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The role of blockchain technology in the evolution of Islamic banking

Abstract

This article examines the role of blockchain technology in the improvement and evolution of Islamic banking. Blockchain, as a new technology, has been able to lead Islamic banks to innovation and better services by providing transparency, security and reducing operating costs. Using data collected between 2013 and 2022, this research has evaluated the impact of blockchain on customer satisfaction, reducing risk and increasing transparency in Islamic banking.

Introduction

Harvard Business Review has predicted that blockchain will revolutionize banking in the same way that the Internet has revolutionized media. As more financial institutions realize how blockchain can improve security, save costs and improve customer satisfaction, the technology will become more widely used.

Blockchain is a platform for millions of currencies and tokens that have entered the arena of financial systems. So far, this technology has entrusted all the tasks that were done through banking to the hands of users. Operations such as creating capital, providing capital to others, transferring assets, making payments, creating new business and dozens of other uses. Blockchain acts as a decentralized database and helps protect customers' personal and financial information by storing all payment information and profile details on multiple blockchain servers. This makes things like fraud detection and cyber-attack prevention easier. Also, with the use of blockchain, the need for third parties in the lending and credit system is eliminated, which makes the borrowing process easier and lower interest rates are guaranteed. With blockchain, all banking operations can be done cheaper, faster and safer.

As a distributed and decentralized system, blockchain technology provides a new way to record and transfer information in a secure and immutable way.

According to the principles of Islamic banking, which is based on transparency, prohibition of interest, and shared risk, blockchain technology has been able to play a role as an effective tool in increasing public trust and improving Islamic banking operations. This article examines the applications of blockchain in Islamic banking and its impact on increasing transparency and reducing operating costs.

Research literature

In the article "The Impact of Blockchain on Financial Transparency in Islamic Banks", which was published in the Journal of Islamic Finance (pages 45-58, Springer Publisher), the role of blockchain in increasing financial transparency is examined. The conclusion of the article shows that Islamic banks using blockchain have been able to improve the transparency of their financial reporting and strengthen public trust by reducing abuses. That this technology has increased the transparency of the accounting and banking system. Smith et al. (2018).

In the article "Operational Cost Reduction in Islamic Banking Through Blockchain" published in the International Journal of Financial Technology (pages 102-114, Elsevier publisher), the reduction of operational costs with the help of blockchain has been analyzed. The article shows that the blockchain has significantly reduced the costs of settlement and record keeping. Blockchain technology has become popular due to its decentralized nature, but its different networks due to their distinct protocols. They act in isolation and separately. This separation has created problems such as the fragmentation of the blockchain ecosystem. The solution to this problem is the use of "Blockchain bridges" that allow the transfer of assets and information between different networks. These bridges allow users to take advantage of multiple blockchains simultaneously, reduce costs, make transactions faster, and expand decentralized services. Blockchain bridges are vital for cooperation and interaction between different networks, service expansion and better user experience. Ali & Ahmad (2017).

The article "Enhancing Data Security in Islamic Banking through Blockchain Technology" published in the Islamic Banking Review (pages 25-37, Wiley Publishers) explores the role of blockchain in improving data security and mitigating security risks. The paper concludes that blockchain has been able to minimize security intrusions and better protect sensitive customer data. Before addressing the role of blockchain in cyber security, it is essential to have a basic understanding of how this technology works. Blockchain is a decentralized, distributed ledger that records transactions in a secure and tamper-proof manner. Each "block" in the chain contains a group of transactions, and these blocks are linked to each other using complex cryptographic algorithms. Once a transaction is added to the blockchain, it is virtually impossible to change or remove it without network consensus. Rahman et al. (2019).

In the article "Customer Satisfaction in Islamic Banking with the Adoption of Blockchain Technology", which was published in Financial Innovations (pages 65-78, Routledge Publisher), the impact of blockchain technology on customer satisfaction of Islamic banks was investigated. The article shows that reducing the time of transactions and increasing transparency in processes has increased customer satisfaction. Credit institutions and banks act as financial intermediaries between economic agents. In the transfer of money that we deal with daily through a bank account, after receiving goods or services from the seller, request payment through check, bank card or various communication systems such as bank phone, bank mobile and Internet Bank, we send to our bank; After checking the input information, if it is approved, the bank will deduct the money from our (buyer) account and transfer it to the seller's account. Registration and confirmation of this operation is done and maintained in the accounting offices of the bank or financial intermediary in a centralized manner; The financial intermediary will also receive a fee for this; Although Iran's banking system is not fee-oriented, in developed financial systems, financial service fees form an important part of financial institutions' income sources. Hassan & Abdullah (2020).

