

# Factors Affecting Return on Assets (ROA) in the Banking Sector of Selected Arab Countries: Is There a Role for Financial Inclusion and Technology Indicators?

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Received: June 16, 2023

Accepted: July 14, 2023

Online Published: July 25, 2023

doi:10.5539/ijef.v15n9p1

URL: <https://doi.org/10.5539/ijef.v15n9p1>

## Abstract

The objective of this study is to examine, using a dynamic panel data framework, the effects of financial inclusion on the performance of the banking sector, as measured by the return on assets, for eleven Arab countries during the period 2012-2019. In addition to financial inclusion and technologies indicators, our analysis incorporates banking and macroeconomic variables. The study reveals that bank-specific variables have a greater impact on the profitability of banks than macroeconomic variables. The results show that there is a positive and significant impact of the bank's assets, the bank solvency, the credit growth, the economic growth rate, and the inflation rate on the profitability of the banking sector. However, the return on assets is unaffected by fluctuations in nonperforming loans and the interbank lending rate. Regarding indicators of financial inclusion and technologies, the study finds no evidence of significant effects of automated teller machines (ATM) distribution and bank branch density on return on assets.

**Keywords:** financial inclusion, Arab region, dynamic panel data models, financial soundness indicators, return on assets, generalized method of moments

## 1. Introduction

As the most significant component of the Arab region's financial sector, the banking system plays a vital role in supporting economic activities. Given its significance to the economy, it is necessary to evaluate the Arab banking sector's performance in order to determine its risks. In this regard, the return on assets (ROA) and return on equity (ROE) are the most important ratios for measuring the operational efficiency, performance, and profitability of a bank. The returns of banks increase the capital flows into the financial sector and the level of confidence as well, so this will lead to enhance the ability of the banking sector to absorb potential shocks (Obeid, 2022a). Prior empirical research has examined the effects of a variety of financial and economic variables, including bank-specific variables, monetary policy factors, and macroeconomic variables, on the profitability of banks. To the best of our knowledge, the response of bank earnings to changes in financial inclusion in the Arab region has not received much attention in the literature. To investigate the sensitivity of bank profitability to financial inclusion indicators for a panel of 11 Arab economies over the period 2012-2019, the current study employs a dynamic panel data framework and incorporates financial inclusion indicators into the analysis. The analysis also incorporates bank-specific determinants and macroeconomic factors in addition to financial inclusion proxies.

The paper attempts to investigate the potential relationship between financial inclusion and the performance of commercial banks in the Arab region, and whether financial inclusion and technology indicators are among the determinants of bank profitability or not. Therefore, the study problem can be formulated in the question: What is the impact of financial inclusion and technology indicators on the profitability of Arab banks? To answer this question, the paper tests the following hypotheses: 1) There is no relationship between financial inclusion and profitability in the Arab banking sector. 2) There is no relationship between technology and profitability in the Arab banking sector.

## 2. Literature Review

Several empirical studies in the relevant literature have investigated the effects of financial inclusion on the

profitability of banks. In this context, Eyadat and Kozak (2005) investigate the impact of information technology systems on the cost-effectiveness and earnings of the banking sector. The findings indicate that investments in information technology systems have a positive effect on the profitability of institutions, while decreasing cost effectiveness proportionally to earning effectiveness.

Akhisar et al. (2015) examine the impact of electronic banking services on the return on assets and return on equity for the banking sector of 23 countries during the period 2005-2013. The study reveals positive effects of debit and credit cards, ATM distribution, and branch count on the performance of banks. However, Internet banking and POS have a negative impact on the profitability of institutions.

Ikram (2015) conducts a survey to examine the impact of the use and availability of affordable financial services and products on the earnings of banks in Karachi. The results of the study indicate that there is no correlation between profitability and the considered factors.

Shihadeh et al. (2018) examine the effects of financial inclusion indicators, namely the number of ATMs, the number of ATM services, the number of credit cards, and the number of novel services, on the return on assets for thirteen Jordanian commercial banks during the period of 2009-2014. The impact on bank profitability is dependent on the financial inclusion indicator used. For instance, there is evidence of a positive and statistically significant relationship between the number of ATMs and the return on assets, indicating that this indicator contributes to the improvement of banks' performance.

