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Green Loans in Bank Portfolio: Financial and Marketing Implications

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Abstract: Banks represent important subjects in business, with dominant positions in the financial system in the world. Banks developed various financial products and services that can cover most market needs. As a result of adequate portfolio diversifications, banks recorded positive profitability rates. In addition to being adjusted to competition, banks should also focus on the environment. Therefore, banks have recognized an opportunity to offer green products and services and support environmentally-friendly initiatives and projects. The aim of this paper is to identify whether crucial determinants of bank profitability are moderated by the presence of green loans in the bank portfolio. For this purpose, a panel fixed-effects approach was applied to data from the Republic of Serbia (2014–2021). The obtained results indicate that the presence of green loans in a bank's portfolio moderates the influences of a bank's liquidity on the bank's profitability measured by return on assets (ROA) and return on equity (ROE). The contribution of the conducted research is that it is, according to the authors' knowledge, the first measurement and estimation of the moderating effects of green loans' presence in banks' portfolios on their profitability. In addition to financial, marketing implications were considered.



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1. Introduction

As culpable members of society, banks should be mindful of environmental changes and promote financing environmentally-friendly initiatives and projects [1]. Specifically, banks contribute to economic growth and development in terms of mobilizing and allocating financial resources to productive investment projects [2]. The role of commercial banks is essential for enabling the funds channel [3]. Bank credit is the most extensive external financing channel, notably in transition economies with the imperfect capital market [4]. With the declining ecological environment, the pressure on financial organizations to be more socially responsible is increasing [5]. Financial institutions should actively create innovative green products, stimulate renewable energy companies' development, and create green financing channels [6]. Financial institutions enhance economic development by offering individuals and business access to financial resources [7]. Based on the study of [8], the role of the development of financial institutions in low-income and emerging economies is central to bringing long-term capital for investment in climate mitigation. In addition to positive spillover effects on society, green credit contributes to sustainable bank development and helps them to improve their operating performance in the long run [9]. Bank's support for the corporate sector in implementing renewable energy in their business improves their profitability and increases the probability to pay back bank loans [10]. Banks can support different green initiatives such as green loans, green bonds, or any eco-friendly projects [11], where the role of banks in financing other projects is regularly involved with social and environmental operations [12]. Similarly,

green innovation is crucial for corporate development in the long run [13]. There is a need to stimulate different green financial instruments [14], where green credits represent one of the most essential financial instruments to promote sustainable development [15]. When it comes to the increasingly prominent role of green credit, these forms of loans will improve profitability and reduce the risks of non-state-owned banks in China [16]. As an essential policy of environmental regulation, green loans have received extensive attention from the state, companies, and scholars [17]. Similarly, green credit policy is a practical tool for banks to reduce credit risks and improve financial performance and financial sustainability [18,19]. It implies that a green lending policy has been profiled as an important tool for sustainable development [20], where green loans can effectively optimize the allocation of resources [21].

Green credit policy is recognized as an essential tool for banks to achieve social and environmental goals at the global level. This growing trend of green awareness in banking activities is slowly coming to the Balkan area. The financial market in the Republic of Serbia is small and bank-centered, where banks play a crucial role in the financial system. It implies that the banking sector represents the dominant segment of the financial system. The fact that banks have 91% of the total assets of the financial system is enough to point out the significance of the development of this sector [22]. This is in line with [23]. This empirical study indicated that banks have become one of the most vital elements of any financial system. The analysis of the last public data of the National Bank of Serbia points out that other financial institutions had a share of 9.1%, the insurance sector of 6%, the pension funds sector 0.9%, and leasing 2.2%. These findings are related to [24], which points out that the increasingly prominent role of the banking sector is especially presented in transition economies. It implies that the financial sectors of these countries are mostly dominated by banking organizations. The analysis of the structure in the banking sector of the Republic of Serbia in 2021 shows that foreign banks had a share of 87% of total assets, while domestic state banks had a share of 7%, and domestic private banks a share of 6%. Currently, there are 22 banks licensed by the National Bank of Serbia operating in the banking market of the Republic of Serbia. Within these 22 banks, there are six domestic banks and 16 foreign banks in the banking sector of the Republic of Serbia [22].

