



An Empirical Analysis of Fintech's Impacts on the Financial Performance of Banks in Kosovo

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Abstract

This analysis aims to empirically investigate the impact of different forms of Fintech on the financial performance of banks in Kosovo from 2010 to 2021. The research is based on secondary data, accounting for 48 observations at quarterly frequencies. The model treats bank performance (i.e., net profits of the bank sector) as an endogenous variable of ATMs, POS, and e-payments. The methodology applied in the research is based on the OLS technique and diagnostic tests for evaluating the normality of distribution, multicollinearity, autocorrelation, specification error, and heteroscedasticity. Results show that the variability of ATMs and e-payments determines bank performance variability. In particular, e-payments show a significant positive impact on bank profitability, whereas ATM payments display a negative impact on bank profitability. In addition, an increase in ATM payments by 1% decreases bank profitability by 0.367%. While an increase in e-payments by 1% increases bank profitability by 0.11%. The POS payments were found to have no significant relationship with bank profitability.

Keywords:

Financial Technology; Fintech;
Bank Performance; OLS.
Bank Industry;
Kosovo.

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1- Introduction

Financial technology (Fintech) plays a vital role in every economic sector. In the past two decades, technological innovations have rapidly developed. As technology becomes increasingly sophisticated, organizations are constantly adopting new technologies to meet customer demand for goods and services more efficiently. Technological innovations have enabled organizations to transition from the traditional way of doing business while improving their competitive advantage by minimizing operational costs [1]. Financial institutions remain the largest sector to adopt technological advancements. Technology has modified the traditional concept of financial institutions, particularly in the banking sector [2]. Banks have become more customer-oriented today by offering 24/7 online banking opportunities with the help of the Internet. Internet banking practices in Kosovo are pursuing the global digitization trend by adopting the latest technologies. This trend can be attributed to the fact that of the 11 commercial banks operating in Kosovo, nine are foreign and only two are domestic. Currently, Kosovo banks offer an integrated concept of digital banking services in the form of "Self-Service Corner" ATMs for withdrawals and deposits, POS terminals, as well as 24/7 online and mobile banking.

Kosovo's banking sector constantly adapts to technological advancements by moving from traditional banking towards e-channels. According to Sadiku [3], financial technology applications remain slow because opening accounts

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and filing for loan applications are services that are still provided on the bank premises and not online. In addition, 78% of international transfers are finalized offline and only 22% through e-banking. Concerning ATMs, more than half do not provide cash-in options, or 56% of the total available ATMs in the market [2]. Conversely, it has been argued that the volume of transactions using up-to-date technologies (ATM, POS, and e-banking) is increasing in Kosovo. In particular, the number of e-banking accounts has doubled from 2013 to 2019, payments through e-banking have increased by more than 250%, and ATM transactions have increased by more than 180% [4].

There are few empirical studies on the impact of Fintech on the banking sector in Kosovo. Accordingly, this research is a pioneering work to explore the impact of different forms of Fintech on the financial performance of banks in Kosovo. This analysis measures financial technology's impact on banks' performance in Kosovo from 2010 to 2021. This particular period was selected because the number of transactions within it increased rapidly. Even though there have been significant technological improvements in the banking sector, the impacts on bank performance remain uncertain. This short analysis briefly reviews the literature on Fintech and its impact on the financial sector and explores the existing data and trends. In the methodology section, the empirical techniques used in this analysis are thoroughly explained. The results give a clear view of the impact of ATM, POS, and e-banking payments on the performance of banks in Kosovo.

2- Literature Review

The notion of Fintech came to light in the 1972 study by Bettinger. The term resembled products that combine the financial nature of banking with modern information technology. The literature can be divided into two large groups: macro- and micro-level analyses of Fintech's impact on the financial sector. A macro-level analysis corroborated the positive impact of Fintech on improving banking efficiency and financial services. In addition, non-bank financial institutions were found to increase their competitiveness with banks through the acceleration of Fintech innovation [5]. Ahn & Lee [6] argued that intra-bank competition is a driver for adopting technologies and that Fintech plays a significant role in spatial geography. A relevant micro-level analysis analyzed the impact of Fintech startups on stock prices and reported a positive relationship between funding Fintech startups and banks' stock returns [7]. However, in another study, the error correction model and the Granger causality test were used to examine how different forms of Fintech impact bank profitability. Bank profitability (ROE) was found to be highly linked to developments in Fintech. Further, findings revealed that the effect of Fintech on the profitability of banks is U-shaped: it declines in the initial stage while increasing in the middle and later stages. The banking sector may effectively increase operations control and reduce costs through digitalization [8].

