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## The impact of Green practices on Banks' profitability

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**Abstract.** The article empirically tests the relationship between "green banking" practices and banks' profitability on the example of the five largest Kazakhstani banks. The authors built a multiple linear regression model with such independent variables as Time and Cashless payments as a proxy for green banking. The results found that pairwise correlations between Time and Return on Assets, and between Cashless Payments and Return on Assets, are high. However, the findings could not establish a strong positive relationship between "green banking" and profitability, since the coefficients were not statistically significant. This could be explained by model limitations and data unavailability. However, several studies (in the case of China, Bangladesh, and Kenya) could establish a positive correlation between green banking and financial performance. We believe further research could refine our model by including more observations or choosing other estimators for green banking.

**Keywords:** Green banking, green banks, green finance, ESG, sustainable finance, sustainable banking, green economy, banks' financial performance, profitability

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### Introduction

The concept of Green banking is a relatively new phenomenon related to sustainable development. Although there are many definitions of green banks, it mainly refers to banks that recognize their impact on the environment. Banks having a prominent role in the financial system are trying to incorporate ESG (Environmental, social, governance) principles into their business operations.

There are several explanations for this tendency. Some governments and their central banks (e.g. Bangladesh) require second-tier banks to become more environmentally conscious, whereas other financial institutions choose to follow the global trend toward sustainable development. For example, in 2021 The Central Bank of Bangladesh adopted Green banking guidelines, which set three stages of green transformation and require listed banks to disclose green banking activities [1].

Another reason could be the benefits that green banking brings to its followers. Various studies tried to assess how "green policy" affects banks' performance. As such, researchers think green credits increase competitiveness and lower environmental and bad debt risks [2], [3]. A study by Ibe-enwo et al. [4] empirically tested the positive effect of green banking practices on bank loyalty, trust, and green image. Thus, the adoption of a sustainable banking approach could bring long-term benefits in terms of customer perception and reputation.

### Formulation of problem

However, since banks are profit-maximizing business entities, it is essential to examine the impact of green banking on their financial performance. Green banking in general increases costs, because it requires specialized staff, more disclosure, and checks. Studies by Ma et al. [5], Yang et al. [6] differentiated the effects of green credit in the short and long term. At first, high costs associated with green banking may reduce banks' profits. Besides being low-interest, green projects usually are relatively risky with uncertain payoffs. This certainly poses a threat to green bank's financial performance. However, the long-term benefits due to the

green image may increase profitability. Thus, it is not clear whether "being green" for a bank is simply an additional expense or whether it can increase profits in the long run.

### **Aim**

The aim of the article is to examine the relationship between the adoption of "green banking" practices and the bank's profitability in the example of the Republic of Kazakhstan. In the article, we employ an econometric analysis and built a simple linear regression model.

The initial hypothesis H0: There is a significant positive relationship between banks' green practices and profitability.

The alternative hypothesis H1: There is no significant relationship between banks' green practices and profitability.

Our dependent variable is "Return on Assets" (RoA), which is widely used to measure profitability. To ensure the robustness of results, the independent variable "green banking" is measured by several proxy variables (namely, "amount of funds through online and mobile banking", "number of cashless payments", etc.?)

There are several explanations why this question is important to investigate. First, effective decision-making is possible if a bank can predict the impact of "green" practices on its financial performance. Thus, financial institutions can make a cost-benefit analysis of "green transformation". Second, if the results support our initial hypothesis, banks would be more willing to engage in green practices as this may increase their profitability. Thus, the prominence of green finance in the country can grow due to more banks' private actions, not due to more governmental regulations.

### **Literature Review**

Although the topic of green finance gains popularity, the literature on green banking is limited. Most research on green banking is related to China, Bangladesh, and India.

Mazina et al. [7] studied the impact of green fiscal policy on the investment efficiency of renewable energy enterprises in Kazakhstan. Birzhanova and Nurgaliyeva [8] propose a model of "greening" the banking sector by introducing "green" alternatives to traditional banking products.

Several studies attempted to test empirically the relationship between green banking and financial performance and specifically, the bank's profitability. Some studies support our initial hypothesis about the positive relationship between the variables.

