

# The contribution of banking services in enhancing the profitability of Jordanian commercial banks

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**Abstract:** Banks have traditionally been in the primacy of utilizing technology to enhance their products, services and efficiency. Investing in new financial technology services may enhance the bank's profitability; but at the same time it may increase costs. Thus, the effect of employing e-services is not obvious and requires to be tested. The study aims at estimating the effect of technological progress on banks performance measured by return on equity (ROE) in 13 Jordanian commercial banks over the period 2011-2016 using panel data.

Results reveal that ATMs ratio, ratio of a bank's branches number, the ratio of visa cards number of each bank out of the total number of visa cards issued by all banks, and the ratio of total credit facilities granted by each bank affect profitability positively as proxied by ROE. On the other hand, the ratio of master cards number of each bank out of the total number of master cards issued by all banks is not significant. The study examines six dummy variables and found that cash withdrawals in foreign currencies and cash transfer within the same bank are the most important services (dummies) that affect bank's profitability.

**JEL Classifications:** G20, G21, G24

**Keywords:** Banking services, banks performance, profitability, commercial banks, Jordan

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## 1. Introduction

The modern banking industry is changing due to the progressively improving technology. Commercial banks offer financial services that develop in step with changes in the regulation of the industry, the evolution of the economy, and improvement in information and communications technologies.

All banks aim at increase the customers' satisfaction and to provide them with needed financial services. Given the increasing competition among commercial banks, new types of services are employed to attract more customers such as internet banking, mobile banking, telephone banking, automated teller machine (ATM) and point-of-sale (POS) network. Investing in new financial technology services may enhance the bank's performance and profitability; but at the same time it may increase costs. Thus, the research problem rises as the effect of employing e-services is not obvious and needs to be tested. This study becomes necessary especially with the increasing employment of e banking services in Jordan and around the world.

This paper aims mainly at estimating the effect of technological progress on banks performance measured by return on equity (ROE) in 13 Jordanian commercial banks over the period 2011-2016 using panel data.

The Section 2 presents literature review, Section 3 describes the methodology of the study, Section 4 explains the results, and Section 5 summarizes the study.

## 2. Literature review

The role of banking electronic services is becoming more and more important nowadays. On the one hand, they are considered as a low-risk and low-cost services, besides the high return on the other hand. Many studies examine whether electronic services have a positive effect on the banks performance or not. After reviewing previous studies, one can notice that there is no global agreement on the effect of e-banking services on the banks profitability which calls for more empirical studies to test the real effect. While some studies confirm the positive effect, other researches reveal the opposed results.

Akhisar, Tunay, & Tunay (2015) study the effects of electronic banking services on the bank's performance. They have examined the data of 23 developed and developing countries over the period 2005-2013. Results reveal that the ratio of the number of branches to the number of ATMs is highly significant and electronic banking services are significant too. Abaenewe, Ogbulu, & Ndugbu (2013) find a positive effect of e-banking on the returns on equity and the returns on assets. Berger & Mester (2003) have also examined the influence of technology on the performance of U.S. banks. Results clarify that adopting new technologies leads to the higher profits.

Aduda & Kingoo (2012) conclude that e-banking has made banking operations easier and faster by bringing services closer to customer, therefore, enhancing banking performance. Romdhane (2013) examines the effect of information technology in fifteen Tunisian banks for the period 1998-2009. Results confirm the positive effect of investments in information technology on banks' performance in Tunis. Acharya, Kagan, & Lingam (2008) study the influence of online banking intensity on the performance of banks. They have found a significant relevant positive effect on the financial performance of banks.

Onay, Ozsoz, & Helvacioğlu (2008) examine the effect of internet banking on the return on assets and equity, interest spread, overhead expenses, and commission and fee income controlling for systemic bank crises in Turkey over the period 1996-2005. Their findings demonstrate the evidence that investment in e-banking affects the performance of the banking system in Turkey positively measured by return on equity only.

Karimzadeh & Sasouli (2013) find a significant positive effect of internet banking services on the profitability of banks in terms of ROA and ROE in India. Hernando & Nieto (2007) argue that the effect of adopting the internet banking is positive and significant for the banks' performance after one and a half years in terms of ROA and after three years in terms of ROE.

