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**Impact of Digital Transformation on Bank Stability:
An Econometric Analysis of the Banking
Sector in Bangladesh**

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ABSTRACT

For a resilient financial system, policymakers need to understand the factors that influence bank stability in a country context. This study aims to identify the determinants of bank stability in an emerging economy context and examine the impact of digital transformation on bank stability. A panel data analysis of Bangladeshi commercial banks over 10 years (2015-2024) was conducted to examine the impact of digital transformation (DT) on bank stability. Both fixed and random effects are used in analyzing data. The empirical results identify that the capital adequacy ratio, equity-to-asset ratio, advance-to-deposit ratio, operating income-to-operating expense ratio, and bank size are bank-specific, whereas GDP growth and inflation are macroeconomic determinants of bank stability. This study also confirms that DT has a positive and significant effect on bank stability. The paper's originality lies in examining the association between digital transformation and bank stability in an emerging country context, while accounting for both bank-specific and macroeconomic determinants. This study will pave the way for making the banking sector sustainable by effectively addressing bank stability factors and leveraging the positive, significant role of digital transformation, thereby strengthening the financial system of an emerging economy.

KEYWORDS

Digital Transformation, Bank Stability Determinants, Panel Data Analysis, Emerging Economy.

JEL: G21, E58, O16, O33.

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1. Introduction

As commercial banks serve as intermediaries, providing both operating and investment capital from surplus units to deficit units within the economy, they are considered an important facilitator in a country's economic system (Babar et al., 2019). Bank stability is of utmost importance for safeguarding the overall financial system and nurturing consistent economic growth (Liang et al., 2025). The stability of a bank is determined by its capacity to absorb external shocks or withstand financial disruptions, while maintaining adequate solvency and liquidity (Demirgüç-Kunt & Detragiache, 2022). It can be achieved by ensuring stability in the banking system (Brunnermeier et al., 2009). Digital Transformation (DT) in banking is viewed as a catalyst for change, as it can drive revolutionary developments in the financial sector through its efficiency and productivity (Ozili, 2018). DT is the application of digital technologies to a bank's products, services, business models, and strategies to innovate and transform fundamental operations (Ulrich-Diener et al., 2025; Xie & Wang, 2023). DT plays a crucial role in enhancing the resilience and risk-taking capacity of a bank by facilitating the digitization of its business processes, which ultimately strengthens its overall stability (Liang et al., 2025; Ahamed & Mallick, 2019).

To create a resilient financial system, policymakers, regulators, and industry players need to understand the factors that influence bank stability (Hordofa, 2024). Bank stability determinants and their effects on the overall financial ecosystem diverge across countries worldwide. Policymakers and bank supervisors are interested in understanding these determinants in their country-specific context. The regulation of banking in developed economies mostly relies on capital adequacy, which is insufficient for achieving bank stability in developing economies (Ozili, 2018). In recent times, the banking sector in Bangladesh has been facing significant challenges, including a liquidity crisis, rising non-performing loans, and governance issues. However, technological advancements in banking operations are paving the way for greater stability in the near future. The banking sector is increasingly adopting innovative technologies for improving customer service and operational efficiency. Bangladesh Bank, the country's central bank, is facilitating this transformation by introducing technology-enabled banking services.

Although identifying bank stability determinants is essential for banking entities and their regulators, studies that consider both entity-specific and macroeconomic variables in the context of emerging economies, such as Bangladesh, are scarce in the existing literature. Moreover, despite evidence of DT's importance, knowledge of its impact on bank stability remains minimal. In almost all cases, prior scholarship has addressed DT innovation only in limited contexts or through opinion-based assessments. In contemporary banking and financial literature, evidence of DT's impact is mainly confined to commercial bank performance. Although DT is crucial for the banking sector, its impact on bank stability has not been assessed in the existing literature. This creates a gap in banking literature. This study aims to fill the gap.

The objectives of the study are to i) find out the determinants of bank stability considering both entity-specific and macro-economic variables, and ii) examine the impact of DT on bank stability in the context of an emerging economy like Bangladesh.

To address recent challenges in Bangladesh's banking sector, improving bank stability is vital to its future growth and sustainability. To examine the effect of DT on bank stability, we control for determinants of bank stability and subsequently incorporate DT in the model, providing evidence that DT is a significant factor.