This paper is devoted to connecting two previously mentioned topics—green credits provided by banks and the banking market of the Republic of Serbia. The structure of the paper includes five segments. After an introduction, the second part of the paper is focused on the theoretical background related to green banking, and the relationship between green loans and bank profitability. The third segment includes a methodological framework, i.e., an explanation of variables and the development of hypotheses. The next segment provides empirical results of the selected panel model applied to examine the bank's profitability in the context of the presence of green loans in a bank's portfolio. Finally, the fifth segment includes a discussion and conclusions. The findings are presented and summarized with recommendations for future research in the field of estimating financial and non-financial performance in the banking sector. Marketing implications are provided as well. According to the authors' knowledge, this is the first study that measures and estimates the moderating effects of green loans' presence in banks' portfolios on their profitability. This is the main contribution of the conducted research and classifies this paper as original and lucrative to policymakers, bank managers, and the scientific community.

2. Literature Review and Hypotheses Development

2.1. Sustainable Development Based on Green Finance

With increasing global concern for environmental protection, climate change, and sustainable development, policymakers and the scientific community have focused on the green finance concept [25]. Green finance has progressively been the focus of researchers in recent years due to its potential to manage environmental problems [26]. One of the most developed financial market segments is the bank market, and banks are capable of offering different products and services to cover potential market needs. This means that banks, as

the main providers of finance for the economy, are a crucial factor in implementing sound behaviors and practices to engage with changing climate conditions [27]. Banks should achieve profit, but also be responsible to society. This implies that one segment of their business must be allocated to the environment and sustainable development.

Green banking is usually known as environmental banking, ethical banking, or sustainable banking [28]. Accordingly, green banking represents an emergent concept that plays a significant role in the intersectional field of environmental policy, financial services, and social and economic development [29]. Likewise, green banking is a form of banking activity where the banks take the initiative to carry out daily operations by considering internal and external environmental sustainability [30]. Many modern banks are making an intensive effort to promote various technologies in line with green banking initiatives [31]. Policymakers and regulators have been increasingly realizing the importance of applying green banking policy interventions so that the financial sector can contribute to the achievement of climate targets and goals [32]. The study by [33] highlights the importance of green finance and investments from banks and other financial institutions. Their research points to green credit guarantee schemes for reducing the financial risk, utilizing community-based trust funds, involving an insurance mechanism, and using the spillover tax to raise the return rate on green projects. Banks can play a crucial role in maintaining sustainability where the business model should focus on three P lines: people (society), planet (environment), and profit (economy). It implies the banks' initiatives to encourage environmentally-friendly investment in order to provide future sustainable business [34]. Banks may support green investment through green credit financing [35]. Banks could profit from the green business model, which ensures that the banks are making a profit by encouraging environmentally responsible behavior on the part of depositors and business and individual clients who are going to use the dedicated credit products [36].

2.2. The Green Loans Concept

The concept of green loans highlights the potential for the financial sector to respond to environmental and social challenges of the world [18]. Green loans represent one of the most used products within the green banking concept, and their presence is significant for all interested subjects in the market. This form of loan is designed for private households and corporate businesses to cover their needs with the smallest negative effects to the environment. Banks with green loans help private and corporate clients with greater environmental awareness to finance and realize their projects. The initiation of green lending started in 2005, when several major U.S. banks, such as Wells Fargo and the Bank of America, allocated resources towards the sustainable business concept [37]. Analyzed by country, the largest total amount of green loans approved are in the United States, the United Kingdom, Australia, France, Japan, and China [37], where this type of loan represents the fastest-growing green financial product in China [15]. Accordingly, the concept of green loans emerged from green finance [5], where banks offer and approve preferential loans for businesses for using more efficient and environmentally-friendly manufacturing techniques. Green loans improve economic performance and decrease pollutions [14]. Nevertheless, enterprises must meet the green loans' strict requirements [35] in order to obtain additional financial resources. Furthermore, green loans help small enterprises to protect their capital structures from financial difficulties [25]. Additionally, these loans enhance the promotion of green innovations in large enterprises with low financial constraints [26]. Green loans can be manifested in the form of loans for improving the energy performance of private homes; bank loans support private clients to invest in energy-efficient projects, such as replacing doors and windows, façade retrofitting, procuring heating equipment or thermal insulation material, photovoltaic panels, heat pumps, energy-saving lighting, and other projects that result in raised efficiency and savings [38]. In addition to positive implications for the environment, green loans can positively affect banks' performance and business.