Through Fintech, banks may improve customer service and strengthen customer relationships. A relevant study argued that Internet-only banking makes it easier for them to penetrate new markets and increase their growth potential [2]. Another study in support of Internet-only banking suggested that Internet banks have no physical branches while all transactions are completed online. Therefore, they may offer low lending rates [6].

The empirical literature on e-payments and the financial sector's development is vast. There is a consensus in the literature on the impact of using e-payment systems and information technology on organizational performance [9–11]. Different studies use different proxies to measure bank performance. However, the most common proxies are the profit levels from period to period. There are also cases where studies use the return on assets (ROA) ratio as a proxy for profit or return on equity (ROE) in other studies. A recent study examined the financial performance of the Bank of Palestine through electronic payments [12]. The analysis is based on a descriptive and analytical approach from 2010 to 2019. Findings reveal that e-payments positively impact the bank's financial performance measured against ROA and ROE. Furthermore, an empirical analysis showed that the performance of Nigerian banks improved exponentially after adopting e-payment technologies [8]. Conversely, another study applied a slightly different approach. The findings revealed that e-banking services positively impact the financial performance of banks in Iran. In general, the empirical literature suggests that banks increase e-banking services and apply the latest financial technologies to improve their performance, enhance profitability and competitiveness, lend at lower interest rates, reduce administrative expenses, reinforce customer loyalty and satisfaction, and improve perceived confidence [13].

3- Data

The analysis is based on empirical data that accounts for four variables (bank profit, ATM payments, POS payments, and e-payments). The data used in the analysis are quarterly data, accounting for 48 observations from 2010 to 2021, gathered from the official website of the Central Bank of Kosovo. Figure 1 illustrates the trend of bank profits in Kosovo.

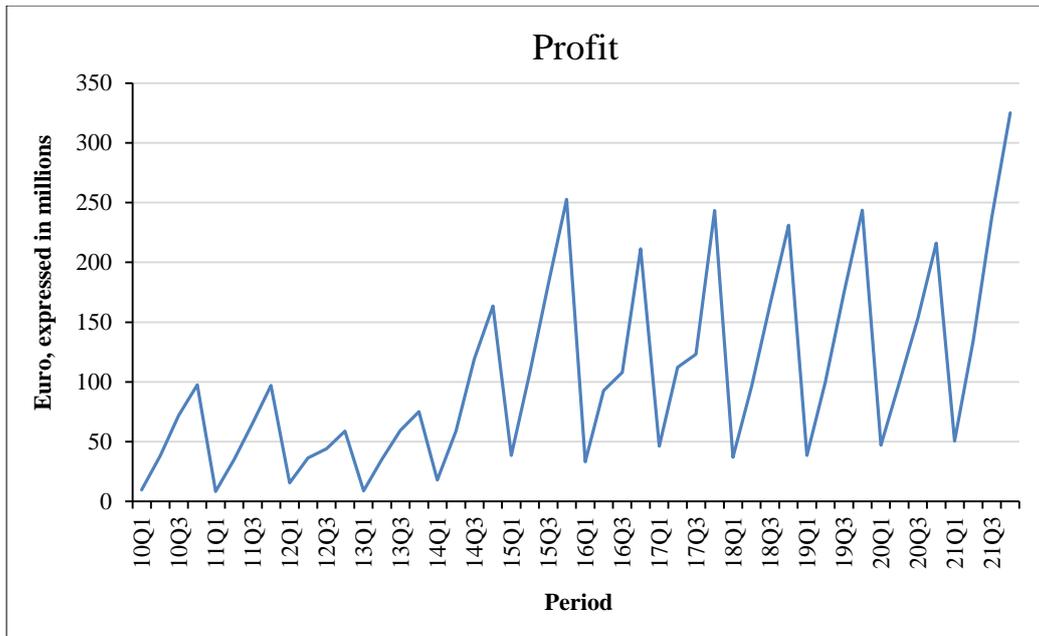


Figure 1. Banking sector net Profits, quarterly

The net profits of the banking sector in Kosovo show an ascending trend over the past 12 years, with sporadic downfalls along the way. For instance, in the first quarter of 2013, the net profits of the banking sector were €8.9 million, which records the lowest profit margin for the period. In the fourth quarter of 2021, the banking sector's net profit was at a record high of €325.2 million. A net profit increase of 235% was recorded in the 2012–2017 period [14]. According to Nuhiu et al. [15], the banking sector in Kosovo is the most profitable financial sector, with a return on equity of over 20% (for all variables and their co-movements across years, see Figure 2).

