strengthen the position of banks and their ability to compete.
4. The results showed that green financing has a significant negative impact on the debt coverage ratio index. On banking competitiveness, this indicates that the cost of debt weakens banking competitiveness.
5. The results showed that there is a significant direct effect of green financing on banking competitiveness, which indicates that the return on equity enhances the banks' ability to achieve banking competitiveness.

Recommendations:

1. Reducing reliance on debt by improving the efficiency of operations or reducing their cost in the research sample banks to confront the risks arising from the increase in the cost of financing, which helps in raising banking competitiveness.
2. Enhancing the banking services provided by private commercial banks by developing payment systems and increasing the deployment of ATMs, which contributes to increasing profitability rates on the one hand, and increasing the degree of competition between banks on the other.
3. Encouraging competition in the Iraqi banking sector by creating appropriate conditions, such as allowing government institutions to deposit their funds in private commercial banks, especially since competition plays an important role in improving the efficiency of banks and providing the best services.
4. The need for banks to invest their idle financial resources in other sectors such as housing and others, which helps increase investment and improve their returns.

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