Broggi et al [9] investigated the link between ESG (environmental, social, governance) score and profitability for a sample of U.S. financial institutions. The results establish a significant positive relationship between banks' ESG disclosure and financial performance, measured by the Return on Assets (RoA).

Zhang [10] assessed the impact of green credits given by the Chinese Industrial bank from 2005-2017 on its profitability. Industrial Bank is the pioneer of Green finance in China. Only in 2017, the bank funded more than 14,000 green projects, which is equivalent to >140 billion CNY. The econometric model employed in the paper measures green banking by the Green Credit ratio (Total green credit/ total loan amount) and banks' financial performance by the Return on Assets (RoA). The author shows that Bank's net profits are positively correlated with the total volume of green credit (p.296, *ibid.*).

The findings of Okumu [11] also support the view that green banking positively affects the financial performance in the example of Kenyan commercial banks. He estimated how green banking initiatives (measured by the number of funds provided through the internet and online banking) affect net profit after tax.

A study by Ma and Jiange [5] differentiated the effects of green credit in the short and long term. At first, high costs associated with Green Banking reduce banks' profits. However, the long-term benefits of green image improve financial performance. This is supported by the research of Istudor et al [12], which found that with the introduction of green investments banks' profitability initially declined, however, it increased in the medium and long term.

In making conclusions we should remember that correlation is not causation. Actually, the relationship between Green banking and Financial performance can go in the opposite direction. Better performing banks may be more interested in green banking policies, i.e. the higher the banks' profits are, the greener it will be.

Some studies attempted to test such hypotheses. An empirical study by Hoque et al [1] tested the impact of financial performance on green banking disclosure. The independent variables were Financial Performance indicators such as profitability (RoA), liquidity (current ratio), and solvency (debt-to-assets ratio). The dependent variable was green banking disclosure, measured by spending on green banking as a share of total spending. The authors found that there is a positive relationship between green spending and Return on Assets for a sample of over 30 listed Bangladesh banks.

A negative relationship between Greenness and Financial Performance was first tested by such authors as Jaffe et al [13]. The authors attempted to establish the effect of increasing environmental regulations on U.S. firms' competitiveness. Although the costs of environmental regulations may be significant, decisive conclusions about the negative relationship were not drawn.

A recent study by Dragomir et al [14] examined the influence of ESG factors on the financial performance of 333 banks in America, Europe, and Asia during the COVID pandemic. The results show that the environmental aspect negatively affected the banks' return on equity, especially in the East Asian region.

Several articles failed to find any significant relationship between green banking and financial performance. For example, Rajput [15] studied a sample of Indian banks and concluded that there was no statistically significant relationship between green banking and banks' profitability. Ratnasari et al. [16] determined an ambiguous effect of green banking on financial performance. On the one hand, the findings show that "green banking daily operation" positively affects profitability. On the other hand, the correlation between "green banking policy" and financial performance was negative.

This study adds to the existing literature on the relationship between the banks' green practices and their financial performance. Moreover, to our knowledge, there is no study applied to the context of Kazakhstan.

The study is intended to assist Kazakhstani banks to engage and promote green banking as part and parcel of their daily operations. The study is also intended to show banks the benefits of green banking.

## Methods

The article employs an ordinary least squares (OLS) regression model and tests the hypothesis of a positive relationship between green banking and banks' profitability using Microsoft Excel. Up to date by September 2022 there were 22 second-tier banks in Kazakhstan. For our analysis, we selected a sample of 5 largest banks based on their Total Assets. These are Halyk, Bereke (former Sberbank Kazakhstan), Kaspi, Jusan, and Otbasy banks. The financial data on banks' net income, total assets, equity, etc. were derived from their audited financial statements and annual reports. Data on banks' green practices were retrieved from the website of the National Bank of the Republic of Kazakhstan. Due to limitations of data the time period is mostly limited to the years 2018-2021.

The initial hypothesis H0: There is no significant positive relationship between banks' green practices and profitability.

The alternative hypothesis H1: There is a significant positive relationship between banks' green practices and profitability.

$$\text{Model: } Y = b_0 + b_1X_1 + b_2X_2 + e;$$

Or specifically

$$RoA = b_0 + b_1T + b_2GB + e; \quad (1)$$

Our dependent variable  $Y$  is "Return on Assets" ( $RoA$ ), which is widely used to measure profitability.