The analysis of panel data of the listed commercial banks in Bangladesh for 10 years (2015-2024) using fixed and random effects models identifies the capital adequacy ratio, equity-to-asset ratio, advance-to-deposit ratio, operating income-to-operating expense ratio, and bank size as bank-specific, whereas GDP growth and inflation are macroeconomic factors of bank stability. This study also confirms that DT has a positive and significant effect on bank stability. The findings of this study will pave the way for making the banking sector more sustainable by effectively addressing factors affecting bank stability, thereby strengthening the financial system of an emerging country.

2. Literature Review

Bank Stability

Bank stability is the maintenance of steadiness in a country's overall banking system, avoiding the possibility of banking crises by the system's resilience to absorb any unwanted

shock (Brunnermeier et al., 2009). There are bank-specific and macroeconomic factors in determining bank stability from a country perspective (Alam, 2024).

Bank Stability Determinants

The risks of the banking business are not uniform across the world. Even the dimensions of risk change over time. Bank stability determinants differ across regions and periods. Table 1 presents these determinants as identified in the existing literature.

Table 1: Determinants of Bank Stability

Authors	Region/Country of study	Study Period	Bank Stability Determinants
Liang et al. (2025)	187 commercial banks in China	2010–2021	Total assets, operational efficiency (asset turnover), NPL, loans/asset, non-interest income/operating income, liabilities/asset, loan provisioning ratio, and digital transformation.
Hordofa (2024)	Ethiopia	1991–2022	GDP growth, remittance inflows to GDP, inflation, and financial development.
Alam (2024)	42 banks in Bangladesh	2012–2022	Capital adequacy, loan loss reserve to total loan, operating expense to operating income, income diversification, bank competition, profitability (ROE), and bank size.
Antwi & Kong (2023)	55 developing economies	2000–2020	Bank concentration, financial development, trade openness, and economic growth.
Wang & Luo (2022)	36 emerging economies from Latin America, Asia, and Central and Eastern Europe	2004–2018	Size (total asset), liquidity, noninterest income to total income, efficiency, equity to total assets, ownership of bank, market structure, money market interest rate, deposit insurance (dummy variable), bank regulation, crisis (dummy variable), and GDP growth.
Yensu et al. (2021)	8 banks of Ghana	2008–2017	Bank size, interest coverage, net profit margin, CEO gender, board size, frequency of board meetings, inflation, GDP growth, and Bank rate.
Banna et al. (2020)	183 banks of 22 countries	2011–2018	Bank size, loan ratio, management quality, loan loss provision ratio, revenue diversification, capitalization (equity ratio), GDP growth, and good governance.
Jahanet et al. (2019)	28 banks in Bangladesh	2012–2016	Non-interest income-to-non-interest expense ratio, net interest income-to-revenue ratio, capital-to-risk-weighted asset ratio, and debt-to-asset ratio.
Miah et al. (2019)	20 banks of Bangladesh	2002–2013	Size, equity level (equity to assets), provisions for loans & leases, statutory reserves, and liquidity.
Ozili (2019)	Nigeria	2003–2016	Bank efficiency, financial depth, regulatory capital ratios, NPL, and banking concentration.
Ali & Puah (2019)	24 banks of Pakistan	2007–2015	Bank size, credit risk, return on assets, liquidity risk, and financial crisis
Ozili (2018)	48 African countries	1996–2015	Banking efficiency, banking concentration, size of banking sector, foreign bank presence, investor protection, government effectiveness, regulatory quality, corruption control, political stability, and unemployment levels.

Source: Author's compilation.

Digital Transformation (DT)

In the existing literature, several quantitative measures are used to quantify DT. Table 2 exhibits a list of literature that used DT as a variable.