Muhammad, Gatawa, & Kebbi (2013) explore the outcome of technology on eleven selected commercial banks in Nigeria and find that the use of ICT in the banking industry increases ROE in Nigeria. On the other hand, they reveal an inverse relationship between additional sustained investment in ICT and efficiency.

Malhotra & Singh (2009) discuss the effects of internet banking on the Indian banking industry in general and particularly on banks' performance and risk. Results reveal that about 57% of the Indian commercial banks delivering internet banking services have better operating efficiency ratios and profitability as compared to non-Internet banks. On the other hand, no significant evidence of any association between employing internet banking by banks and their performance.

Khrawish & Al-Sa'di (2011) test the impact of electronic banking services on the profitability of Jordanian banks in the period 2000-2009. Their results show no significant effect of electronic banking services on the profitability measured by ROA and ROE. The study notice that expenses and cost associated with applying these services are high which may reduce the profits.

Sundas, Farhat, & Ummara (2017) examine empirically the contribution of IT to financial performance as measured by net profit, ROA and ROE. Results reveal that IT does not directly improve financial performance in terms of ROA and ROE. Instead, it enhances financial performance as measured by net profit.

Shin (2001) finds no impact of information technology on the financial performance measured by ROA and ROE. But the influence is significant on net profit when IT is implemented in conjunction with vertical disintegration and diversification.

### 3. Research methodology

#### 3.1. Types and sources of data

This study employed secondary data collected from annual reports of Association of Banks in Jordan (ABJ) during 2011-2016. Thus, this study utilizes the panel data. We use E-views 9 software to process the data.

#### 3.2. Variables and measurement

Table 1 shows variables of the study with their measurement.

TABLE 1. VARIABLES MEASUREMENT

VARIABLE	MEASURES	EXPECTED SIGN	INDICATORS
<i>DEPENDENT VARIABLE</i>			
Return on equity (ROE)	$\frac{Net\ Profit}{Total\ Equity}$		Profitability
<i>INDEPENDENT VARIABLES</i>			
Ratio of ATMs number (ATM)	$\frac{ATMs' number_{it}}{\sum_{i=1}^{13} ATMs' number_{it}}, i=13: t=6$	+	Indicates the ratio of each bank's ATMs out of the total ATMs of banks in each year
Ratio of branches number (NB)	$\frac{Branches' number_{it}}{\sum_{i=1}^{13} Branches' number_{it}}, i=13: t=6$	+	Indicates the ratio of each bank's branches out of the total branches of banks in each year

TABLE 1. VARIABLES MEASUREMENT

VARIABLE	MEASURES	EXPECTED SIGN	INDICATORS
Ratio of visa cards number (VC)	$\frac{Visa\ cards'\ number_{it}}{\sum_{i=1}^{13} Visa\ cards'\ number_{it}}$ , $i=13: t=6$	+	Indicates the ratio of each bank's visa cards out of the total visa cards issued by all banks in each year
Ratio of master cards number (MC)	$\frac{Master\ cards'\ number_{it}}{\sum_{i=1}^{13} Master\ cards'\ number_{it}}$ , $i=13: t=6$	+	Indicates the ratio of each bank's master cards out of the total master cards issued by all banks in each year
Ratio of total credit facilities (TCF)	$\frac{Total\ credit\ facilities_{it}}{\sum_{i=1}^{13} Total\ credit\ facilities_{it}}$ , $i=13: t=6$	+	Indicates the ratio of each bank's credit facilities out of total credit facilities granted by banks in each year
<i>SERVICES PROVIDED BY COMMERCIAL BANKS' ATM'S (DUMMY VARIABLES)</i>			
Cash withdrawal in foreign currencies (D1)	Dummy variable measured as 0 or 1, 0 means the service is not provided by ATM, and 1 means the service exists	+	
Direct cash deposit (D2)	Dummy variable measured as 0 or 1, 0 means the service is not provided by ATM, and 1 means the service exists	+	
Checks deposit (D3)	Dummy variable measured as 0 or 1, 0 means the service is not provided by ATM, and 1 means the service exists	+	
Utility bills paying (D4)	Dummy variable measured as 0 or 1, 0 means the service not provided by ATM, and 1 means the service exists	+	
Cash transfer within the same bank (D5)	Dummy variable measured as 0 or 1, 0 means the service is not provided by ATM, and 1 means the service exists	+	
Eye print (D6)	Dummy variable measured as 0 or 1, 0 means the service is not provided by ATM, and 1 means the service exists	+	