X1 is the variable Time  $T$  (2018-2021), which takes values from 1 to 4. To ensure the robustness of results, the independent variable X2, "green banking practices" (GB), is measured by several proxy variables (namely, "amount of funds through online and mobile banking", "number of cashless payments", etc.). B0 is the intercept, i.e. the value of  $Y$  when  $X1=0$  and  $X2=0$ . B1 is the effect of Time, while B2 shows the relationship between X2 (green banking) and  $Y$  (profitability).

**Results and Discussion**

Table 1 presents the Returns on Assets (RoA) of the five largest Kazakhstani second-tier banks for the period of 2016-2021. It can be seen that the average RoA was increasing until 2019, after which the profitability indicator started decreasing. This can be explained by the unprecedented lockdown measures and other restrictions due to COVID-19 pandemic, which disturbed the ordinary course of business and lowered profitability in many sectors. In Graph 1 Individual RoAs show the upward trend for such banks as Halyk, Bereke, and Kaspi. Otbasy bank's Return on Assets was mostly decreasing for the last six years. Profitability indicators for Jusan do not reveal a certain tendency for the period of interest.

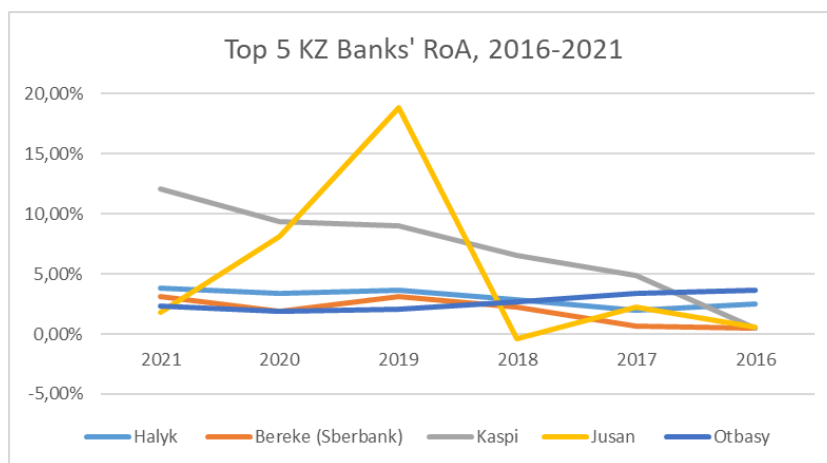
For our econometric analysis, we used average RoA as a measure of the profitability of the banking sector.

**Table 1. Returns on Assets of selected Kazakhstani banks, 2016-2021**

in mln KZT	2021	2020	2019	2018	2017	2016
Halyk	3,82%	3,39%	3,62%	2,83%	1,96%	2,46%
Bereke (Sberbank)	3,10%	1,92%	3,12%	2,20%	0,65%	0,47%
Kaspi	12,06%	9,38%	9,01%	6,54%	4,84%	0,47%
Jusan	1,76%	8,16%	18,81%	-0,43%	2,25%	0,59%
Otbasy	2,34%	1,86%	2,04%	2,65%	3,36%	3,64%
<b>Average</b>	<b>4,62%</b>	<b>4,94%</b>	<b>7,32%</b>	<b>2,76%</b>	<b>2,61%</b>	<b>1,52%</b>

Note: Compiled by Authors  
Source: Audited financial statements

**Graph 1. Returns on Assets of selected Kazakhstani banks, 2016-2021**



Note: Compiled by Authors  
Source: Audited financial statements

Different variables are used by researchers to measure green banking practices. Generally, there are two approaches: the direct way is to use the total value of funds provided to green initiatives (e.g. green credit, green loans, etc.) For example, Zhang [10] chose the Green Credit ratio (Total green credit/ total loan amount)

as a “green banking” measurement. Hogue et al [1] measured green banking disclosure by the amount of spending on green banking as a share of total spending. The second way is indirect, i.e. using various proxy variables when data on specific green funds are not available. For calculating the greenness of Kenyan banks, Okumu [11] used the number of funds provided through the internet and online banking. Since in the case of Kazakhstan data on specific green funds provided by banks are not publicly available, we employ an indirect approach and use various proxy variables to measure green banking practices.