Table 2: Digital Transformation as a variable in existing literature

Author	Study Area	Components considered as DT variable	Represented by DT variable
<i>Secondary Data</i>			
Kriebel & Debener (2020)	Stock Exchange-listed U.S. banks	Textual analysis of banks' annual reports.	DT activity.
Tran et al. (2022)	Two banks in Hungary	Digitization-related keywords from public disclosure.	The process of DT.
Ding & He (2023)	194 banks in China	Keywords related to DT in the bank's annual report.	Digital technology.
Nguyen et al. (2023)	26 Listed banks on the Stock Exchange of Vietnam	Text analysis (Technology, Internet, digitization, Fintech, ATM, etc.) on bank annual reports.	Level of DT.
Herath & Gamlath (2025)	10 licensed commercial banks of Sri Lanka	Internet, mobile banking, debit/credit card, and cloud computing.	Number of digital transactions.
Podder & Ghosh (2025a)	All listed commercial banks of India	A comprehensive framework, considering a bank's strategic transformation level, technological spending, and digital transactions.	DT as an index.
<i>Survey/Questionnaire/Expert view</i>			
Al Shanti & Elessa (2023)	212 respondents from Jordanian banks.	Expert opinions of the financial managers, auditors, and financial analysts.	DT towards the application of blockchain technology.
Salih et al. (2024)	29 Iraqi private banks	Questionnaires.	Driving forces of DT.
<i>Both Primary and secondary data</i>			
Xie & Wang (2023)	199 Chinese commercial banks	Strategy, business, and management transformation.	DT.

Source: Author's compilation.

Moreover, there is extensive literature that uses variables similar to DT (not exactly DT) across different research works. For example, Al-Azzawi and Altmimi (2015) included non-interest expenses and other operating expenses for IT equipment. Medyawati et al. (2021) used the number of ATM (automated teller machines), internet, and mobile banking transactions. Rao and Kumar (2019) used NEFT (National Electronic Funds Transfer), RTGS (Real-Time Gross Settlement), and mobile transactions. Chhaidar et al. (2022) used the frequency of DT-related keywords in annual reports. In addition, several scholars (Siddik et al., 2016; Islam et al., 2019) employed a dummy variable to express the presence of electronic banking.

However, in practice, it is not feasible for all banks that invest in a particular year to observe the outcome the following year. The dummy-variable methodology is therefore inadequate to capture the holistic impact of DT. Moreover, the dummy cannot distinguish between a bank that adopts DT intensively and one that adopts it minimally (Chhaidar et al., 2022). An additional problem is that while some studies considered only one item, others used more than one. A partial consideration of DT is misleading and insufficient to confound its impact.

Digital Transformation and Bank Stability

Antwi & Kong (2023) found that digital finance technology affects bank stability in developing economies. In their study, they considered mobile phone subscription and internet usage as proxies for digital finance technology. They found a negative impact in the first case and a positive effect in the latter case.

Liang et al. (2025) found that digital finance enhances a bank's profitability and risk-taking capacity, thereby strengthening its stability. However, Syed et al. (2021) observed that digital finance increases the likelihood of systemic risks, provoking financial instability. Hordofa (2024) also found that DT adversely affects banking stability.

There is no conclusive finding in the literature regarding the association between DT and bank stability. Prior studies are primarily descriptive. In a few cases, the quantitative approach is confined to partial consideration of DT.

3. Hypothesis Development

DT makes banking operations digital. Customers can access a bank's virtual platform to conduct their necessary transactions, thereby enabling the bank to expand its business volume without requiring additional branches or staff. It helps banks make additional profit from expanded business and reduced expenses.

As part of DT, with analytics, it is possible to select the right clients for loan sanctioning and disbursement, thereby reducing the risk of default. It reduces non-performing loans. As a consequence, banks have more available funds to invest, which increases their scope to earn higher profits.

The more a bank becomes digital, the more it can run its operation without errors. With the help of analytics, it is also possible to identify customer-specific innovative banking products, creating scope to better manage their portfolios and increase their profitability and efficiency.

Usually, capital grows gradually in a profitable and efficient bank, as there is no requirement to create provisions for or write off bad loans. When a bank manages its funds properly, without eroding capital through bad loans, achieves consistent growth, and becomes profitable, it becomes a stable institution. So, we hypothesize:

Hypothesis: The stability of commercial banks is positively associated with DT.

4. DATA AND EMPIRICAL FRAMEWORK

4.1 Variables

Dependent Variable (Bank Stability)

We use the Z-score (Laeven & Levine, 2009) to assess each bank's stability in each quarter.

$Z - Score_{i,t} = \frac{ROA_{i,t} + EQT_{i,t}}{\delta(ROA)_{c,t}}$, where, $ROA_{i,t}$ = The return on assets (ROA) of the bank i in year t ; $EQT_{i,t}$ = The equity to assets ratio of the bank i in year t ; and $\delta(ROA)_{c,t}$ = The standard deviation of ROA of all banks in the country in the period t .

Independent Variables

Primary Independent Variable

Digital Transformation

Following the methodology of Podder & Ghosh (2025b), the DT index for each bank under study has been calculated annually using a comprehensive framework (Table 3) that considers a bank's strategic transformation level and technological spending.