### 3.3. Model specification

This paper employs ordinary least square (OLS) regression model to analyze the panel data and examines the influence of banking technological progress on the profitability of Jordanian commercial banks. The study determines which of the two models - fixed effect (FE) and random effect (RE) - is best fit by applying the Hausman test for random effects. Based on the literature review, this study constructs the following empirical regression model:

$$ROE_{it} = c + \beta(X_{it}) + D_{it} + U_{it} \quad (1)$$

Where the  $ROE_{it}$  is return on equity for bank  $i$  at time  $t$ ,  $X_{it}$  are explanatory variables,  $D_{it}$  are dummy variables, and  $U_{it}$  are error terms.

## 4. Results and discussion

### 4.1. Testing stationary problem

To ensure the stability of the variables, this study uses the LLC test suggested by Levin, Lin, & Chu (2002):

$$\Delta Y_{it} = a_i + \rho Y_{i,t-1} + \sum_{k=1}^n \phi_k \Delta Y_{i,t-k} + \delta_i t + \theta_t + \mu_{it} \quad (2)$$

LLC provides an appropriate test in a small sample. This model allows verifying the existence of fixed effects in two directions (two-way fixed effects): the first direction is  $a_i$  and it refers to the fixed effects for each company; the second direction is  $\theta_t$  and it refers to the fixed effects for each year (Baltagi, 2005). Fixed effects model for each company is very important as it allows the existence of a differentiation in the properties of companies. Moreover, LLC test assumes the existence of cross-sectional independence between companies. Under this assumption, the test uses the least squares method to estimate  $\rho$  parameter which takes the form of a normal distribution. The null hypothesis (H0) for LLC test indicates for existence of unit root (instability) in the data.

TABLE 2. UNIT ROOT TEST

VARIABLE	T-STATISTIC	PROBABILITY	LAG	STATIONARY
<i>ROE</i>	-10.035	0.000	0	Level*
<i>ATM</i>	-6.492	0.000	0	Level*
<i>NB</i>	-8.251	0.000	0	Level*
<i>VC</i>	-9.354	0.000	0	Level*
<i>MC</i>	-6.458	0.000	0	Level*
<i>TCF</i>	-11.211	0.000	0	Level*

Note: \* - Exogenous variables: Individual effects, individual linear trends.

Table 2 presents unit root test results;  $t$ -statistic value and its probability show that all variables are stationary in their level, which means rejection of H0.

### 4.2. Testing multi-co linearity problem

Multi-collinearity between the explanatory variables can be tested by variance inflation factors (VIF) test (Table 3). This test analyzes the linear regression between the explanatory variables, assuming that one of the explanatory variables is the dependent variable, and other explanatory variables to be independent, and this process is repeated for all the explanatory variables.

TABLE 3. TESTING MULTI-COLLINEARITY PROBLEM

VARIABLE	VIF	TOLERANCE VALUE 1/VIF*
<i>ATM</i>	1.27	0.78
<i>NOB</i>	1.25	0.8
<i>VC</i>	1.06	0.94
<i>MC</i>	1.32	0.75
<i>TCF</i>	1.33	0.75
Mean VIF	1.25	

Table 3 presents the multi-collinearity among the independent variables. According to O'Brien (2007), the variance inflation factor (VIF) above 10 or the tolerance value (1/VIF) below 0.1 is an indication that there is a problem of multi-collinearity among the variables. Our analysis shows that there is no VIF greater than 10 and 1/VIF below 0.1; any of the independent variable included in this study is not explained by the other. Hence all variables can be retained in the study model.

### 4.3. Regression analysis

To determine which model of effects - fixed effect or random effect - is appropriate to the model of our study, the Hausman test was conducted. Chi-square statistic is 30.175 and its probability 0.00, so the Hausman test shows that fixed effect is appropriate for the regression model (Table 4).

Table 4 shows that the relationship between profitability as proxied by return on equity and ATMs ratio is positive and significant. This is an indication that when the ATMs share of each Jordanian commercial bank increases by 1%, bank's return on equity will increase by 0.46%. This is consistent with expectations that the growing number of ATM attracts more clients, increases the stock price and enhances profitability.

