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# THE IMPACT OF DIGITAL TECHNOLOGY TRANSFORMATION ON THE BANKING SYSTEM

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**Abstract:** This research aims to evaluate the transformative impact of digital technologies on the global banking system, with a special focus on the Republic of Armenia. Consequently, the research objective is twofold: to identify and analyze the technological systems driving digitalization in banking, and also to

empirically assess the relationship between digital adoption and bank profitability using econometric methods. This study contributes to the literature by offering a rare econometric quantification of digital transformation's impact on banking profitability across a large global sample. It also presents Armenia as an emerging case of digital banking success, providing insights for other developing economies undertaking similar transitions.

**Keywords:** digital transformation, banking system, financial technologies, return on equity, econometric analysis.

**JEL codes:** G21, O32

**Research aims:** The research aims to identify the impact of the use of digital technologies on the efficiency of RA banking activities, in particular on the growth of the profitability of banking transactions

**Research novelty:** The results confirm that digital technologies-particularly mobile money transfers and borrowing from formal financial institutions-positively influence bank profitability. Conversely, increased digital purchases correlate with reduced short-term profitability, likely due to the transitional costs of technological adaptation. The model explains approximately 30% of the variance in ROE, and all Gauss-Markov conditions are satisfied.

## Introduction

The banking system, as a fundamental pillar of economic intermediation, has historically adapted to shifting socio-economic conditions, but the current wave of digital transformation is more systemic in nature. Unlike previous waves of technological change, digitalization now permeates every layer of banking-from customer

interfaces and internal processes to compliance systems and strategic planning. Terms such as *digital banking*, *neo banking*, *e-banking*, and *open banking* reflect the depth of this transformation and the growing reliance on non-traditional channels to deliver financial services.

While global research has documented the rise of digital banking in advanced economies, emerging and developing countries are also accelerating their digital transitions-albeit under different institutional and technological conditions. In this context, the Republic of Armenia presents a particularly interesting case. Despite being a small, developing economy, Armenia has demonstrated notable progress in financial digitalization, with commercial banks adopting innovative tools such as virtual banking platforms, digital scoring algorithms, and app-based financial products. However, the broader economic impact of these transformations-especially in terms of bank performance-remains underexplored.

A significant gap in the existing literature concerns the empirical assessment of how digital transformation affects banking system profitability, particularly in transitional or under-researched markets. While most studies focus on consumer behavior, technology adoption rates, or operational efficiency, few provide quantitative evidence linking digital adoption to financial performance metrics such as Return on Equity (ROE).

This study aims to fill that gap by analyzing the relationship between digital transformation indicators and the profitability of the banking sector, using cross-country data and econometric modeling. Special attention is given to Armenia, both as a case study

and as part of the global sample. By exploring this link, the research contributes to the growing field of digital finance and offers actionable insights for policymakers, bank managers, and regulators seeking to harness the full potential of digital transformation while mitigating its inherent risks.

## Research methodology

Given the multifaceted impact of digitalization, we conducted both quantitative and econometric analyses. The quantitative component aimed to assess the current extent of digital technology effects, while the econometric analysis explored the statistical relationships between digitalization and banking system indicators.

To address this, our econometric analysis uses 2021 data from the World Bank, focusing on the global effects of digital transformation on banking profitability. The sample includes 104 countries at varying levels of development and digitalization, allowing for credible insights into current global patterns.

Ultimately, by identifying key factors influencing banking profitability, this study contributes to understanding present trends and informing future projections.

## Research results

The econometric analysis was carried out using the EViews software package, through which a multiple linear regression model was constructed.

$$\text{ROE}= C_0+\propto_1\times B_1 +\propto_2\times B_2 +\propto_3\times B_3 +\propto_4\times B_4 +\propto_5\times B_5 + \propto_6\times B_6 + \varepsilon \quad (1)$$

in which:

| | |
|---|---|
| ROE | Return on Equity of a country's banking system (Profit/Capital ratio) |
| $B_1$ | Share of respondents who reported borrowing directly from an official financial institution or from a mobile money account |
| $B_2$ | Share of respondents who reported using funds from a mobile money account, debit or credit card, or mobile phone to make payments from an account, or who reported having used the internet in the past year to pay bills online or to buy something in a store (i.e., made a digital payment), |
| $B_3$ | Share of respondents who reported making or receiving a digital payment |
| $B_4$ | Share of respondents who reported using a mobile phone or the internet to buy something online |
| $B_5$ | Share of respondents who reported using a mobile phone or the internet to pay bills |
| $B_6$ | Share of respondents who reported using a mobile phone or the internet to send money |
| $\varepsilon$ | Standard error |

By examining the multiple linear regression in all variations and making the appropriate adjustments, we obtained the following final result.