Table 3: Digital Transformation

Com- ponent	Level	Measurement
TAS	DT Strategy	$TAS_{t,1} = \{TAS'_{t,i} / \sum_{i=1}^m (TAS'_{t,i})\} \times 100$, $TAS'_{t,i} = \ln \left\{ 100 \times \sum_{j=1}^M \left(\frac{t_f}{n_t} \right) \right\}$, where, $TAS_{t,1}$ is the text analysis score of the bank i in year t ; $TAS'_{t,i}$ is the primary text analysis score of the bank i in year t ; m is the number of banks under study; t_f is the term frequency of the DT-related keyword j in the investigated report, n_t is the number of total words in the investigated report and M is the total number of keywords (digital, online, mobile, cyber, internet, information technology, fintech, information system, social media, artificial intelligence, blockchain, big data, computing, robotic, and hack) tested in the investigated report.
DTSS	DT Imple- mentation	$DTSS_{t,i} = (DTSS'_{t,i} / \sum_{i=1}^m DTSS'_{t,i}) \times 100$, $DTSS'_{t,i} \approx \{(Opexp - Stexp)_w \times (NII_w / TA_w)\}_{t,i}$, where $DTSS_{t,i}$ = DT spending score of i bank in the year t , $DTSS'_{t,i}$ = Primary DT spending score of i bank in the year t , $Opexp$ = Operating expense, $Stexp$ = staff expense, NII = Net Interest Income, TA = Total Asset; $(NII_w)_{t,i}$ = weightage of NII of i bank in the year t ; $(TA_w)_{t,i}$ = weightage of TA of i bank in the year t ; m = No of banks under study.

Note: A bank's DT is the average of the two components: the Text Analysis Score (TAS) and the Digital Technology-related Spending Score (DTSS).

Source: Podder & Ghosh (2025b).

Control Variables

In examining the effects of DT on bank stability, we include several control variables consistent with the banking literature.

Bank-specific controls

(i) Capital Adequacy ratio (CAR): It is a financial metric that measures a bank's capital relative to its risk-weighted assets. It is measured by dividing a bank's total capital (Tier 1 and Tier 2) by its risk-weighted assets.

(ii) Equity-asset ratio: This ratio measures the proportion of a bank's assets that are funded by its shareholders' equity, indicating its level of financial leverage and stability.

(iii) Advance-deposit ratio: This ratio expresses the ratio of advances given to customers with respect to the total deposits collected from the depositors of a bank. It shows how effectively banks use their deposits for lending and investment. If the ratio is very low, banks may not earn an optimal return, whereas if it is too high, the banks may not have enough liquidity to cover unexpected funding needs (Puspitasari et al., 2021).

(iv) Operating income-operating expense ratio: Operating income of a bank refers to the revenue it earns from its primary business activities – interest income from loans exceeding the interest paid on deposits and non-interest income, including commission, investment income, exchange, and brokerage fees. Operating expenses of a bank refer to the costs incurred in its day-to-day operations, including directors' fees, employee salaries, stationery, fixed assets, information technology, legal fees, and consulting services (Kovner et al., 2014). The operating income-operating expense ratio of a bank is calculated by dividing its operating income by its operating expenses.

(v) Bank size: A bank's total asset is considered to be an indicator of its size. We have used the logarithmic transformation of total assets in the analysis.

Macroeconomic controls

vi) GDP growth: Annual growth rate (in %) of Gross Domestic Product of a country.

(vii) Inflation: Annual change (in %) in the cost to the average consumer of acquiring a basket of goods and services.

In Table 4, we have shown the variables, their elaborations, and the data sources.

Table 4: Variable description

Variable	Definition	Expected Sign
<i>Dependent Variable</i>		
Bank Stability	Z-score (described in the methodology section)	
<i>Primary Independent Variable</i>		
DT	Digital Transformation (Table 1)	+
<i>Controls</i>		
CAR	Capital Adequacy Ratio [(Tier 1 capital + Tier 2 capital)/Risk-weighted Assets]	+
EquityAsset	The ratio of total equity to total assets	+
Advdep	The ratio of total advance to total deposit	+
Opelnc OpeExp	The ratio of operating income to operating expense	+
Size	The logarithmic transformation of total assets	–

Variable	Definition	Expected Sign
GDPGrowth	Annual percentage growth rate of GDP at market prices based on constant local currency	+
Inflation	Annual percentage change in the cost to the average consumer of acquiring a basket of goods and services.	+

Source: Author.