Ratio of a bank's branches number has a positive and a significant relationship to the return on equity in Jordanian commercial banks. The increase in a bank's branches number by 1% is followed by the increase of profitability of the bank by 0.44%. In fact, the spread of branches increases the sales which in turn influence positively on the net income.

Moreover, the ratio of visa cards number of each bank out of the total number of visa cards issued by all banks has a positive and significant effect on the Jordanian commercial banks' profitability. While a bank's visa cards number increases by 1%, the profitability of the bank increases by 0.05%. On the other hand, the ratio of master cards number of each bank out of the total number of master cards issued by all banks is not significant.

Ratio of total credit facilities granted by each bank has a positive and a significant effect to the return on equity. While the credit facilities increases by 1%, the profitability increases as well by 0.12%. The high market share might result in high profit; high market share

boosts a bank's market advantages helping the bank to boost profit and achieve economies of scale.

TABLE 4. REGRESSION ANALYSIS

EFFECT OF BANKS' TECHNOLOGICAL PROGRESS ON ROE (FIXED EFFECTS)			
VARIABLE	COEFFICIENT	T-STATISTIC	PROB.
<i>c</i>	-0.03	-0.790	0.432
<i>ATM</i>	0.462	2.424	0.018**
<i>NB</i>	0.440	4.977	0.000*
<i>VC</i>	0.054	7.182	0.000*
<i>MC</i>	0.010	0.531	0.597
<i>TCF</i>	0.117	4.319	0.000*
<i>D1</i>	0.023	3.533	0.000*
<i>D2</i>	0.002	0.376	0.707
<i>D3</i>	0.008	2.167	0.034**
<i>D4</i>	0.009	2.643	0.010**
<i>D5</i>	0.011	1.844	0.070***
<i>D6</i>	0.005	1.022	0.311
<i>R</i> <sup>2</sup>	0.84		
<i>Adjusted R</i> <sup>2</sup>	0.77		
<i>F</i> -statistic	12.42 (0.000)		
<i>D</i> - <i>W</i> statistic	1.99		
<i>Observations</i>	78		

Note: \*, \*\*, \*\*\*- significance level of 1%, 5% and 10% respectively.

As mentioned before, the study examines six dummy variables: cash withdrawal in foreign currencies (D1), direct cash deposit (D2), checks deposit (D3), utility bills paying (D4), cash transfer within the same bank (D5), eye print (D6). All of those services are provided by banks' ATMs. Four services (D1, D3, D4, and D5) out of six services have positive and significant effect on Jordanian commercial banks profitability. Cash withdrawals in foreign currencies (D1) and cash transfer within the same bank (D5) are the most important services that affect a bank's profitability.

The results in Table 4 show that the value of R-square is 84%, meaning 84% of the profitability variation of Jordanian commercial banks is explained by the independent variables. Durbin Watson coefficient (DW=1.99) is close to 2, meaning that there is no evidence of autocorrelation between the residuals as a rule of thumb. Moreover, F-statistic and its probability show that the overall regression model is statistically significant. Under these circumstances, the panel analysis seems to be appropriate for this research model.

## 5. Conclusion

This paper aims at estimating the effect of banking services in enhancing the profitability of commercial banks in Jordan over the period 2011-2016. For this purpose, the study utilizes a panel data for 13 commercial banks and employs ordinary least square regression model besides the Hausman test to determine which of the two models (fixed effect or random effect) is best fit.

Results of Hausman test show that fixed effect is appropriate for the regression model. Regression result reveals that ATMs ratio, ratio of bank's branches number, the ratio of visa cards number of each bank out of the total number of visa cards issued by all banks and the ratio of total credit facilities granted by each bank positively influence the profitability as proxied by return on equity. On the other hand, the ratio of master cards number of each bank out of the total number of master cards issued by all banks is not significant.

The study provides outputs for the dummy variables also (Table 4). Four services - *D1* (cash withdrawal in foreign currencies), *D3* (checks deposit), *D4* (utility bills paying), and *D5* (cash transfer within the same bank) have positive and statistically significant effects on Jordanian commercial banks' profitability. Cash withdrawals in foreign currencies (*D1*) and cash transfer within the same bank (*D5*) are the most important services in affecting bank's profitability in Jordan.

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