2.3. The Relationship between Green Loans and Bank Profitability

The relationship between green credit policy and a bank's performance is estimated in previous studies [1,39–45]. By adopting environmental practices and equator principles in business, banks can improve liquidity and profitability [43]. According to the study by [46], the application of environmental strength policy in banks may stimulate their profitability in the long run. Greater attention to the environment enables higher quality of products and services in banks, as well as larger profitability in the long run [47]. Green credits upgrade financial performance indicators such as return on assets and net interest margin [48]. Furthermore, the study by [45] analyzed the impact of green banking practices on the profitability of the Indonesian banking sector for the period of 2012 to 2016. Their results confirmed that green banking's daily operation, capital adequacy, and liquidity positively affect the bank's profitability. Although a higher propensity for green lending is related to lower profitability, it is necessary to empower the role of banks in boosting ecological issues with the public and government support [49]. The study by [30] indicated that components such as bank size, reputation, age, profitability, and investors' reaction are stimulating elements for banks' green performance. The empirical findings of [1] found that (in the example of commercial banks in Bangladesh) banks' employees, daily operations, and activities related to green banking practices have a significant and positive impact on green financing. The research by [50] analyzed 19 listed banks in China for the period 2008–2017 from the aspect of the relationship between green credit ratio and financial performance, and their study pointed to the positive influence of this credit form. Some studies have confirmed the negative relationship between green credit and banks' profitability [39,41,51,52]. In a comparative analysis between banks with green credits and banks without green credits, the study by [39] confirmed their negative impact on banks' profitability as a result of the increasing operating expenses of banks. Additionally, an empirical by [51] estimated the effect of the green credit ratio on 20 commercial banks' profitability in China for the period from 2009 to 2018. The results of the random effects model manifested the negative impact of green loans on the profitability of analyzed commercial banks. Research by [52] analyzed the impact of green credits on 36 commercial banks' profitability in China for the period 2011–2020. These empirical findings identified the negative effect of this loan type on banks' financial performance, measured by return on assets.

2.4. Conceptual Model and Hypotheses

Based on a study by [5] that analyzed the influence of green loans on commercial banks' profitability, we created the modified model with the most important internal determinants, such as bank size, liquidity, and capital adequacy [53].

The empirical study of banks' profitability focuses on three mentioned determinants, and green loans. Taking into account the data available in banks' financial reports, green loans are analyzed from the perspective of their presence in a banks' portfolio. In addition, as already described, there are contradictory results about their effect on profitability. These type of loans include energy-efficiency loans and other credit lines related to eco-friendly initiatives and projects for private households and corporate business in the Republic of Serbia, as previously described.

The research estimates bank profitability measured by return on assets, (ROA), and return on equity (ROE) [53–55]. Both variables are included in order to assess the impact of selected explanatory variables on banks' profitability which is important for bank managers (ROA) and bank shareholders (ROE).

The selection of variables was also supported by previous empirical studies related to bank size [53,56,57], liquidity [51,53,58], capital adequacy [59–62], and green loans [5]. Our model includes the presence of green loans in banks portfolio as a moderator (Figure 1).