4.2 Data

This study considered 33 scheduled Bangladeshi commercial banks listed on the stock exchanges. All data are annual and span a decade, from 2015 to 2024. We collected secondary data from the banks' annual reports (2015-2024) and the World Bank.

4.3 Determinants of bank stability

Mathematically, the equation for finding out the determinants of bank stability is as follows:

$$Y = a + b_1x_1 + b_2x_2 + b_3x_3 + b_4x_4 + b_5x_5 + \mu$$

Where, Y = Bank Stability, a = Constant term, b_1 to b_5 = Regression coefficients for respective variables, x_1 = Capital adequacy ratio, x_2 = Equity to assets ratio, x_3 = Advance to deposit ratio, x_4 = Operating income to operating expense ratio, x_5 = Size of the bank, x_6 = GDP growth, x_7 = Inflation, μ = Error Term.

4.4 Empirical Framework

To examine the impact of DT on bank stability, we control for determinants of bank stability, then add DT to the model, and provide evidence that DT is a significant factor affecting bank stability.

Our empirical model estimates the bank- and country-specific determinants of bank stability. We extend the model with the DT variable. Thus, our model is positioned as follows:

Model 0: Base Model

$$Bank\ Stability_{i,t} = \alpha + \beta_1 Control\ variables_{i,t} + \varepsilon_{i,t}$$

Model 1: Including Primary Independent Variable (DT)

$$Bank\ Stability_{i,t} = \alpha + \beta_1 DT\ Index_{i,t} + \beta_2 Control\ variables_{i,t} + \varepsilon_{i,t}$$

We have provided detailed model identification in Table 5.

Table 5: Identification of the Models

Model	Dependent Variable	Model Description
0	Bank Stability	Base Model with controls: (1) CAR, 2) EquityAsset, 3) AdvDep, 4) OpeInc OpeExp, 5) Size, 6) GDPGrowth, 7) Inflation.
1	Bank Stability	Include the primary independent variable DT with Model 0

Source: Author.

We have provided the descriptive statistics and correlations in Tables 6 and 7.

Table 6: Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
BankStability	330	2.273	1.663	-3.941	12.961
DT	330	3.03	6.249	-94.701	32.635
CAR	330	.132	.049	-.268	.275
EquityAsset	330	.071	.026	-.067	.214
AdvDep	330	.973	.121	.608	1.577
OpeInc OpeExp	330	2.054	1.081	-10.855	4.703
Size	330	4.466	.312	3.31	5.347
GDPGrowth	330	.063	.013	.034	.079
Inflation	330	.068	.018	.055	.105

Source: Author with Stata 19.5.

Table 7: Matrix of correlations

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
(1) BankStability	1.000								
(2) DT	0.163	1.000							
(3) CAR	0.338	0.121	1.000						
(4) EquityAsset	0.722	-0.048	0.487	1.000					
(5) AdvDep	-0.262	-0.081	-0.416	-0.346	1.000				
(6) OpeInc_OpeExp	0.252	0.178	0.228	0.217	-0.139	1.000			
(7) Size	-0.543	0.087	-0.143	-0.658	0.214	-0.047	1.000		
(8) GDPGrowth	0.166	0.000	0.090	0.168	-0.020	0.160	-0.166	1.000	
(9) Inflation	-0.274	0.000	-0.141	-0.262	0.192	-0.245	0.288	-0.445	1.000

Source: Author with Stata 19.5.

4.5 Research method

We use panel data analysis, incorporating both fixed- and random-effects models, to capture within-unit variation (changes within the same subjects over time) and between-unit variation (differences among subjects) (Baltagi, 2008; Hsiao, 2007).

The assumptions of the fixed effects model are described as follows: i) Some factors within the individual may impact the independent variables, ii) the time-invariant characteristics are unique to the individual and should not be correlated with other individual characteristics. Fixed-effects models are used to control for omitted-variable bias due to unobserved

heterogeneity that is constant over time. These models help remove this heterogeneity from the data, ensuring more accurate estimates. The equation for the fixed effects model is described as follows:

$$Y_{it} = \alpha_i + \beta_i X_{it} + \varepsilon_{it},$$

Where, Y_{it} is the dependent variable; $i = \text{individual bank}$, $t = \text{year from 2015 to 2024}$; α_i ($i = 1 \dots 33$) is the intercept for each bank; X_{it} represents the independent variables and controls; β_i is the coefficient for the explanatory variables; and ε_{it} is the error term.