Ahamed and Mallick (2019) demonstrate that the presence of bank branches in areas with a higher concentration of unbanked individuals and businesses enables a better understanding of their requirements, thereby reducing default risk and non-performing loans and boosting bank earnings.

Jouini et al. (2021) investigate the relationship between the financial inclusion and the return on assets ratio for the Arab region during the period (2013-2019), the study does not find any significant effects of the distribution of ATMs and the number of bank branches on the return on assets.

Kumar et al. (2021), determine the relationship between financial inclusion and profitability of banking sector in Japan during the period from 2004 to 2018. The results show a positive impact of the number of branches (proxy of financial inclusion) on the profitability of banks (ROA and ROE). While the number of loan accounts and ATMs had no significant effects on the profitability of the banks.

Yakubu et al. (2022) reveal that financial inclusion has a negative impact on bank profitability in Sub-Saharan Africa, while the banking sector stability positively influences bank performance. Regarding inflation, the results show that it has a positive effect on profitability, while the impact of economic growth on profitability differs depending on the period of analysis.

Kaya (2022) examine the relationship between financial inclusion and financial performance in the banking sector using dynamic panel data method for 85 developing countries covering the period from 2005-2017. The findings of the study indicate that the relationship between the banking sector profitability (bank return on assets, bank return on equity, and bank net interest margin) and financial inclusion are significantly positive.

Khatib et al. (2022) investigate the potential impact of financial inclusion on the performance of Palestinian banking sector using dynamic panel analysis over the period (2012-2020). The results show that access to financial services (e.g., the number of ATMs and the number of bank branches), service delivery (the average costs to maintain a current account), and the products' quality have a positive impact on banks' profitability. While the point-of-sale (POS) terminal has no significant impact on profitability.

Dahham (2023) measures the relationship between financial inclusion and the profitability of Egyptian banking sector in the period from (2012 to 2020). Banking services and the accessing banking services were used to express the financial inclusion indicators, while the profitability of banks was measured by the return on assets and the return on ownership. The results reveal that financial inclusion has a positive impact on the return on assets and the return on equity.

### 3. Data and Variables

In the literature, the empirical and analytical framework of the financial inclusion impacts on bank earnings in the Arab region are still not sufficient. This is why the current study examines the relationship between the return on assets and a variety of explanatory variables for a panel of 11 countries in the Arab region (UAE, Qatar, Egypt, Oman, Jordan, Lebanon, Morocco, Kuwait, Saudi Arabia, Sudan, and Iraq) using annual data covered the period 2012 to 2019. In our models, the dependent variable will be the return on assets ratio. Regarding explanatory variables, three categories of determinants are considered.

### 3.1 Bank-Specific Characteristics

The size of banks (SIZE) as measured by their assets (in natural logarithm) is anticipated to have a positive effect on the profitability of banks (Kosak & Cok, 2008; Khrawish, 2011). In fact, larger banks are more effective in managing credit risk and provide accurate evaluations for the client. In addition, large banks use their market dominance and business reputation to increase their profits, and they take advantage of their size by cutting costs (Obeid & Adeinat, 2017). Second, we evaluate the solvency proxied by the capital adequacy ratio (CAR), which is anticipated to have a positive effect on the return on assets. In fact, a bank with a high level of capital adequacy would increase customer confidence and attract more deposits, thereby boosting its earnings. The well-capitalized banks are in a stable position in terms of solvency (Athanasoglou et al., 2006).

Third, we examine credit growth (CREDIT), whose correlation with banking profitability depends on the assets management. In fact, the granting of additional credit without any rational evaluation would have a negative impact on the earnings of the bank (Abreu & Mendes, 2000). Due to the efficient management of the loan's portfolio, the relationship between credit growth and bank profits may be positive (Staikouras & Wood, 2004). The ratio of nonperforming loans (NPLs) is expected to have a negative impact on the return on assets. Indeed, the weak credit evaluation and low quality of the credit portfolio assets increase non-performing loans and allow a portion of the liquidity to be used to offset expected credit losses, thereby reducing bank earnings (Iannotta et al., 2007).