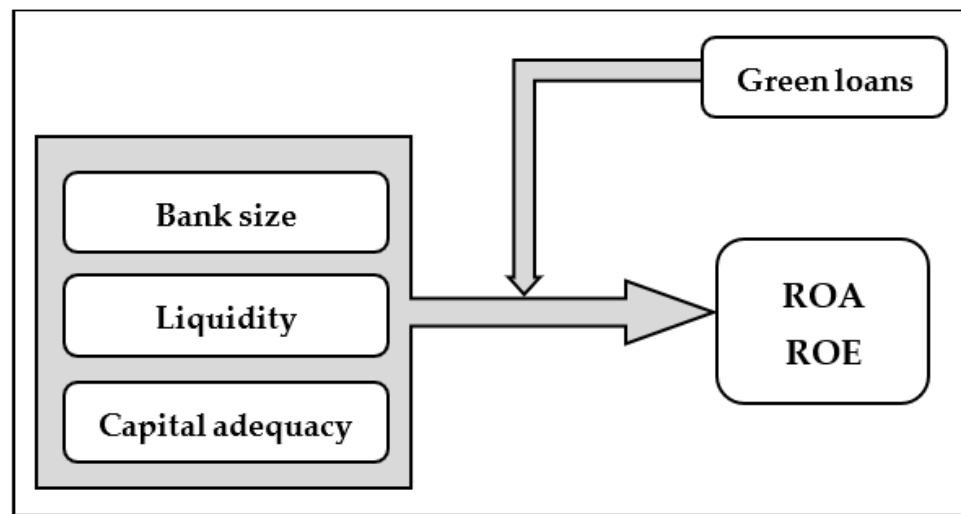


Figure 1. Conceptual model.

Having all previous explanations in mind, the general hypothesis is formulated as follows:

H₁: *The presence of green loans in a bank's portfolio moderates the influences of bank-specific determinants on different measures of a bank's profitability.*

As suggested before, in this research, we rely on three different bank-specific determinants (bank size, liquidity, and capital adequacy) and two measures of the bank's profitability (ROA and ROE). Therefore, two auxiliary hypotheses are formulated in relation to the general hypothesis, while three sub-hypotheses for each of the auxiliary hypotheses. It can be presented as follows:

H_{1.1}: *The presence of green loans in a bank's portfolio moderates the influences of bank-specific determinants on a bank's ROA.*

H_{1.1.1}: *The presence of green loans in a bank's portfolio moderates the influence of a bank's size on a bank's ROA.*

H_{1.1.2}: *The presence of green loans in a bank's portfolio moderates the influence of a bank's liquidity on a bank's ROA.*

H_{1.1.3}: *The presence of green loans in a bank's portfolio moderates the influence of capital adequacy on a bank's ROA.*

H_{1.2}: *The presence of green loans in a bank's portfolio moderates the influences of bank-specific determinants on a bank's ROE.*

H_{1.2.1}: *The presence of green loans in a bank's portfolio moderates the influence of a bank's size on a bank's ROE.*

H_{1.2.2}: *The presence of green loans in a bank's portfolio moderates the influence of a bank's liquidity on a bank's ROE.*

H_{1.2.3}: *The presence of green loans in a bank's portfolio moderates the influence of capital adequacy on a bank's ROE.*

3. Materials and Methods

The empirical research includes annual data obtained from the National Bank of Serbia for twenty-two banks in the Republic of Serbia and their financial reports (annual report, balance sheet, and income statement).

When it comes to the calculation of selected variables (return on assets (ROA), return on equity (ROE), bank size (SIZE), liquidity (loan-to-deposit ratio (LDR)), and capital

adequacy (CA)), we followed previous empirical researches [51,53–62]. In addition, the presence of green loans in banks' portfolio is considered as a dummy variable, where banks were divided into two groups: 0—banks without green loans and 1—banks with green loans (Table 1).

Table 1. Variable selection.

Variables	Notation	Calculation
Dependent		
Return on assets	ROA	$\frac{\text{Net income}}{\text{Total assets}}$
Return on equity	ROE	$\frac{\text{Net income}}{\text{Total equity}}$
Independent		
Bank size	SIZE	Log of total assets
Liquidity	LDR	$\frac{\text{Total loans}}{\text{Total deposits}}$
Capital Adequacy	CA	$\frac{\text{Total capital}}{\text{Total Assets}}$
Dummy		
Green loans	GL	0—banks without green loans in bank's portfolio, 1—banks with green loans in bank's portfolio

The paper introduces panel estimation of bank's profitability using fixed-effects model with moderation. The mentioned model implies a constant of changes with each observation unit, where it is constant in time and defined as [63]:

$$Y_{it} = \alpha_i + \beta_1 X_{it1} + \beta_2 X_{it2} + \dots + \beta_n X_{itn} + \mu_{it}; i = 1, \dots, N; t = 1, \dots, T$$

where N denotes number of observations, T number of period, α constant, β parameters, μ random error.