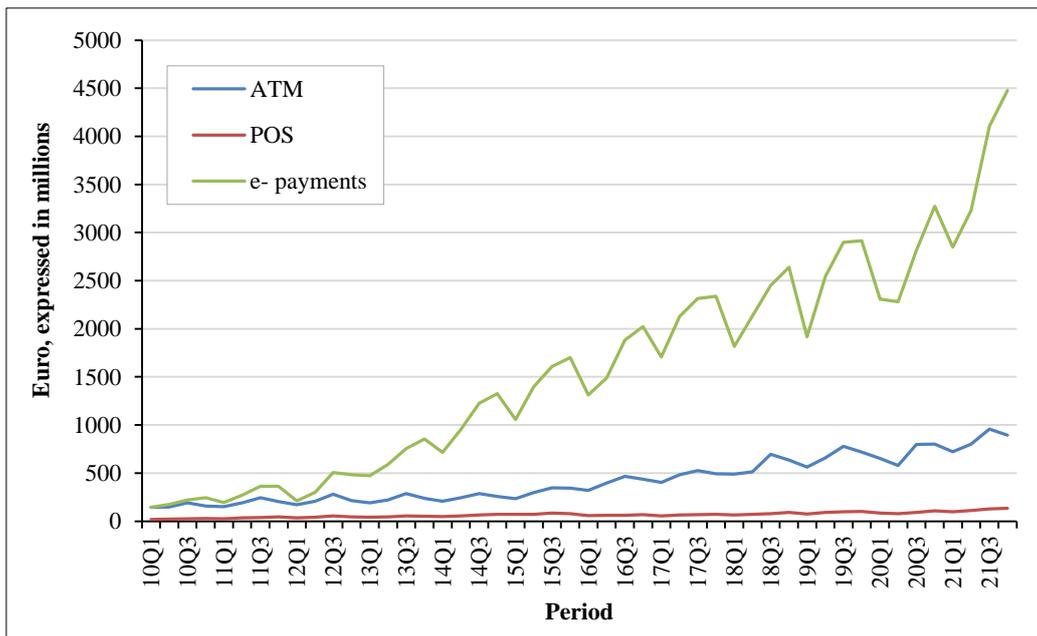


Figure 2. Co-movement of variables (profits, POS, ATM, e-payments)

The increasing trend of data can be observed across all variables. POS payments appear to have the lowest oscillations and the slowest increasing trend (Tables 1 and 2). However, it is observed that e-payments are the most predominant form of payment and are increasing at the fastest pace among other forms of payment. The number of POSs in 2012 was over 8,000, which grew exponentially to over 11,000 in 2017 and over 15,000 as of 2020 [4]. As a result, the number of payments through POS has increased accordingly. Even though the number of ATMs remained constant throughout the period, the volume of payments through ATMs increased exponentially. E-banking accounts increased exponentially throughout the period. As of 2012, there were around 90,000 accounts registered, which increased to 250,000 accounts in 2018 and over 300,000 in 2021 [4]. The increasing number of e-banking accounts has led to an exponential increase in the volume of e-payments (Table 2).

Table 1. OLS regression results

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|-------------------------|-------------|------------|-----------------------|----------|
| C | 39.76465 | 33.07664 | 1.202197 | 0.2357 |
| ATM | -0.367743 | 0.125249 | -2.936088 | 0.0053 |
| POS | 0.686959 | 0.912197 | 0.753081 | 0.4554 |
| EPAY | 0.110264 | 0.034559 | 3.190652 | 0.0026 |
| R-squared | | 0.617891 | Mean dependent var | 104.5082 |
| Adjusted R-squared | | 0.591839 | S.D. dependent var | 78.73814 |
| S.E. of regression | | 50.30384 | Akaike info criterion | 10.75370 |
| Residual sum of squares | | 111341.0 | Schwarz criterion | 10.90963 |
| Log likelihood | | -254.0887 | Hannan-Quinn criter | 10.81262 |
| F-statistic | | 23.71684 | Durbin-Watson stat | 2.029510 |
| Prob (F-statistic) | | 0.000000 | | |