Where variables $A_1$, $A_4$, and $A_6$ represent the logarithmic series of variables $B_1$, $B_4$, and $B_6$, respectively. The reason for implementing this transformation was to satisfy the Gauss-Markov conditions, ensuring that the estimates obtained by the least

squares method are the best linear unbiased and efficient estimators. Ultimately, other explanatory variables included in the model were removed because their presence caused autocorrelation, and their transformation did not help correct the violated condition. In the case presented in Table 2, all Gauss-Markov conditions are satisfied, which will be outlined below.

***Table 1. Estimation Results of the Multiple Linear Regression Model***
***Source:*** *Authors' own work.*

**Dependent Variable: ROE**
Method: Least Squares
Date: 11/20/24 Time: 22:07
Sample (adjusted): 2 104
Included observations: 103 after adjustments

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| **C** | 3.155490 | 3.171914 | 0.994822 | 0.3223 |
| **A1** | 4.198120 | 1.234074 | 3.401837 | 0.0010 |
| **B2** | -0.096800 | 0.047570 | -2.034882 | 0.0446 |
| **A4** | -3.701892 | 0.787910 | -4.698370 | 0.0000 |
| **A6** | 3.529282 | 1.006528 | 3.506394 | 0.0007 |
| **R-squared** | 0.327629 | **Mean dependent var** | | 9.989353 |
| **Adjusted R-squared** | 0.300186 | **S.D. dependent var** | | 5.985911 |
| **F-statistic** | 11.93824 | **Durbin-Watson stat** | | 2.223113 |
| **Prob (F-statistic)** | 0.000000 | | | |

***Table 2. Condition of Absence of Heteroscedasticity***
***Source:*** *Authors' own work.*

**Heteroskedasticity Test: Breusch-Pagan-Godfrey**

| | | | |
|---|---|---|---|
| **F-statistic** | 0.269886 | Prob. F(4,98) | 0.8967 |
| **Obs*R-squared** | 1.122259 | Prob. Chi-Square(4) | 0.8907 |
| **Scaled explained SS** | 3.144387 | Prob. Chi-Square(4) | 0.5340 |

Prob. F(4,98) = 0.89 > 0.05; therefore, the null hypothesis that the model residuals are homoscedastic is accepted, meaning the condition is satisfied.

***Table 3. Condition of Absence of Autocorrelation***
***Source:*** *Authors' own work.*

**Breusch-Godfrey Serial Correlation LM Test:**

| | | | |
|---|---|---|---|
| **F-statistic** | 1.644768 | Prob. F(2,96) | 0.1985 |
| **Obs*R-squared** | 3.412466 | Prob. Chi-Square(2) | 0.1815 |

The condition of absence of autocorrelation was tested using the Lagrange Multiplier (LM) test, where the null hypothesis states that the model residuals are not autocorrelated. As a result, Prob. F(2,96) = 0.19 > 0.05, and thus the null hypothesis was accepted.

***Table 4. Condition of Absence of Multicollinearity***
***Source:*** *Authors' own work.*

**Variance Inflation Factors**
**Date: 11/20/24 Time: 23:06**
**Sample: 1 120**
**Included observations: 103**

| Variable | Coefficient Variance | Uncentered VIF | Centered VIF |
|---|---|---|---|
| **C** | 10.06104 | 41.32726 | NA |
| **A1** | 1.522940 | 63.89431 | 3.176540 |
| **B2** | 0.002263 | 42.54713 | 7.583658 |
| **A4** | 0.620802 | 27.36112 | 3.062022 |
| **A6** | 1.013098 | 44.65652 | 3.351620 |

The Variance Inflation Factors (VIF) test was used to assess the absence of multicollinearity. As shown in Table 5, all variables have VIF values less than 10, indicating that there is no multicollinearity problem in the model.

After checking the Gauss-Markov conditions, the correctness of the model specification was tested using the Ramsey RESET test.

**Table 5. Test for Correct Specification of the Model**
***Source:*** *Authors' own work.*

**Ramsey RESET Test**
**Equation: UNTITLED**
**Specification: ROE C A1 B2 A4 A6**
**Omitted Variables: Squares of fitted values**

| | Value | df | Probability |
|---|---|---|---|
| **t-statistic** | 0.505986 | 97 | 0.6140 |
| **F-statistic** | 0.256022 | (1, 97) | 0.6140 |
| **Likelihood ratio** | 0.271500 | 1 | 0.6023 |

The null hypothesis posed in the Ramsey test states that the model specification is correct, and since in Table 6 Prob(F) = 0.61 > 0.05, the null hypothesis is accepted.

Thus, the Gauss-Markov conditions are satisfied. The model is statistically significant at the 1% significance level (Prob(F-stat) = 0.00 < 0.01, Table 2), and given that adj. $R^2$ = 0.3001, 30.01% of the variation in the dependent variable is explained by the variables included in the model.