The assumptions of the random effects model are specified as follows: i) the variation across individual entities is random and uncorrelated with the explanatory variables, and ii) the entity error term is not correlated with the explanatory variables. The random effects model includes time-invariant variables. The equation for the random effects model is given below:

$$Y_{it} = \alpha + \beta_i X_{it} + u_{it} + \varepsilon_{it},$$

where $i = \text{individual bank}$, $t = \text{year from 2015 to 2024}$, α is the intercept, Y_{it} is the dependent variable, X_{it} represents the explanatory variables, β_i is the coefficient for the respective explanatory variables, u_{it} is the specific impact of an individual bank i^{th} , and ε_{it} is the error.

The unobserved bank heterogeneity may arise from time-invariant factors correlated with DT. These include, for instance, corporate governance (Zareie et al., 2024), corporate social responsibility (Meng et al., 2022), and bank ownership (Roy & Thangaraj, 2020). The fixed-effects transformation removes the effects of these heterogeneities. Next, the unobserved time-invariant effect, which is uncorrelated with DT, includes bank board members' qualifications (Fakhruddin et al., 2020) and bank employees' education level (Makinde et al., 2018). The associated random-effects transformation removes these time-fixed factors.

We conducted the Durbin-Wu-Hausman (DWH) test (Hausman, 1978) to determine the appropriate model (Dougherty, 2011). We also perform the Breusch-Pagan test (Breusch & Pagan, 1980) to examine the presence of random effects.

We used standardized regression coefficients to facilitate comparison (Siegel & Wagner, 2022). We investigated whether endogeneity affected our analyses. It signifies the presence of any unobserved factor that influences the bank stability and the DT relationship. We further performed the heteroskedasticity test (White, 1980). Several other diagnostic tests have been conducted to find out the validity of each of the models, such as with the variance inflation factor (VIF), it has been checked whether there is any multicollinearity in the models; with the Durbin Watson test (Durbin & Watson, 1971) and the Breusch-Godfrey test (Breusch, 1978; Godfrey, 1978), it has been checked whether there is autocorrelation.

5. Results and Discussions

The results (Model 0 in Table 8) show the prominent determinants of bank stability. We found that the capital adequacy ratio, equity-to-assets ratio, advances-to-deposits ratio, operating income-to-operating expenses ratio, and bank size are bank-specific determinants. Moreover, GDP growth and inflation are macroeconomic determinants for bank stability.

Table 8: Panel Data Analysis Results

Dependent Variable: Bank Stability

Model	Model 0		Model 1	
Variables	Fixed Effect	Random Effect	Fixed Effect	Random Effect
DT			0.190*** (0.03)	0.197*** (0.04)
CAR	0.125** (0.05)	-0.011 (0.05)	0.119** (0.05)	-0.036 (0.05)
EquityAsset	0.565*** (0.07)	0.627*** (0.06)	0.552*** (0.07)	0.645*** (0.06)
AdvDep	0.219*** (0.06)	-0.002 (0.04)	0.203*** (0.05)	0.008 (0.04)
OpeInc_OpeExp	0.144*** (0.04)	0.100** (0.04)	0.106*** (0.04)	0.066* (0.04)
Size	-1.310*** (0.12)	-0.139** (0.06)	-1.343*** (0.12)	-0.134** (0.05)
GDPGrowth	-0.074** (0.04)	0.002 (0.04)	-0.071** (0.03)	0.003 (0.04)
Inflation	0.229*** (0.04)	-0.046 (0.04)	0.229*** (0.04)	-0.056 (0.04)
Constant	0.000 (0.03)	0.000 (0.04)	0.000 (0.03)	0.000 (0.04)

Model	Model 0		Model 1	
Variables	Fixed Effect	Random Effect	Fixed Effect	Random Effect
Number of Banks	33	33	33	33
Observations	330	330	330	330
R-squared within	0.6621	0.5464	0.6947	0.5672
R-squared between	0.6497	0.8175	0.6590	0.8577
Overall R-squared	0.4040	0.5441	0.4223	0.5810
F-statistics/Wald χ^2	81.18***	376.59***	82.22***	439.62***
F-test	6.01***		6.25***	
Hausman's Test		112.04***		219.07***

Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1; Best models are shown in bold.