Table 2. Heteroscedasticity test

| Heteroskedasticity Test: Breusch-Pagan-Godfrey | | | |
|--|----------|----------------------|--------|
| Null hypothesis: Homoscedasticity | | | |
| F-statistic | 2.147842 | Prob. F(2,45) | 0.1286 |
| Obs*R-squared | 4.182776 | Prob. Chi-Square (2) | 0.1235 |
| Scaled explained SS | 3.934180 | Prob. Chi-Square (2) | 0.1399 |

4- Methodology

The model is based on the impact of bank performance and technological application by the banks. The model measures the bank profits realized through periods and consumers' non-traditional forms of payments, including ATMs, POS, and e-payments. In this realm, bank profits are dependent variable of ATM, POS, and e-payments. Therefore, the following equation is derived:

$$B.Profit_i = \alpha + \beta_1 ATM_i + \beta_2 POS_i + \beta_3 epayments_i \varepsilon_i \quad (1)$$

where *B.Profit* is accounts for the banking sector net profits, ATM is accounts for the total amount of ATM payments, POS is accounts for the total amount of POS payments, E-payments is accounts for the total amount of internet payments, and β is coefficients of the independent variable.

The empirical literature is rich in terms of econometric techniques applied to measure technological advancements and their impact on bank performance. OLS is one of the most predominant techniques. This technique is very efficient in estimating the unknown parameter in the model [16–19]. In particular, OLS is very effective in testing the model's assumptions, such as normality of distribution, multicollinearity, autocorrelation, specification error, and heteroscedasticity, and suffers from some limitations that can directly affect the F-test score and the means and standard error within the model [20, 21].

In this study, multiple linear regression and the t-statistic were applied to examine the significance of each independent variable regarding bank performance in Kosovo. After analyzing the t-statistic and beta values of the corresponding PRF and SRF, the analysis examines the basic assumptions of the linear regression models: autocorrelation, heteroscedasticity, error terms, and normality of the distribution of the data.

5- Findings

The regression analysis using OLS revealed that bank profits are related to its operations in terms of e-payments and ATMs, given that the probability is lower than $\alpha < 0.05$, even at $\alpha < 0.01$. The respective probability or p values were 0.0053 and 0.0026, meaning that the null hypothesis was rejected. The t-statistic is considerably higher than the t-critical, which indicates that bank profitability may be explained through ATM and e-payments. The POS's payments were found to have no statistically significant relationship with bank profitability ($p = 0.4554$, much higher than $\alpha < 0.05$) (Figure 3).

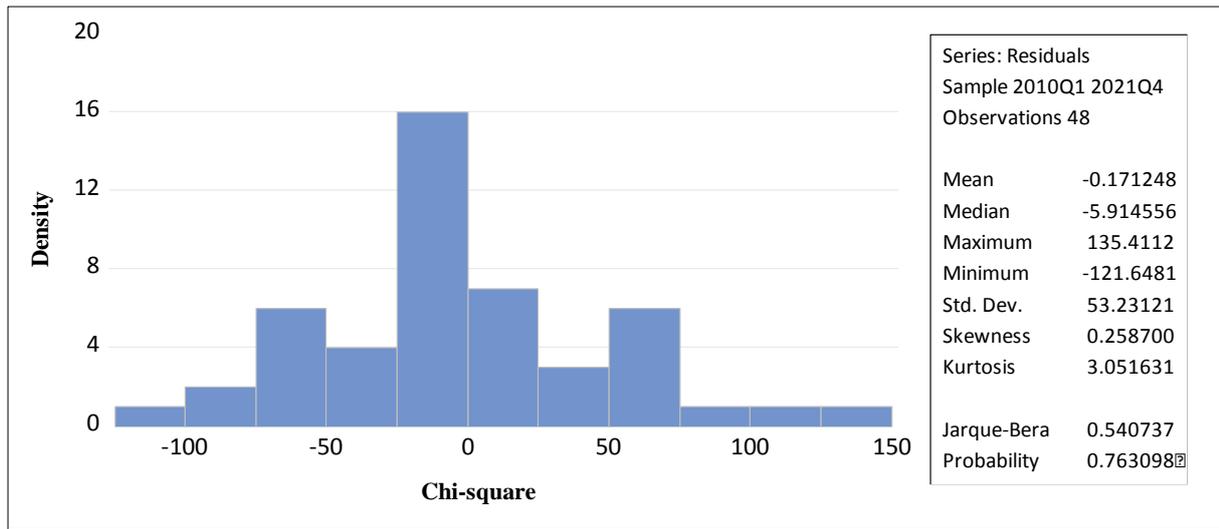


Figure 3. Normality test Jarque and Bera

The beta coefficients in terms of SRF and PRF estimator are as follows:

$$PRF:B.Profit_i = \alpha - \alpha_1ATM_i + \alpha_2epayments_i + \epsilon_i \tag{2}$$