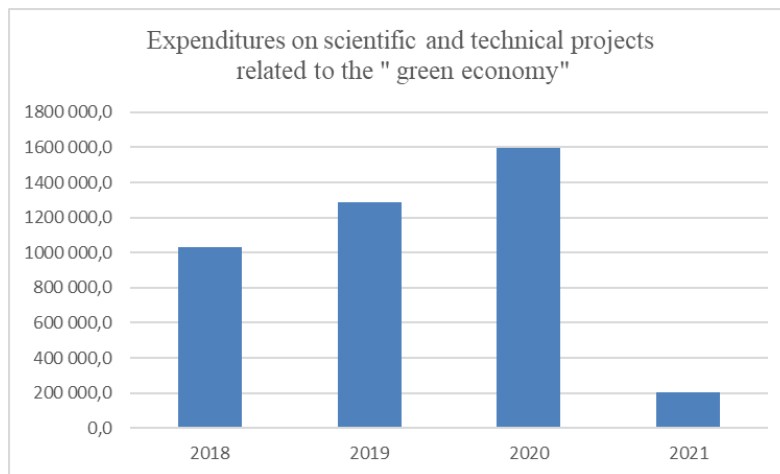
Table 2 presents data on the total amount of funds provided to the Kazakhstani government to finance scientific and technical projects related to the “green economy” [17]. The data shows that the number of financed green projects grew almost threefold in 2018 and was stable for three years. The expenditure on green scientific and technical projects was increasing by 23-25% in the period of 2018-2020. However, in 2021 both the number and the funding of green projects severely declined. Although this variable is widely used as one of the measurements of “green development”, the major drawback of applying it in our model is that the funds are provided by the budget, i.e. the Kazakhstani government. As the subject of interest is commercial banking, this variable does not provide information about the development of “green banking”.

Table 2. Expenditure on scientific and technical projects related to Green Economy

The amount of funds allocated to finance scientific and technical projects on the "green economy" in the framework of grant and program-targeted funding							
		Unit of measurement	2017	2018	2019	2020	2021
1.	Number of scientific and technical projects on the "green economy"	units	15	41	41	42	3
2.	Expenditures on scientific and technical projects related to the "green economy"	In thousands KZT	...	1 030 612,7	1 286 137,8	1 594 321,2	203 940,0

Source: Bureau of National Statistics [17]

Graph 2. Expenditure on scientific and technical projects related to Green Economy



Source: Bureau of National Statistics [17]

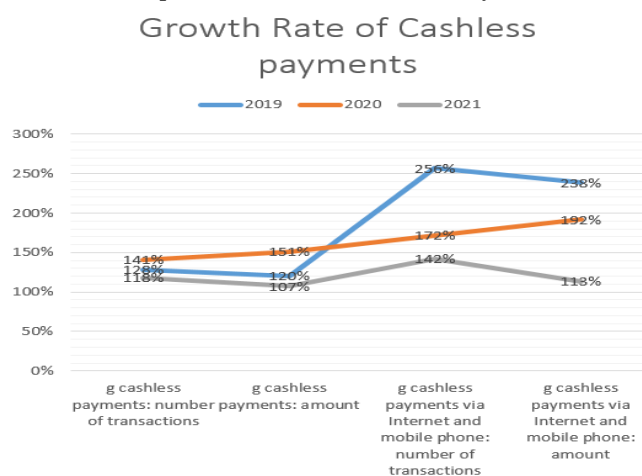
Another proxy variable to measure “green banking” is the use of payment cards issued by Kazakhstani banks. A similar approach for the independent variable was in the paper of Okumu [11], where green banking was measured by the number of funds provided through the internet and online banking. Table 3 summarizes findings on cashless payments by the total number of transactions, total amount of funds through payment cards, and the number and amount of transactions through the Internet and mobile banking. The data was

derived from the website of The National bank of the Republic of Kazakhstan [18]. It can be seen that both the number of cashless transactions and the amount of cashless payments have been considerably increasing in the given period. Graph 3 shows the growth rates for all categories were more than 100%, with the peaks during 2019-2020. For further analysis, as an independent variable X2 we employ cashless payments via Internet and mobile phone (number of transactions).