The fixed-effects panel model is chosen based on specification tests such as the Hausman test and the Breusch–Pagan Lagrange multiplier test. By adopting a fixed-effects model, the study estimates how the presence of green loans in banks' portfolios moderates the influences of selected bank-specific determinants on a banks' profitability. This model was separately performed for ROA and ROE. The observed period is from 2014 to 2021. For this purpose, we used software package STATA13.

4. Results

This section includes descriptive and empirical analysis of bank-specific determinants in the Republic of Serbia. A descriptive analysis of selected variables is presented in Table 2.

Table 2. Descriptive statistics.

Variables	Mean	Std. Dev.	Min.	Max.
ROA	−0.009	0.115	−1.421	0.121
ROE	−0.047	0.658	−8.333	0.477
SIZE	17.871	1.342	14.438	20.316
LDR	2.41	1.374	1.11	11.2
CA	0.205	0.112	0.069	0.988

The results from the descriptive analysis show the average profitability measured by ROA and ROE in the banking sector of the Republic of Serbia was −0.009% and −0.047%, respectively, for the period from 2014 to 2021. It implies that observed banks negatively operated, whereas the highest profitability level was recorded in 2017, when banks registered ROA of 0.121% and ROE of 0.477%. Furthermore, selected banks had an average liquidity of 2.41. Mean capital adequacy was 20.5%, which is above the regulated bank capital level of 8% total-risk assets defined by the National Bank of Serbia.

The results of testing multicollinearity are presented in Table 3.

Table 3. Multicollinearity test.

Variables	VIF	1/VIF
SIZE	1.82	0.5507
GL	1.60	0.6258
CA	1.15	0.8724
LDR	1.13	0.8859
Mean VIF	1.42	

Based on the results from Table 3, it can be concluded that there is no problem of collinearity between selected explanatory variables (the mean value of VIF is less than 4).

We applied the Fisher-type test for testing unbalanced panel data, where obtained results are given in Table 4 (stationarity at level) and Table 5 (panel unit root test with structural break).

Table 4. Panel unit root tests—level.

Variables	FT Test	Inverse Chi-Squared (<i>p</i>)	Inverse Normal (<i>Z</i>)	Inverse Logit (<i>L</i>)	Modified Inv. Chi-Squared (<i>Pm</i>)
ROA		290.15 (0.000)	−9.08 (0.000)	−16.11 (0.000)	26.24 (0.000)
ROE		231.96 (0.000)	−6.49 (0.000)	−12.15 (0.000)	20.03 (0.000)
SIZE		171.23 (0.000)	0.396 (0.654)	−4.41 (0.000)	13.56 (0.000)
LDR		178.39 (0.000)	−4.36 (0.000)	−8.23 (0.000)	14.32 (0.000)
CA		265.21 (0.000)	−4.09 (0.000)	−10.99 (0.000)	23.58 (0.000)

Table 5. Panel unit root test—structural break.

Variables	ADF Test	1%	5%	10%	KT Test
ROA	−38.583 (0.000)	−5.347	−4.859	−4.607	−0.505 (0.011)
ROE	−48.310 (0.000)	−5.347	−4.859	−4.607	−0.026 (0.070)
SIZE	−5.126 (0.000)	−5.347	−4.859	−4.607	−2.185 (0.140)
LDR	−6.428 (0.000)	−5.347	−4.859	−4.607	−2.182 (0.000)
CA	−10.062 (0.000)	−5.347	−4.859	−4.607	−0.033 (0.030)

The results strongly reject the null hypothesis that all the panels contain unit root tests (*p*-values are less than 0.05). It implies that estimated panels are stationary at the level. Additionally, the empirical findings from panel unit root tests with structural break (augmented Dickey–Fuller test and Karavias and Tzavalis test) showed that all variables are stationary at significance level of 10%, except variable SIZE.