Based on the results generated from the OLS regression, the following SRF can be achieved:

$$SRF:B.Profit_i = \alpha - 0.367 + 0.110 + \epsilon_i \tag{3}$$

If payments through ATMs increase by 1%, bank profitability will decrease by 0.367; on the other hand, if e-payments increase by 1%, bank profitability is 0.11. This indicates that the growth in payments has a significant positive impact on e- and bank profitability, while increasing ATM payments exerts a significant negative impact on bank profitability. The R square and R adjusted, which indicate the goodness-of-fit of the data, were found to be 0.61 and 0.59, respectively. Based on the results, around 60% of the variation in the dependent variable (bank profits) is explained by the variations in the independent variables (ATM and e-payments). The model was tested for autocorrelation using the Durbin-Watson test. In this study, the Durbin-Watson statistic was 2.0295, indicating no autocorrelation issue in the model. In addition, a heteroscedasticity test (the Breusch-Pagan test) was performed to find any disturbance in the stochastic population regression function for equal variance (see Table 2).

Probability figures were higher than $\alpha < 0.05$, meaning the null hypothesis was not rejected. Therefore, the model did not suffer from heteroscedasticity, meaning that the data in the model are homoscedastic. A normality test was performed to measure the normal distribution of the residuals (Table 3).

The null hypothesis states that residuals are normally distributed. Given that the probability score is 0.763, higher than $\alpha < 0.05$, the residuals are normally distributed, and the model does not suffer from an abnormality of distribution. Finally, the analysis checks for the specification of error using the Ramsey reset test. Probability scores show that they are higher than $\alpha < 0.05$ at 0.5748 for the F statistic test and likelihood ratio (Table 3). Given that the null hypothesis is not rejected, the model is specified correctly.

Table 3. Ramsey Reset Test, error specification

| Omitted Variable: Powers of fitted values from 2 to 3 | | | |
|---|----------|--------|-------------|
| | Value | df | Probability |
| F-statistic | 0.560791 | (2.44) | 0.5784 |
| Likelihood ratio | 1.208210 | 2 | 0.5466 |

6- Conclusion

This paper explored the impacts of different forms of Fintech on the financial performance of the banking sector in Kosovo using the OLS technique. The study was based on quarterly data from 2010 to 2021, accounting for 48 observations. As a proxy of Fintech, the analysis was based on payments. Three forms of payments were examined: ATMs, POS, and e-payments. As a proxy for bank performance, the industry’s net profits were used in this analysis. In general, the banking industry's performance had a positive trend within the study timeframe, showing that profits have rapidly increased, indicating a shift from traditional banking methods. The data indicated that in the study period, the use of e-payments, POS, and ATMs increased rapidly, showing that Kosovo's banking sector is constantly adopting new

technologies to satisfy consumer needs through better and more efficient forms of banking. In this analysis, bank profitability was treated as a dependent variable on POS, ATM, and e-payments. The results reveal that bank performance variability is described by the variability of ATMs and e-payments at large. In particular, e-payments display a significant positive impact on bank profitability, whereas the opposite can be concluded for ATM payments (i.e., ATM payments negatively impact bank profitability). On the contrary, POS reveals no significant relationship with bank profitability over time.

7- Declarations

7-1-Author Contributions

Conceptualization, H.D., M.H., K.D., and L.H.; methodology, H.D., M.H., K.D., and L.H.; formal analysis, H.D., M.H., K.D., and L.H.; data curation, H.D., M.H., K.D., and L.H.; writing—original draft preparation, H.D., M.H., K.D., and L.H.; writing—review and editing, H.D., M.H., K.D., and L.H. All authors have read and agreed to the published version of the manuscript.

7-2-Data Availability Statement

The data presented in this study are available on request from the corresponding author.

7-3-Funding

The authors received no financial support for the research, authorship, and/or publication of this article.

7-4-Institutional Review Board Statement

Not applicable.

7-5-Informed Consent Statement

Not applicable.

7-6-Conflicts of Interest

The authors declare that there is no conflict of interest regarding the publication of this manuscript. In addition, the ethical issues, including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, and redundancies have been completely observed by the authors.

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