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PAPER

The Impact of Electronic Banking Products on Economic Growth: the Case of Kosovo

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Abstract This study aims to investigate the impact of access and usage of electronic retail banking products or services on economic growth, with particular emphasis on the case of Kosovo. Specifically, the study will identify the impact of electronic retail payment products such as ATMs, POS, and E-banking and their impact on economic growth. The paper employs data from the Central Bank of Kosovo from 2007-2019, consisting of a times series data set. The methodology employed is a linear regression model. The results confirm that the development of retail banking products positively impacts real GDP. The study will promote the development of electronic payment products in Kosovo, and increase financial inclusion, to create possibilities for households and businesses to have better access to and use of retail financial products, leading to higher economic growth and increased macroeconomic benefits. The study findings will be valuable to the Central Bank of Kosovo, financial institutions, and other policymakers in Kosovo.

Keywords: Electronic banking products, ATM, POS, E-banking, Economic growth.

JEL Classification: G21, E02, C22, O40

1. Introduction

Over the past decades, the retail banking industry has witnessed many challenges and opportunities. Technological development and digitalization have also affected the banking sector and electronic banking services. The development of electronic banking products or services has implications for reducing transaction costs, increasing the exchange of goods, and leading to economic growth. Mainly empirical studies on electronic banking products or services have been focused on analyzing the impact of retail banking products on bank efficiency and profitability. There is a vast empirical literature on the relationship between financial development and economic growth

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(King & Levine, 1993b; Greenwood & Jovanovic, 1990; Beck et al., 2000), mainly focused on the impact of financial depth indicators, private credit, bank deposits and interest rate on economic growth. However, the impact of electronic banking products on the real economy has gained attention from researchers only in recent years.

New theories of financial development, except financial depth indicators (bank credit, bank deposits), nowadays emphasize the role of financial inclusion indicators (electronic banking products) as a significant segment of financial development. Pioneers of financial inclusion are Galor & Zeira (1993) and Banerjee & Newman (1993), who have created the conceptual background for the theory of financial access or usage, as an essential segment of financial development. The World Bank researchers have developed Global Financial Development Database, a new framework for financial systems, including financial depth, financial inclusion, financial efficiency, and financial stability, as four measures of the financial development system, both for financial institutions and financial markets (Cihak et al., 2012). The financial inclusion indicators are accepted as one of the main segments of financial development.

Inclusive financial systems are considered those that allocate monetary fund's effectively in society and the economy, contributing to economic and social development. Through financial services, people may escape poverty by facilitating investments in business, education, and health, while access to finance also can help businesses for investments and growth, creation of jobs, and innovation. On the other side, financial exclusion, or lack of access to finance, can lead to societal inequality, increase poverty and indicate lower economic growth (The World Bank, 2014). Financial inclusion means that individuals and businesses have access, to or use financial electronic products or services, like transaction payments, savings, and credit facilities or services, that are delivered responsibly (Demirguc-Kunt et al., 2018). Financial inclusion through the development of electronic banking products can have a positive impact on growth by reducing poverty as well as may indicate in income inequality. Also, a developed retail payment system can reduce market friction and lead to an efficient payment system that can help transfer funds in society, increase trade and services, and enhance economic growth.

Despite the relative importance of retail financial products, the empirical literature on electronic banking products' impact on economic growth is not well developed. Some studies examined the relationship between electronic payment instruments or products and bank cost or profitability (Humphrey et.al, 2003). Authors Hasan et al. (2012), find that electronic banking products positively impact bank performance and create many possibilities for increasing credit, investment, and growth (Hasan et al.,2012). So, the limitation of existing retail payment infrastructure literature is that it focuses on the implication that electronic payment products or services have on the banking sector, without extending the analysis for possible benefits of retail payment products on the real economy or economic growth.

This paper aims to fill this gap by estimating the impact of electronic banking products: ATMs, POS, and E-banking on real GDP in Kosovo over the period 2007-2019. The study paper is to find whether financial retail banking products positively impact Kosovo's real GDP. In order to examine this implication, we address the research question: Does electronic banking products increase real GDP in Kosovo? We establish the following two hypotheses to address this research question:

H1. The increased number of electronic banking products will positively impact the real GDP in Kosovo;

H2. Electronic banking products' increased value positively impacts Kosovo's real GDP.