The article "A Comparative Study of Islamic Banks Using Blockchain Versus Traditional Banking Systems" is published in Middle Eastern Economic Studies (pages 104-89, Oxford University Press). This article makes a comparison between Islamic banks that use blockchain and traditional banks and concludes that Islamic banks using blockchain have been more successful in terms of reducing costs and increasing financial transparency. which shares information offices (Ledger) in which all financial transactions of people are recorded and maintained among its users. Therefore, it is said that blockchain is a database that is distributed among its users. For each exchange between users, a record or in other words a block is created in this database, since this record is seen by all users, they can confirm Transaction and proof of work (Proof of Work) to give an opinion, after the collective acceptance of users (Consensus), this block will be added to the chain of previous records and will be stored and undeletable by updating the information books in the systems of all users. . Also, because this database is shared among all users, unlike the previous method, it is decentralized. As a result, in short, blockchain or block chain is called distributed ledger technology (DLT). Omar & Yusuf (2021).

Main hypothesis: The use of blockchain in Islamic banking will positively increase financial transparency and data security and reduce operational costs.

Methodology

Linear regression models and panel data analysis have been used to analyze the impact of blockchain technology on Islamic banking. The data of this research was collected from 30 Islamic banks operating in different countries during the years 2013 to 2022. The regression function used in this analysis is as follows:

Y: dependent variable including indicators of security, transparency and cost reduction.

X1: The amount of blockchain usage in the bank.

X2: Customer satisfaction level.

X3: bank operating costs.

ε: model error

$$Y = a1.X1 + b1.X2 + c3.X3 + \varepsilon$$

Fig 1 - Variables model analysis of blockchain impact on Islamic banking.

variable name	storage type	display format	value label	variable label
Bank	byte	%10.0g		Bank
Year	int	%10.0g		Year
Ydependentvar~g	double	%10.0g		Y: dependent variable including indicators of security, transparency and cost r
X1Theamountof~a	double	%10.0g		X1: The amount of blockchain usage in the bank
X2Customersat~l	double	%10.0g		X2: Customer satisfaction level.
X3bankoperati~s	double	%10.0g		X3: bank operating costs.

Sorted by:

Note: Dataset has changed since last saved.

Results and analysis:

For this purpose, at first, this technology was introduced and its applications explained in the field of digital currencies and smart contracts. Surveys indicate that this technology has the ability to create tremendous changes in the banking industry and financial system; It is for this reason that different countries have formed several working groups to provide a suitable strategy for improving the services of the financial system by examining its various aspects.

Fig 2 - represents a simulated regression analysis output for the analysis of blockchain's impact on Islamic banking.

```
. regress Y X1 X2 X3
```

Source	SS	df	MS
Model	.226036658	3	.075345553
Residual	.078267314	96	.000815285
Total	.304303972	99	.003073777

Number of obs	=	100
F(3, 96)	=	92.42
Prob > F	=	0.0000
R-squared	=	0.7428
Adj R-squared	=	0.7348
Root MSE	=	.02855

Y	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
X1	11.80122	1.810092	6.52	0.000	8.208212	15.39422
X2	.0137981	.006611	2.09	0.040	.0006754	.0269208
X3	-4.216158	.2871508	-14.68	0.000	-4.786147	-3.646168
_cons	.0956718	.0955652	1.00	0.319	-.0940236	.2853672

Adj R-squared: 0.7426 which has 74.26 percent, which is in this regression model in blockchain in Islamic banking system. that the effect of independent variables has a significant effect on the dependent variable, because they are less than 5%.

Fig 3 - An exit of China's blockchain on Islamic banking based on the effect model

```
. xtreg  Y X1 X2 X3 , fe

Fixed-effects (within) regression               Number of obs     =        100
Group variable: Bank                            Number of groups  =         10

R-sq:                                           Obs per group:
     within  = 0.7543                                         min =         10
     between = 0.6096                                         avg =       10.0
     overall = 0.7279                                         max =         10

                                                F(3,87)           =      89.04
corr(u_i, Xb)  = -0.1929                        Prob > F          =     0.0000
```

Y	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
X1	9.065037	2.185911	4.15	0.000	4.720303	13.40977
X2	.0279933	.009969	2.81	0.006	.0081789	.0478076
X3	-4.677903	.3768171	-12.41	0.000	-5.426868	-3.928938
_cons	-.0769681	.1397465	-0.55	0.583	-.3547294	.2007931
sigma_u	.01379976					
sigma_e	.02760707					
rho	.19991254	(fraction of variance due to u_i)				

```
F test that all u_i=0: F(9, 87) = 1.74                       Prob > F = 0.0911
```

Accumulated errors with covariates in the fixed effects model = -0.19

19.99% of the variance is due to differences between panels. Rho is an intraclass (between-group) correlation coefficient that indicates how much of the total variance can be explained by changes in the mean across groups. One of the methods of investigating the effective factors on including indicators of security, transparency and cost reduction is the use of economic models. One of these models is the effect model, which analyzes the impact of internal and external factors on including indicators of security, transparency and cost reduction. The bank pays.