Table 6 presents the results of Hausman test.

Based on results from the Hausman test, it can be seen that *p*-values are less than 0.05, which implies that a fixed-effects model is an adequate for measurement banks' profitability with moderation. Additionally, the results of the Breusch–Pagan Lagrange multiplier test (*p*-values are higher than 0.05) confirmed that random-effects are not needed in panel data model (Table 7).

Table 6. Panel specification test—Hausman test.

Model Specification (ROA)	Results	Conclusion
Random-effects model vs Fixed-effects model	$\text{Chi2}(3) = (b - B)'[(V_b - V_B)^{-1}](b - B) = 17.70$ Prob > chi2 = 0.0005	Fixed-effects model is an appropriate
Model Specification (ROE)	Results	Conclusion
Random-effects model vs Fixed-effects model	$\text{Chi2}(3) = (b - B)'[(V_b - V_B)^{-1}](b - B) = 13.11$ Prob > chi2 = 0.0044	Fixed-effects model is an appropriate

Table 7. Panel specification test—Breusch–Pagan Lagrange multiplier test.

Breusch–Pagan Lagrange Multiplier Test	ROA	ROE
Results	Chibar 2(01) = 0.04 Prob > chibar2 = 0.4235	Chibar 2(01) = 0.01 Prob > chibar2 = 0.4547

According to developed hypotheses in the research, we also employed test for equality of estimated coefficients between two groups of banks (0—banks without green loans in bank's portfolio, 1—banks with green loans in bank's portfolio). The results provided in Table 8 are related to auxiliary hypothesis $H_{1.1}$.

Table 8. Modelling bank's ROA with moderation (0—banks without green loans, 1—banks with green loans).

ROA	Coef.	Std. Err.	T	$p > t$	[95% Conf. Interval]	
GL#c.LDR						
0	−0.000342	0.022077	−0.02	0.988	−0.04397	0.043294
1	−0.062855	0.014041	−4.48	0.000	−0.09061	−0.035100
<i>Diff.</i>	−0.062513	0.026164	−2.39	0.018	−0.11422	−0.01079
GL#c.SIZE						
0	0.0022474	0.017639	0.13	0.899	−0.03261	0.037113
1	0.0849045	0.069275	1.23	0.222	−0.05202	0.221832
<i>Diff.</i>	0.082657	0.071486	1.16	0.249	−0.05864	0.223954
GL#c.CA						
0	−0.012866	0.146839	−0.09	0.930	−0.30310	0.277373
1	0.358793	0.222235	1.61	0.109	−0.08047	0.798058
<i>Diff.</i>	0.371659	0.266354	1.40	0.165	−0.15483	0.898150
<i>R-squared</i>	0.281					
<i>Prob > F</i>	0.000					

As can be seen in Table 8, the obtained results showed that the loan-to-deposit ratio (as a measure of bank's liquidity) negatively affects ROA at both bank groups, but only significantly in the case of banks with green loans. In addition, the difference in liquidity coefficients between banks that offer green loans, and those that do not, is significant at $p < 0.05$. When it comes to a bank's size, this variable positively, although non-significantly, affects ROA at both groups of banks, but there is no significant difference between them. A significant difference in coefficients was not found in the case of capital adequacy either, despite the fact that one coefficient was positive (banks with green loans) and the other was negative (banks without green loans). In both cases, these influences were not significant.

The results provided in Table 9 are related to auxiliary hypothesis $H_{1.2}$.

The findings presented in Table 9 indicate that, at banks which offer green loans, the loan-to-deposit ratio (as a measure of bank's liquidity) significantly and negatively affects ROE. On the other hand, at banks without green loans, the impact of this indicator on ROE is positive and non-significant. Moreover, the difference between those two coefficients is

significant at $p < 0.05$. The presence of green loans in bank's portfolio does not moderate the influences of bank's size and capital adequacy on bank's ROE, as differences in estimated coefficients at both relations were non-significant. In addition, the effects of those variables were not significant when observing the two groups separately.