### 3.2 Macroeconomic Factors

First, we evaluate the interbank lending rate (ILR), which is anticipated to have a negative impact on the return on assets. For instance, high interest rates may increase the cost of loans and the disposable income for the bank's clients, thus reducing the banks' profits (Obeid, 2022b). Consequently, an increase in the interest rate may reduce the solvency of bank clients, resulting in a decrease in the assets quality, which in turn increases the financial burden on banks to cover credit losses (Obeid & Awad, 2018; Jouini & Obeid, 2020). Second, we include the economic growth rate (GR), which has a positive potential impact on the return on assets. Indeed, a favorable economic environment increases the cash flows of businesses and households, thereby enhancing their solvency (Obeid, 2022b). In addition, a rise in economic confidence would increase the demand for investment loans, thereby boosting the profitability of banks (Obeid & Adeinat, 2017). Thirdly, we examine the inflation rate (INF), which is anticipated to have a negative impact on the return on assets, as high prices may have a negative impact on clients' ability to repay bank loans (Curak et al., 2013). Positivity can also exist between the return on assets and the inflation rate. Indeed, price increases may have a negative impact on the balance sheet of both households and corporate sectors, which may encourage them to borrow more from banks, thereby boosting the profits of banks (Vong & Chan, 2007; and Tan & Floros, 2013).

### 3.3 Financial Inclusion and Technologies Indicators

Numerous studies have found a correlation between the distribution of ATMs and the earnings of banks. Indeed, the variety of electronic channels offered by the banking industry attracts more deposits and improves access to finance, thereby boosting the profitability of banks (Frame & White, 2012). Additionally, the geographical distribution of ATMs may enhance customer loyalty, which could have a positive effect on bank earnings (Monyoncho, 2015). Moreover, the number of bank branches (BRCH) has a positive effect on the profitability of banks (Al-Tamimi, 2010).

Data is collected from various sources. Indeed, data on the ROA, the NPLs ratio, the assets, the credit growth, and the capital adequacy ratio are gathered from the financial stability report in the Arab region; while the data on the interbank interest rate are collected from Arab central bank databases; regarding the real GDP, it was gathered from the World Bank's World Development Indicators; data on inflation rate are compiled from the Arab monetary Fund database; and data on financial inclusion and technologies indicators are gathered from the World bank database (Findex).

## 4. Preliminary Analysis of Data

Table 1 reports the descriptive statistics, the mentioned table indicates that Sudan has the highest return on assets (3.35), followed by Saudi Arabia (2.01), and Qatar (1.96), indicating that the banking sector in these economies is more efficient than in the other states. Iraq has the lowest return on assets (0.59), followed by Lebanon (0.87), and Morocco (0.91), indicating that the banking sector management in these countries is less efficient at generating earnings from total assets compared to other economies. Notable is the fact that the average return on assets for Sudan (Iraq), Saudi Arabia (Lebanon), and Qatar (Morocco) is higher (lower) than the average return on assets across all economies (1.50). As indicated by the standard deviation values, the volatility of the ROA

varies across economies, with Sudan having the highest volatility (0.99), while Jordan and Kuwait have the lowest volatility (0.10). In addition, the findings reveal discrepancies in the averages and volatility of bank-specific, macroeconomic, and financial inclusion determinants across the examined.