As a result of the above assessments, the multiple linear regression equation takes the following form.

$$\widehat{ROE} = 3.15 + 4.19 \times A_1 - 0.09 \times B_2 - 3.70 \times A_4 + 3.52 \times A_6 \quad (2)$$

Since $A_1$, $A_4$, and $A_6$ represent the logarithmic series of the corresponding explanatory variables by country, to accurately explain the magnitude of their effects, let us calculate how the logarithmic value (A) changes as a result of a 1% increase in any variable (denoted as B^).

**Digitalization process of commercial banks in Armenia**

In recent years, commercial banks in the Republic of Armenia have been actively developing strategies for attracting and servicing "digital" customers, while also expanding the scope of digital services.

Fast Bank, as an innovative and digital bank, offers a virtual space-Fspace-designed for active internet users and those ready for digital transformation. In Fspace, the bank's customers can communicate with the avatars of bank employees through private

talk, create their own avatars, and interact with others present in the platform. This allows them to be present at Fast Bank at any time and from anywhere in the world.

According to Ameriabank's 2023 annual report, the share of transactions conducted through remote and digital channels amounted to 98% of all transactions, while the usage rate of internet banking reached 72%. The volume of transactions carried out via mobile and internet banking systems increased by 110% compared to the previous year. Ameriabank provides a detailed overview of the opportunities created through digital transformation. In particular, the bank's website states that it is currently possible to order a payment card that does not have a physical form within a few minutes. The MyAmeria application allows users to withdraw cash from ATMs using a generated code. In other words, the generated code can be sent, for example, to a related individual in need of cash at a given moment, enabling them to easily withdraw the specified amount from an ATM.

The positive response of customers to the introduction of such services by banks is reflected in their level of interest and willingness to use these services. Although public data on the volume of digital service implementation is not yet available for all banks in Armenia, Ameriabank reports that in 2023, 95% of consumer loans were issued online. Thus, digital transformation in the banking sector is not merely a matter of technological adoption but also a strategic imperative for institutions seeking to maintain relevance and competitiveness in an evolving digital world (F. Kitsios, I. Giatsidis, M. Kamariotou, 2021).

In the digital environment developed by IDBank, a distinctive tool for establishing positive relationships with customers is the digital loyalty unit, idcoin, which customers can earn in the Idram&IDBank app by participating in campaigns, loyalty programmes, offers, or simply by being a bank client. Currently, money transfer conditions via digital platforms in Armenia have become considerably simpler, as demonstrated by Arca payment organisation's innovative product Arca Pay, introduced in November 2024. It is a simple, fast, easy, and secure platform allowing customers of Armenian banks and payment organisations to make instant transfers via phone number. Ameriabank, Evocabank, and Converse Bank were the first banks to connect to this system.

Thanks to such strategies, as of 2023, 40.3% of the population has made payments digitally. Considering that those holding bank accounts constitute 52.3% of the total population, this percentage is essentially a fairly strong indicator.

**Risks of digital transformation in the banking system**

In general, risk is inherent in any activity aimed at generating profit. In this context, based on empirical analysis, some authors have concluded that if banks actively pursue profit, they will increase their risks (Ying, Z., and Zhang, X. H., 2020). Research shows that in the process of using digital technologies for business growth and process innovation, commercial banks face more risks than other participants of the financial markets (S. Chen et al., 2021). Among the multitude of risks, cyber risk poses a significant threat (Nadeau, J., 2021). Cybercrimes can lead to a decline in

banks' key financial indicators, damage to their reputation, and loss of customer trust (Bouveret, A., 2018).

According to an article published by Armenian Public Radio, cybercrimes in Armenia increased by 103% in 2021 compared to 2019, with a large proportion being financial crimes (65%). These include extorting money through fraudulent access to bank card details, obtaining funds from individuals on blacklists by providing loans and then disappearing, among others.

Although cybercrimes occur in nearly all countries, it must be acknowledged that their occurrence also depends on the financial literacy level of the target (customer). Besides customers, banks themselves are also subjected to cyberattacks. The fear of major cyberattacks on banks has increased since hackers successfully stole 81 million dollars from the Central Bank of Bangladesh in February 2016 (S&P Global, Market Intelligence, 2016). Shortly thereafter, officials from the Central Bank of Russia revealed that hackers had stolen more than 31 million dollars (at the time, 2 billion rubles) from the country's Central Bank and commercial banks (S&P Global, Market Intelligence, 2016). A report published in January 2020 and revised in 2021 by the Federal Reserve Bank of New York notes that the risk of consequences from cyberattacks is high due to the interconnectedness of the banking system. The report states that a cybercrime targeting one of the five most active banks in the United States could affect 38% of the overall banking system (Federal Reserve Bank of New York, 2020).