Source: Author's computations using STATA 19.5.

In Model 0, we performed the regression using only the control variables. The significant control variables turned out to be the capital adequacy ratio ($\beta = 0.13, p < 0.05$), equity to assets ratio ($\beta = 0.57, p < 0.01$), advances to deposits ratio ($\beta = 0.22, p < 0.05$), operating income to operating expenses ratio ($\beta = 0.14, p < 0.01$), bank size ($\beta = -1.31, p < 0.01$), GDP growth ($\beta = -0.07, p < 0.05$), and inflation ($\beta = 0.23, p < 0.01$). All variables are significant, confirming their role as determinants of bank stability.

Capital plays an important role in absorbing unexpected shocks during economic turmoil. An adequate level of capital is a strength for a commercial bank in the face of instability arising from unforeseen circumstances. The CAR is crucial to ensure that banks have sufficient capital to absorb potential losses and protect depositors' money. Regulators set minimum CAR requirements to prevent banks from becoming insolvent and to maintain financial stability. It is a key component of the Basel Accords, which are global regulatory frameworks that standardize banking regulations worldwide. The higher the CAR, the more stable the bank. The equity-to-assets ratio is also an important factor in bank stability. It is a crucial measure of financial health in evaluating a bank's capital structure and risk profile. A higher equity-to-asset ratio for a bank indicates greater resilience. Again, a higher advance-deposit ratio, a prominent determinant of bank stability, indicates active lending and higher profitability, but it may also signal higher credit risk, as more funds are locked in loans. If the advance-deposit ratio is too high or too low, it indicates the bank's inefficiency and signals instability. The ratio of operating income to operating expenses, another vital determinant of bank stability, indicates a bank's operational

efficiency. Without operational efficiency, a bank cannot be stable. A bank's size is an important factor in its stability. Large banks are more systematically important to the stability of the financial system.

Favorable macroeconomic conditions, with consistent GDP growth and a tolerable inflation rate, can help ensure bank stability. Consistent GDP growth and moderate inflation create a favorable business environment in which banks can play an effective intermediary role by collecting funds from surplus units, disbursing them to deficit units, and recovering disbursed loans from clients. Not only consistent GDP growth, but very high and very low inflation can also impede the recovery of disbursed loans.

Again, the result (Model 1 in Table 8) also shows that DT has a positive and significant influence on bank stability. Model 1 asserts a positive association between bank stability and DT. The hypothesis of our study was supported with high significance ($\beta_1 = 0.19$, $p < 0.01$). On average, a one-standard-deviation increase in a bank's DT index is associated with a 19 per cent rise in stability, indicating that DT significantly enhances bank stability.

With the help of analytics, as part of DT, banks can innovate both deposit and loan products in accordance with clients' specific demands, ensure their availability to those clients, and monitor the recovery process, thereby reducing or mitigating the risks of adverse selection and moral hazard. This reduces banks' non-performing loans. Moreover, innovative business models supported by DT can increase the volume of bank business on its digital platform, without requiring additional physical branches or manpower, thereby increasing banks' profitability. The higher efficiency, profitability, and productivity enabled by DT can help ensure greater bank stability. In this regard, both policymakers and bank management can encourage and initiate appropriate policies to maximize the benefits from the accelerated use of DT in banking.

6. Conclusion, limitation, and areas of further research

This study simultaneously identifies the key determinants of bank stability and examines the impact of DT on bank stability. The findings will help ensure resilience in the banking sector by paving the way for addressing specific determinants of bank stability. For a resilient financial system, policymakers need to understand the factors that influence bank stability in a country

context. The identified bank-specific determinants, such as the capital adequacy ratio, equity-to-asset ratio, advance-to-deposit ratio, operating income-to-operating expense ratio, and bank size, require the bank's management to focus on improving bank stability from the bank's perspective. Moreover, macroeconomic determinants, such as GDP growth and inflation, should be monitored by the central bank and other policymakers to ensure bank stability. Furthermore, examining DT's positive and significant impact will help policymakers in their strategic decision-making and encourage industry players to invest in DT to accelerate bank stability.

Although this study has very impressive findings, it has a few limitations. This study considers the banking sector of a single economy. If it could be extended to several emerging economies, the results would become generalized.

Studies on moderating factors, such as bank size, age, and ownership, in the relationship between DT and bank stability are areas for further research.

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