Table 1. Descriptive statistics of the variables

Variable	OMA	QAT	KSA	SUD	UAE	MOR	EGP	IRQ	JOR	KUW	LEB	Whole panel
<b>ROA</b>												
Mean	1.63	1.96	2.01	3.35	1.50	0.91	1.53	0.59	1.20	1.14	0.87	1.50
Std. Dev.	0.15	0.30	0.11	0.99	0.13	0.11	0.36	0.28	0.10	0.10	0.30	0.84
<b>SIZE</b>												
Mean	78.43	338.57	601.71	17.71	706.90	148.14	301.57	108.71	68.00	204.57	202.86	252.50
Std. Dev.	11.52	63.91	60.03	4.75	89.47	13.68	51.26	12.28	4.80	17.67	29.89	216.98
<b>CAR</b>												
Mean	16.84	16.24	19.21	17.39	18.30	14.09	15.06	140.43	18.00	17.99	15.83	28.10
Std. Dev.	1.30	1.25	1.21	1.63	0.64	0.80	1.69	26.45	0.80	0.70	1.00	36.55
<b>CREDIT</b>												
Mean	10.36	12.77	11.35	2.87	4.80	6.58	7.67	11.38	11.80	6.16	-2.29	7.60
Std. Dev.	11.78	11.46	10.82	34.85	5.07	19.58	28.15	18.62	14.30	7.59	17.06	17.66
<b>NPLs</b>												
Mean	2.20	1.70	1.51	5.21	5.60	7.17	6.27	9.66	5.10	2.29	6.84	4.90
Std. Dev.	0.62	0.21	0.37	1.91	0.53	0.56	2.11	2.61	0.90	0.76	4.19	3.03
<b>ILR</b>												
Mean	7.50	4.64	1.68	14.05	1.40	2.45	15.25	4.86	3.30	1.21	2.86	5.40
Std. Dev.	0.00	0.28	1.02	3.10	0.70	0.29	2.31	1.07	0.80	0.42	1.21	4.91
<b>GR</b>												
Mean	0.29	0.39	1.38	-1.23	1.70	2.76	2.35	2.09	5.00	-2.54	3.16	1.40
Std. Dev.	9.05	12.18	8.40	30.41	6.57	5.73	15.53	12.09	2.10	14.88	2.04	12.47
<b>INF</b>												
Mean	0.84	1.58	1.22	1.22	1.70	2.86	15.84	0.89	2.10	2.27	2.22	3.00
Std. Dev.	0.55	1.60	1.99	1.99	1.89	0.89	7.65	0.95	2.40	1.07	3.45	4.95
<b>ATM</b>												
Mean	4.00	113.45	8.23	0.50	62.20	15.18	9.38	1.19	18.30	109.05	175.99	47.00
Std. Dev.	0.46	9.62	1.15	0.09	4.36	1.36	2.11	0.50	2.60	19.69	20.32	58.22
<b>BRCH</b>												
Mean	1.77	20.60	0.96	0.32	11.60	14.03	2.92	2.20	10.20	25.63	107.85	18.00
Std. Dev.	0.03	2.04	0.08	0.03	0.52	0.80	0.15	0.26	0.50	1.24	3.79	29.76

Source. author's calculations.

The correlations between the return on assets and the explanatory variables shown in Table 2 are calculated across countries and for the entire panel. There are positive and negative correlations (depending on the country) between the return on assets and the considered determinants. The return on assets is negatively correlated across all economies with bank size (-0.02), the capital adequacy ratio (-0.32), the nonperforming loans ratio (-0.32), ATM distribution (-0.26), and bank branch density (-0.32). However, the ROA is positively correlated with credit growth (0.11), interbank lending interest rate (0.45), economic growth (0.08), and inflation rate (0.01). These correlation values are inconclusive with regard to the nature of the relationship between the return on assets and the considered determinants, prompting us to conduct an in-depth study of this relationship in the Arab region using estimation and testing procedures pertinent to the objectives of the analysis.

Table 2. Correlations between the ROA and the other variables

Variable	OMN	QAT	KSA	SUD	UAE	MOR	EGP	IRQ	JOR	KUW	LEB	Whole panel
SIZE	-0.66	-0.89	-0.42	0.86	-0.19	0.39	0.54	-0.64	-0.50	0.84	-0.23	-0.02
CAR	-0.60	-0.31	-0.18	0.17	-0.24	0.33	-0.04	0.72	0.30	-0.21	-0.02	-0.32
CREDIT	-0.31	-0.04	0.52	0.58	0.12	0.46	-0.45	-0.01	-0.20	0.39	0.94	0.11
NPLs	-0.38	0.18	-0.10	0.18	0.51	-0.19	-0.56	0.46	0.30	-0.89	-0.84	-0.32
ILR	-0.52	-0.49	-0.60	-0.56	0.10	-0.04	0.60	-0.41	0.30	0.75	-0.73	0.45
GR	-0.06	-0.23	0.34	0.67	-0.11	0.58	-0.59	0.30	0.50	0.55	0.76	0.08
INF	-0.07	0.82	0.46	0.33	-0.25	0.36	0.56	-0.44	0.10	-0.82	-0.04	0.01
ATM	-0.73	-0.85	-0.29	-0.41	-0.25	0.20	0.44	0.36	-0.50	0.86	-0.56	-0.26
BRCH	-0.31	0.70	-0.28	-0.47	0.22	0.17	0.44	-0.29	-0.40	0.88	-0.57	-0.32

Source. author's calculations.