While legislation and regulatory mechanisms are vital in combating cybercrime, awareness-raising initiatives by supervisory authorities are equally important. Events like the Central Bank of

Armenia's annual CyberGEN conference, supported by the Armenian Agency for Information Systems, foster knowledge exchange and skill development in cybersecurity among youth, promoting secure digital solutions.

Digitalisation introduces new compliance risks. As banks collect extensive customer data, they become more susceptible to cyberattacks, increasing the risk of violating data protection laws such as the EU's General Data Protection Regulation (GDPR), which mandates strict consent and data handling protocols.

Moreover, the rise of cryptocurrency transactions complicates regulatory oversight. Countries like Japan, the UK, and Australia have adopted legal frameworks to address these risks. A key tool in this context is the Know Your Customer (KYC) standard, which verifies clients' identities and profiles to mitigate AML/CFT risks. However, the anonymity of crypto transactions limits their traceability, prompting many countries to restrict their use and thereby reduce associated compliance risks.

## Conclusion

Thus, the economic interpretation of the regression results concludes that, all else being equal, a 1% increase in the proportion of the population borrowing from official financial institutions or mobile money accounts leads to a 0.018 percentage point increase in the profitability of the global banking system ($4.19 \times 0.0043$).

The results indicate an inverse relationship between variables $B_2$ and $A_4$ and ROE. Specifically, a 1 percentage point increase in the share of the global population making digital payments results in a 0.09 percentage point decrease in banking system profitability,

while a 1% increase in the share of individuals making online purchases via mobile phones or the internet leads to a 0.0159 percentage point decrease in global banking system profitability (3.70 × 0.0043).

Conversely, a 1% increase in the share of people transferring funds via mobile phone or the internet results in a 0.152 percentage point increase in banking system profitability.

Thus, as a result of digital technology transformation, banking activities and other financial services are migrating to the digital realm. Numerous banks, through rebranding, are beginning to adapt to the digital environment, address digital challenges, attract digital customers, and thereby contribute to the development of the digital economy.

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# ԹՎԱՅԻՆ ՏԵԽՆՈԼՈԳԻԱՆԵՐԻ ՓՈԽԱԿԵՐՊՄԱՆ ԱԶԴԵՑՈՒԹՅՈՒՆԸ ԲԱՆԿԱՅԻՆ ՀԱՄԱԿԱՐԳԻ ՎՐԱ

**Գոհար Կոստանյան**
Հայաստանի պետական տնտեսագիտական համալսարան
դոցենտ, տ.գ.թ.

**Վահե Ասատրյան**
Հայաստանի պետական տնտեսագիտական համալսարան
մագիստրոս

**Սվետլանա Շախանումյան**
Հայաստանի պետական տնտեսագիտական համալսարան
մագիստրոս

**Բանալի բառեր** - թվային փոխակերպումներ, բանկային համակարգ, ֆինանսական տեխնոլոգիաներ, կապիտալահատույց:

Հետազոտությունում գնահատվում են թվային տեխնոլոգիաների փոխակերպող ազդեցությունը համաշխարհային բանկային համակարգի վրա՝ հատուկ ուշադրություն դարձնելով Հայաստանի Հանրապետությանը: Նպատակը կրկնակի է՝

բացահայտել և վերլուծել բանկային ոլորտում թվայնացումը խթանող տեխնոլոգիական համակարգերը, և էմպիրիկ կերպով գնահատել թվային ներդրման և բանկերի շահութաբերության միջև եղած կապը՝ օգտագործելով էկոնոմետրիկ մեթոդներ:

Ուսումնասիրությունը կիրառում է խառը մեթոդների մոտեցում՝ համատեղելով թվային տեխնոլոգիաների ներդրման միտումների որակական վերլուծությունը քանակական էկոնոմետրիկ մոդելավորման հետ: Այն օգտագործում է համաշխարհային և հայկական ֆինանսական համակարգերից ստացված տվյալներ՝ որպես կախյալ փոփոխական օգտագործելով սեփական կապիտալի եկամտաբերությունը (ROE): Մշակվել է բազմակի գծային ռեգրեսիայի մոդել՝ օգտագործելով EViews-ը՝ Համաշխարհային բանկի Global Findex տվյալների բազայից 104 երկրների համար ստացված թվային օգտագործման ցուցանիշների միջև վիճակագրորեն նշանակալի կանխատեսող գործոնները բացահայտելու համար:

Հետազոտության արդյունքները հաստատում են, որ թվային տեխնոլոգիաները, մասնավորապես՝ բջջային դրամական փոխանցումները և ֆորմալ ֆինանսական հաստատություններից փոխառությունները, դրականորեն ազդում են բանկերի շահութաբերության վրա: Հակառակը, թվային գնումների աճը կապված է կարճաժամկետ շահութաբերության նվազման հետ, հավանաբար տեխնոլոգիական հարմարվողականության անցումային ծախսերի պատճառով:

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