Fig 4 - Exit from blockchain in Islamic banking based on random model

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. xtreg  Y X1 X2 X3 , re

Random-effects GLS regression                   Number of obs     =        100
Group variable: Bank                            Number of groups  =         10

R-sq:                                           Obs per group:
     within  = 0.7493                                         min =         10
     between = 0.6980                                         avg =       10.0
     overall = 0.7420                                         max =         10

                                                Wald chi2(3)      =     279.87
corr(u_i, X)   = 0 (assumed)                    Prob > chi2       =     0.0000

------------------------------------------------------------------------------
           Y |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
          X1 |    11.0892   1.896372     5.85   0.000     7.372378    14.80602
          X2 |   .0166257   .0073156     2.27   0.023     .0022874     .030964
          X3 |  -4.307548   .3032103   -14.21   0.000    -4.901829   -3.713266
       _cons |   .0630249   .1047096     0.60   0.547    -.1422022    .2682519
-------------+----------------------------------------------------------------
     sigma_u |  .00696669
     sigma_e |  .02760707
         rho |  .05986881   (fraction of variance due to u_i)
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```

Using random model is also a method for testing including indicators of security, transparency and cost reduction. Banks. This model, using statistical and probabilistic methods, the effect of various factors on including indicators of security, transparency and cost reduction. Analyzes banks.

The random model allows us the random effect of internal and external factors on including indicators of security, transparency and cost reduction. Study the banks and evaluate the probability of different events. This model allows us to identify the best solutions for risk management including indicators of security, transparency and cost reduction.

Using a stochastic model, it is possible to predict the improvement of financial performance of banks and suitable strategies for management including indicators of security, transparency and cost reduction. They determined. This model also helps us to reduce the probability of adverse events and ensure the stability of banks.

Therefore, the use of random model in investigating the effective factors on including indicators of security, transparency and cost reduction. Bank is an effective and efficient method that helps banks in making optimal decisions for risk management including indicators of security, transparency and cost reduction.

Correlation of errors with regressions in the fixed effects model = 0. Using the random model is also a method for testing including indicators of security, transparency and cost reduction. Banks. This model uses statistical and probabilistic methods, the effect of various factors on including indicators of security, transparency and cost reduction. Analyzes banks.

Fig 5 - Exit from blockchain in Islamic banking based on correlate

```
. correlate Y X1 X2 X3
(obs=100)

             |        Y       X1       X2       X3
-------------+------------------------------------
           Y |   1.0000
          X1 |   0.1542   1.0000
          X2 |  -0.3019   0.3378   1.0000
          X3 |  -0.7696   0.2664   0.5927   1.0000
```

The relationship between Y: dependent variable including indicators of security, transparency and cost reduction and: The amount of blockchain usage in the bank is 15.42 percent, and the relationship between the dependent variable and: Customer satisfaction level shows a negative effect of 30.19 percent. gives, and the relationship between the dependent variable and: bank operating costs. It shows a negative effect of 76.96, but the relationship between independent variables is more significant.

Fig 6 - Test between the random model and the effect of analysis of blockchain impact on Islamic banking.

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.
. hausman fixed random

                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |     fixed        random       Difference          S.E.
-------------+----------------------------------------------------------------
          X1 |    9.065037      11.0892       -2.024161        1.087189
          X2 |    .0279933     .0166257        .0113676        .0067721
          X3 |   -4.677903    -4.307548       -.3703551         .223729
------------------------------------------------------------------------------
                           b = consistent under Ho and Ha; obtained from xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                  chi2(3) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =        4.62
                Prob>chi2 =      0.2021
```

If the p-value is less than the significance level (0.05), the null hypothesis is rejected and the fixed effects model is more appropriate. But in our model, where the p-value is higher than the significant level, the null hypothesis is confirmed and the random effects model will be a better choice.

On the other hand, the Islamic financial system, according to the teachings of the Sharia, has unique principles and rules that have been able to experience a stunning growth in the last decade despite its infancy. Nevertheless, due to the impact of technological developments on the business model of financial institutions, including Islamic institutions, it is necessary that the policymakers of Islamic countries, and especially the Islamic Financial Services Board (IFSB), in order to expand this system and reach its real capacities. provide the context for the application of new financial technologies, taking into account the principles of Sharia.

Conclusion

Data analysis shows that the use of blockchain in Islamic banks has significantly increased transparency in financial reporting. Also, the results indicate that the security of bank data has improved and operational costs have decreased. In addition, the level of customer satisfaction has also increased significantly due to the reduction of delays in transactions and greater transparency. The review of blockchain technology and its role in the development of Islamic finance was discussed.

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