## 5. Econometric Methodology

This study uses the difference Generalized Method of Moments (GMM), which was developed by Arellano and Bond (1991) to estimate dynamic panel data models, to analyze the reactions of the return on assets in the Arab banking sector to the fluctuations in the bank-specific, macroeconomic, and financial inclusion variables. Therefore, our model takes the following form:

$$\begin{cases} Y_{it} = \alpha_i + \beta Y_{i,t-1} + \gamma B'_{it} + \delta M'_{it} + \varphi F'_{it} + v_{it} \\ i = 1, 2, \dots, N, \quad t = 1, 2, \dots, T \end{cases} \quad (1)$$

Where  $i$  represents the nation in the cross-section and  $t$  represents the time period in the time series; Return on assets ( $Y_{it}$ ), bank-specific variables ( $B'_{it}$ ) (SIZE, CREDIT, CAR, and NPL), macroeconomic variables ( $M'_{it}$ ) (Interest rate, Gross Domestic Product, and Inflation), financial inclusion and technology indicators ( $F'_{it}$ ) (ATMs, Branchless Teller Machines), and a disturbance term ( $v_{it}$ ). In terms of the coefficients in the model, Individual impacts are quantified by the variable  $\alpha_i$ . The coefficient  $\beta$  measures the ROA's reaction to its own historical values; the vector  $\gamma$  measures ROA's impact on bank-specific determinants; the vector  $\delta$  shows ROA's response to changes in macroeconomic variables; and the vector  $\varphi$  measures ROA's impact on indicators of financial inclusion.

By reshaping the model into the first difference form, the GMM estimators eliminate the influence of the individual-specific effects in dynamic panel data models.

$$\Delta Y_{it} = \beta \Delta Y_{i,t-1} + \gamma \Delta B_{it} + \delta \Delta M_{it} + \varphi \Delta F_{it} + \Delta v_{it} \quad (2)$$

Assuming no autocorrelation in the error term  $Y_{it}$  and weak exogenous explanatory variables, Arellano and Bond (1991) use the first-differenced GMM estimator that chooses two or more lagged values of the independent variables as instruments to overcome the correlation problem between the transformed error term,  $v_{it}$ , and the variable,  $Y_{i,t-1}$ . The instantaneous circumstances upon which this estimate relies are as follows:

$$E[X_{i,t-j} \Delta v_{it}] = 0, \quad j \geq 2, t = 3, 4, \dots, T \quad (3)$$

Where  $X_{i,t-j} = Y_{i,t-j}, B_{i,t-j}, M_{i,t-j}, F_{i,t-j}$ .

Arellano and Bond (1991) recommend computing one-step and two-step estimators, both of which are common in economics, given these constraints. Since the two-step GMM estimator is asymptotically superior to the one-step GMM estimator (for further information, see Arellano & Bond, 1991), we employ it in our investigation.

## 6. Discussion of the Results

### 6.1 Effects of Bank-Specific, Macroeconomic, Financial Inclusion and Technologies Variables on Profitability

Table 3 displays the GMM estimated responses of ROA to changes in bank-specific, macroeconomic, and financial inclusion variables. The return on assets is shown to be unaffected by one of the five bank-specific factors tested (including the lagged ROA). The return on assets is positively influenced by the size of the bank and the capital adequacy ratio. In fact, an increase in ROA by 0.005 and 0.021 percentage points may be expected for every 1 percentage point increase in bank size and capital adequacy ratio respectively. Return on assets is also affected by credit expansion in the banking industry while the nonperforming loans ratio has no significant impact on the ROA. An increase of one unit in real GDP growth and one unit in inflation rates leads to a rise of 0.013 and 0.029 unit, respectively, in the return on assets. However, changes in the overnight

interbank lending rate have no significant effects on the return on assets. The results show that the return on assets is unaffected by financial inclusion variables such as the location of ATMs or the number of bank branches.

Table 3. Two-step GMM estimates of the effects of bank-specific, macroeconomic, and financial inclusion variables on profitability

Variable	Estimate	Standard Error
ROA (-1)	0.395***	0.079
SIZE	0.005***	4.967E-4
CAR	0.021*	0.010
CREDIT	0.002**	0.001
NPL	-0.003	0.066
ILR	-0.022	0.052
GR	0.013*	0.008
INF	0.029*	0.015
ATM	-0.015	0.011
BRCH	-0.014	0.032
Wald Test	201.600+++ (0.000)	
Second-Order Autocorrelation Test	0.618 (0.640)	
Sargan Test	1.824 (1.000)	

*Note.* Wald test for overall significance of the model, Second-order autocorrelation test for no serial correlation in first-differenced errors, and Sargan test for over-identifying restrictions. The values in parentheses are the p-values of the tests. \*\*\* and \* stand for statistical significance at the 1% and 10% levels, respectively. +++ stands for rejection of the null hypothesis at the 1% level.