Table 3: Use of payment cards in Kazakhstan

	2021	2020	2019	2018
Cashless payments: number of transactions (thousand)	6 271 338	2 878 476	1 195 627	523 847
Cashless payments: amount (mln.tenge)	73 123 297	35 294 806	14 050 810	6 387 178
Cashless payments via Internet and mobile phone: number of transactions (thousand)	4 048 450	1 672 576	615 873	172 766
Cashless payments via Internet and mobile phone: amount (mln.tenge)	60 119 062	28 170 018	9 655 303	2 852 419

Graph 3. Growth Rate of Cashless Payments



Note: Compiled by Authors

Source: The National Bank of the Republic of Kazakhstan [18]

Table 4 below presents descriptive statistics on three variables of interest: Y1- average RoA, X1- time, X2 – cashless payments. Means for Average RoA and Cashless payments were 5% and 1 627 416 thousand KZT, respectively.

Table 4. Descriptive Statistics

Average RoA		Time		Cashless Payments number of transactions (thousand)	
Mean	0,05	Mean	2,50	Mean	1 627 416,40
Standard Error	0,01	Standard Error	0,65	Standard Error	866 153,91
Median	0,05	Median	2,50	Median	1 144 224,70
Mode	#N/A	Mode	#N/A	Mode	#N/A
Standard Deviation	0,02	Standard Deviation	1,29	Standard Deviation	1 732 307,81
Sample Variance	0,00	Sample Variance	1,67	Sample Variance	3 000 890 359 094,59
Kurtosis	1,44	Kurtosis	- 1,20	Kurtosis	1,26
Skewness	0,40	Skewness	-	Skewness	1,29
Range	0,05	Range	3,00	Range	3 875 684,20
Minimum	0,03	Minimum	1,00	Minimum	172 766,00
Maximum	0,07	Maximum	4,00	Maximum	4 048 450,20
Sum	0,20	Sum	10,00	Sum	6 509 665,60
Count	4,00	Count	4,00	Count	4,00

The correlation Matrix shows correlation coefficients for a pair of variables. In our model, the correlation coefficient for average RoA and Cashless payments is 0.95, which means the variables are highly correlated

(see Table 5). The coefficient of Determination, measured by R square, shows the goodness-of-fit. Overall, cashless payments and time help to explain 46% of the variation in Average Return on Assets (Table 6).

Table 5. Correlation Matrix

Table 6. Regression Statistics

Correlation Matrix				Regression Statistics	
	Average RoA	Time	Cashless Payments		
Average RoA	1,00			Multiple R	0,68
Time	0,22	1,00		R Square	0,46
Cashless Payments	- 0,00	0,95	1,00	Adjusted R Square	- 0,61
				Standard Error	0,02
				Observations	4,00

The regression results are provided in Table 7.

Table 7. Linear Regression

	Coefficients	Standard Error	t Stat	P-value
Intercept	0,008164421	0,05	0,17	0,89
Time	0,030258605	0,03	0,93	0,52
Cashless Payments number of transactions (thousand)	- 0,000000021	0,00	- 0,88	0,54

Based on our findings, the equation (1) can be rewritten as

$$RoA=0.00817+0.03026T-0.000000021GB$$

These coefficients can be interpreted as follows. The intercept of 0.0082 can be understood as the average Return on Assets value when  $T=0$  and Cashless Payments=0, although such a situation is unlikely. The coefficient on Time  $T$  is 0.0303, which means that Average RoA is positively correlated with Year, i.e. it has a tendency to increase throughout time. In particular, each year Average RoA grows by 0.0303. The coefficient of Green banking is negative, meaning that the increase in cashless payments is associated with a slight reduction in banks' profitability. This is contrary to our expectations of a positive effect of green banking practices on financial performance.