Table 9. Modelling bank's ROE with moderation (0—banks without green loans, 1—banks with green loans).

ROE	Coef.	Std. Err.	T	$p > t$	[95% Conf. Interval]	
GL#c.LDR						
0	0.010339	0.1299481	0.08	0.937	−0.24651	0.267191
1	−0.324939	0.0826515	−3.93	0.000	−0.48830	−0.16157
Diff.	−0.335279	0.1540058	−2.18	0.031	−1.78662	1.63014
GL#c.SIZE						
0	0.0142653	0.1038278	0.14	0.891	−0.19095	0.219488
1	−0.460871	0.4077633	−1.13	0.260	−0.34510	1.266846
Diff.	0.4466059	0.4207744	1.06	0.290	−0.38508	1.278298
GL#c.CA						
0	−0.078243	0.022876	−0.09	0.928	−1.78662	1.603014
1	2.356895	1.308105	1.80	0.074	−0.22867	4.942462
Diff.	2.435138	1.567858	1.55	0.123	−0.66385	5.534126
<i>R-squared</i>	0.252					
<i>Prob > F</i>	0.000					

Bearing in mind that the results from Tables 8 and 9 are related to hypotheses' testing, in Table 10, we provide an overview of the obtained results in the context of each of sub-hypotheses.

Table 10. The results of hypotheses' testing.

Moderating Effects of Green Loans When It Comes to the Influence of Bank-Specific Determinants	On ROA	On ROE
Bank size (SIZE)	H _{1.1.1} Rejected	H _{1.2.1} Rejected
Liquidity (LDR)	H _{1.1.2} Supported	H _{1.2.2} Supported
Capital adequacy (CA)	H _{1.1.3} Rejected	H _{1.2.3} Rejected

As can be seen in Table 10, most of the sub-hypotheses are not supported. Therefore, both auxiliary hypotheses, as well as the general hypothesis, can be considered as partially confirmed. The interpretation of the obtained results is provided in the following section of the paper.

5. Discussion and Conclusions

5.1. Theoretical and Methodological Implications

The research estimated the presence of green loans in banks' portfolios and how this type of loan moderates the influences of bank-specific determinants on the bank's profitability. The choice of the independent variables for this research was determined by previously conducted studies. With regard to the influences on profitability, it was considered from the perspective of bank size [51,53,58,59,61,62], liquidity [51,53,58,60–62], and capital adequacy [51,53,58,60–62]. In addition, when considering their measurement, it can be concluded that it was usually performed in the similar manner as in this research: for bank size [51,53,58,59,61,62], liquidity [51,60,61], and capital adequacy [51,53,58,60–62].

With regard to research method, we applied panel unit root tests, panel specification tests, and a fixed-effects model with moderation. By adequately adapting econometric procedures and proper panel analysis, we ensured model validity and reliability. The results of the Hausman test and the Breusch–Pagan Lagrange multiplier test confirmed that the fixed-effects model is an appropriate method for identifying profitability determinants in the banking sector of the Republic of Serbia.

The results of our research can be considered from the perspective of previous studies using some or all of the independent variables. Nevertheless, it should be noted that our research implements moderation based on the presence of green loans in the bank's portfolio, and that separate results are provided for banks that offer and for those that do not offer such loans. As has already been shown (Tables 8 and 9), significant influences on profitability can be attributed only to liquidity in the case of banks that have green loans in their portfolios, confirming sub-hypotheses $H_{1.1.2}$ and $H_{1.2.2}$. The negative impact of the loan-to-deposit ratio on both ROA and ROE implies that when loans are less covered with deposits, i.e., when banks are less liquid, they are going to be less profitable. Similar relations were found in the study also conducted in the Republic of Serbia [61], according to which, the increase in LDR is associated with the increase in liquidity risk exposure, consequently resulting in a negative impact on profitability. Therefore, the banks that are ready to support various types of projects, including low-profitable ones—such as green loans—may be more exposed to liquidity risk issues, which can affect their profitability.