Source: author's calculations.

## 6.2 Economic Explanations

The findings of our results regarding the impact of the bank specific variables are in line with previous literatures (Davydenko, 2010; Dietrich & Wanzenrid, 2011; Olweny & Shipho, 2011; Rahman et al., 2015; Kohlscheen et al., 2018). Banks' ability to influence the market and attract more customers and savings has been shown to have a positive effect on banks' earnings (Sufian & Habibullah, 2009; Naceur & Omran, 2011), which may explain the positive correlation between bank size and return on assets.

The positive impact of the capital adequacy ratio on the ROA is expected since high capital adequacy indicates an efficient risk management system, which is reflected positively in banks' profitability and financial soundness indicators. Furthermore, high capital adequacy may indicate that the bank is conservative, and its risk appetite is low, which in turn lowers credit risk.

Consistent with previous research (Nguyen et al., 2012; Dang, 2019), the positive impact of the credit growth on the profitability can be explained by the fact that the credit growth, in parallel with accurate evaluation of customers risk, lead to gain more profits.

Increases in credit risk (higher NPLs) lead to additional costs and pressure on banks' earnings, which explains the negative (albeit nonsignificant) relationship between the return on assets and the NPLs ratio (Sufian & Habibullah, 2009; Naceur & Omran, 2011).

Regarding the macroeconomic factors, the favorable economic sentiment allows investors to extend their economic projects and activities by borrowing more from banks, which in turn increases the return on assets and the real GDP growth rate. In addition, if the economy continues to recover, this might lead to a rise in consumer solvency, which in turn would reduce nonperforming loans and boost bank profits (Demirgüç-Kunt & Huizinga, 1999; Bikker & Hu, 2002; Pasiouras & Kosmidou, 2007).

Because rising prices may reflect negatively on the disposable income of households and businesses, they may have to borrow more liquidity from banks, which could have a positive effect on the profitability of banks (Vong & Chan, 2007; Tan & Floros, 2013).

The fact that the Arab countries still need to make more efforts to enhance financial inclusion and conduct more awareness campaigns explains the lack of significance in the relationship between return on assets and the financial inclusion indicators (distribution of ATMs and geographical spread of bank branches). It is worth noting that the achievement of financial inclusion strategies goals needs more time to be successful, considering that the operating costs of bank branches and spreading ATMs may be high.

### 6.3 Diagnostic Checks

To check the robustness of our model, we do the Wald test for overall significance, the second-order serial correlation, and the Sargan test for overall validity of the instruments to ensure the accuracy of the estimated models. The Wald test rejects the null hypothesis at the 1% level, indicating that the findings report in Tables 3 are evidence of the overall significance of the model. In addition, the results of the second-order autocorrelation test reject the null hypothesis that there is no serial correlation in the first-differenced disturbance component. There is also proof of valid over-identifying constraints in the form of a failed Sargan test. The test results are consistent with the differential GMM estimations.

## 7. Conclusion

Using a dynamic panel data framework, this study analyzes the correlation between ROA and a variety of variables for the Arab banking sector across 11 countries from 2013 to 2019. These variables include bank-specific determinants, macroeconomic factors, and financial inclusion indicators.

The results show that the bank specific factors and economic variables have significant impacts on the bank profitability, there is evidence that the size of banks, the capital adequacy ratio, the expansion of banking sector credit, the growth rate of real GDP, and the inflation rate all have positive effects on bank profitability when lags of one period are considered. Despite changes in the non-performing loans ratio, the interbank lending rate, and the proxies for financial inclusion and technologies, which are represented by the distribution of ATMs and the number of bank branches, the return on assets does not change. This paper recommends that central banks should keep paying attention to financial soundness indicators to enhance operational efficiency at banks (particularly domestic systemically important institutions), and to keep assessing the impact of economic risks on banks performance through stress testing.

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