However, when interpreting these coefficients, it is important to note their significance measured by  $t$ -statistics and associated  $p$ -values. The intercept's  $t$ -stat is equal to 0.17 and the  $p$ -value is very high (0.89). This means we fail to reject the hypothesis that the coefficient is different from zero. Similarly, the coefficients on Time and Cashless Payments are not statistically significant, with  $p$ -values equal to 0.52 and 0.54, respectively.

There are several explanations for why our findings fail to produce significant results. First of all, cashless payments may not be a good proxy for green banking practices. Further research may use other variables to measure the extent of "green banking", such as the amount of funds provided to green projects by banks (e.g. total value of green loans, the ratio of green to total loans, number of green practices or instruments, etc.). A second limitation of our model may be the short period of observations (2017-2021). We chose the 5-year period due to data availability, so regression results may improve if more observations are added.

## Conclusion

The present article aimed to statistically test the impact of green banking practices on banks' financial performance on the example of Kazakhstan. An econometric model with two independent variables, Time and Cashless Payments (a proxy variable) was built and a linear regression was estimated. The results could

not reject the initial hypothesis of no significant relationship between green banking and profitability, measured by average Return on Assets. The estimated coefficients were found to be statistically not significant. However, several studies (in the case of China, Bangladesh, and Kenya) could establish a positive correlation between green banking and financial performance. We believe further research could refine our model by including more observations or choosing other estimators for green banking.

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### **Жасыл тәжірибелердің банктердің кірістілігіне әсері**

**Аннотация.** Мақалада қазақстандық бес ірі банк мысалында «жасыл банкинг» тәжірибесі мен банктердің кірістілігі арасындағы байланыс эмпирикалық түрде тексеріледі. Авторлар жасыл банкинг үшін прокси ретінде Қолма-қол ақшасыз төлемдер және Уақыт сияқты тәуелсіз айнымалылары бар бірнеше сызықтық регрессия үлгісін құрды. Нәтижелер уақыт пен активтердің кірістілігі және қолма-қол ақшасыз төлемдер мен активтердің кірістілігі арасындағы жұптық корреляцияның жоғары екенін көрсетті. Дегенмен, нәтижелер «жасыл банкинг» пен кірістілік арасында күшті оң байланыс орната алмады, өйткені коэффициенттер статистикалық маңызды емес еді. Мұны үлгі шектеулерімен және деректердің қолжетімсіздігімен түсіндіруге болады. Бірқатар зерттеулер (Қытай, Бангладеш және Кения жағдайында) жасыл банкинг пен қаржылық көрсеткіштер арасында оң корреляцияны анықтай алды. Біз одан әрі зерттеулер көбірек бақылауларды қосу немесе жасыл банкингті өлшеу үшін басқа айнымалыларды таңдау арқылы модельімізді нақтылай алады деп сенеміз.

**Түйін сөздер:** жасыл банкинг, жасыл банктер, жасыл қаржыландыру, ESG, тұрақты қаржы, тұрақты банкинг, жасыл экономика, банктердің қаржылық көрсеткіштері, табыстылық

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### **Влияние «зеленых» практик на прибыльность банков**

**Аннотация.** В статье эмпирически проверяется взаимосвязь между практиками «зеленого банкинга» и прибыльностью банков на примере пяти крупнейших казахстанских банков. Авторы построили модель множественной линейной регрессии с такими независимыми переменными, как время и безналичные платежи, в качестве прокси для зеленого банкинга. Результаты показали, что парные корреляции между временем и рентабельностью активов, а также между безналичными платежами и рентабельностью активов высоки. Однако результаты не смогли установить сильную положительную связь между «зеленым банкингом» и прибыльностью, поскольку коэффициенты не были статистически значимыми. Это можно объяснить ограничениями модели и недоступностью данных. Посредством ряда исследований (в случае Китая, Бангладеш и Кении) установлена положительная корреляция между «зеленым» банкингом и финансовыми показателями. Мы считаем, что дальнейшие исследования могут уточнить нашу модель, включив больше наблюдений либо выбрав другие переменные для измерения зеленого банкинга.

**Ключевые слова:** зеленый банкинг, зеленые банки, зеленые финансы, ESG, устойчивое финансирование, устойчивый банкинг, зеленая экономика, финансовые результаты банков, прибыльность.

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