Contrary to liquidity, our results pointed out that bank size and capital adequacy did not have significant effects on profitability (ROA and ROE), neither for banks that offer green loans nor for those that do not, meaning that all remaining sub-hypotheses ($H_{1.1.1}$, $H_{1.1.3}$, $H_{1.2.1}$, and $H_{1.2.3}$) are rejected. This can be compared to previous studies in which the effects of bank size [61,64] and capital adequacy [51,61,65] on profitability were also non-significant; however, it should be mentioned that there are studies in which bank size [51,53,58,59,62] and capital adequacy [53,58,60] were found to be significant determinants of banks profitability.

Bearing in mind that the presence of green loans in a bank's portfolio moderates only the influences of a bank's liquidity on a bank's profitability (ROA and ROE), it can be concluded that both auxiliary hypotheses $H_{1.1}$ and $H_{1.2}$, and thus the general hypothesis H_1 , were partially confirmed.

These findings are crucial for banks in the Republic of Serbia that have or plan to introduce green loans into their portfolio. Banks which approve green loans set aside certain funds that they invest in environmentally projects and initiatives. This could affect the level of their liquidity. The obtained results from our research suggest that the negative effect of LDR is significant only in the case of banks offering such loans.

5.2. Practical and Managerial Implications

The research specifies the internal determinants of bank profitability with an emphasis on green loans in bank portfolios. The obtained results provide a guide for bank management to better understand the significance of green financing in their business. In addition to expanding the theoretical opus that analyzes the relationship between financial and non-financial performance in the banking sector, these findings will be helpful to other banks that do not have green loans in their portfolios. Although the use of green products and services is not common in Serbia, banks have the opportunity, but also the responsibility, to offer appropriate products and services that are related to green banking. The empirical findings confirmed that the presence of green loans moderated the effects of liquidity on profitability. Significant relations between these two variables only in the case of banks that offer green loans imply that their managers should work on the increase of deposit activity in order to establish the adequate level of liquidity, as an important determinant of profitability [61]; banks should pay attention to liquidity risks especially in time of crisis [66].

5.3. Marketing Implications

In light of competitive market conditions, the financial service sector has been transformed, demanding new marketing knowledge to provide direction for successful practice [67]. Apparently, the main goal of banks' business is profit, but satisfied clients are a precondition for successful operation. It implies that banks should focus on market trends and create their portfolio according to market needs. A higher level of satisfaction enables clients' loyalty, which will have positive implications for the financial performance of banks as well. The mixed focus on bank profitability and social responsibility can achieve both upgrade social reputation and lead to profit growth [68]. Therefore, banks may offer green financial products and services to improve their competitiveness, reputation, customer loyalty, and their profitability [69], making their role in environmental sustainability vital [70]. By adopting environmentally friendly practices, banks can upgrade their non-financial performance, such as reputation and loyalty [71–73]. Additionally, the study by [74] identified the benefits of green banking adoption, such as green brand image, improved market share, competitive advantage, operational efficiency, risk minimization, employee satisfaction, and economic and social legitimacy. By adopting environmental factors in their activities, banks can gain public trust and simultaneously fulfill their responsibility toward society [30]. The use of green appeals can lead additionally toward sustainable consumer behavior [75], and the same can be also performed by the banks. An empirical study by [76] determined customers' insufficient awareness about green banking, high investment costs, and lack of capable and competent staff in estimating green loans, as well as difficulties and complexity in assessing green projects as major challenges that affect the development of green banking in Bangladesh. Since green banking practices affect the banks' image, bank organizations should increase awareness among their employees, clients, and stakeholders to enable more benefits [77].

5.4. Limitations of the Conducted Research

As with any empirical research, there are certain limitations related to this study. The main limitation of this study is the absence of data for green loans in the annual reports of banks and the National bank of Serbia. Those reports did not include quantitative values of green loans such as their share. Based on a smaller degree of data disclosure, the model included green loans as a dummy variable.

5.5. Future Research Directions

Future research should include banks from different countries and accordingly external, i.e., macroeconomic determinants, such as gross domestic product growth rate, real interest rate, and inflation rate, which may significantly affect the bank's profitability. That way, the effects of both internal and external determinants on bank profitability could be checked.

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