The contribution of this paper is twofold: Firstly, the study fills the gap in finding the correlation between financial inclusion or electronic banking products as a segment of financial development and economic growth in Kosovo. Secondly, the study explores the impact of different financial inclusion indicators, the number and value of ATMs, POS, and E-banking on economic growth, expressed through real GDP in Kosovo. The paper is organized as follows: The next section provides a literature review. Section three explains the research methodology and data. Section four shows empirical results. Section five provides the conclusion and recommendations.

2. Literature review

Numerous studies investigate the importance of financial development and its contribution to economic growth and productivity (King&Levine, 1993b; Rajan & Zingales, 1988; Beck et al., 2000). On the other hand, many studies focus on the relationship between electronic payment products and bank profitability. Berger (2003), found that technical development of banking systems, such as internet banking and electronic banking products or services, lead to reduced paper-based bank activities or bank operation cost, increasing productivity and bank profitability (Berger, 2003). Humphrey et al. (2003) find that European countries may save around 1% of their GDP annually as it shifts from an entirely paper-based based to a fully electronic-based payment system. Bank costs, as a result, may have fallen by 45%, as the share of electronic transactions in 12 countries rose from .43 to .79 over 1987-1999 (Humphrey et al., 2003).

Recently, empirical studies are focused on the role of electronic banking products in economic growth or socio-economic development (Beck et al., 2005). Bruhn et al. (2004) find that an increase in financial services in Mexico leads to an increase in income for low-income individuals to about 7% and employment growth by 1.4%. Thus, the increase in access to financial services has had a significant impact, both on the labor market and on the level of income, and the increase in GDP per capita (Bruhn & Love, 2014; Demirguc-Kunt et al., 2017). Dabla-Norris et al. (2015) find that increasing financial depth and financial inclusion by reducing the cost of credit products can increase the participation of small businesses in lending, affect economic growth,

and have an impact on income inequality (Dabla-Norris et al., 2015). Lenka et al. (2017), using time series methods over the period 1980-2014, have found that financial inclusion indicators or electronic banking products positively impact economic growth in India in the long and short term. (Lenka & Sharma, 2017). Sharma (2016) find that there is a positive association between economic growth and dimensions of financial inclusion: banking penetration, availability of banking services, and usage of banking services in India over the period 2004-2013. The regression results confirm the positive and significant relationship between financial inclusion segments and GDP in India (Sharma, 2016). Inoue et al. (2016), applying panel data for 37 African countries over the period 2004-2012, have analyzed the impact of access to finance on economic growth in Sub-Saharian countries. Empirical results show that improving financial access to products positively affects economic growth (Inoue & Hamori, 2016).

Hasan et al. (2012), using data from 27 European countries, over the period 1995-2009, have examined the relationship between retail payments and economic growth. Empirical results show that electronic retail payments products: Card payments, ATMs, and POS terminals positively impact GDP, consumption and trade and contribute positively to the whole economy. (Hasan et al.,2012). Zandi et al. (2016) have analyzed the impact of the electronic product on economic growth, trying to answer the question: Do electronic payments provide macroeconomic benefits? The empirical results show that increased use of electronic payment products like debit cards and credit cards positively affects consumption and GDP. In the sample of 70 countries, during the period 2012-2015, the increase in card usage contributed to an increase in consumption of 296 milliard euros, increasing GDP by 0.10 % yearly (Zandi et al., 2016).

The primary empirical studies on the relationship between financial, retail products, and economic growth have used time series data, usually applying linear regression techniques. Most empirical studies find a positive correlation between electronic retail banking products and economic growth.

3. Research methodology - data

The data used for this paper are secondary data of the Central Bank of Kosovo over 2007-2019. The study uses time series on yearly and quarterly bases. Based on empirical studies (King et al., 1993; De Gregorio & Guidotti, 1995; Demetriades & Hussein, 1996; Levine, 1997), the most well-known indicator in literature for measuring economic growth is: real Gross Domestic Product - GDP, as the dependant variable. At the same time, the independent variables for measuring electronic banking products are: ATM withdrawals, POS payments, and E-banking payments (Hasan et al., 2012; Zandi et al., 2016; Humphrey et al., 2003).

In this section, an empirical econometric model is developed to investigate the relationship between electronic banking products and real GDP in Kosovo. For this purpose, a linear regression model is employed to empirically assess the impact

of electronic banking products on real GDP. The basic model can be written in the following equation:

$$GDP_t=\beta_0+ \beta_1 ATM_t+ \beta_2 POS_t+ \beta_3 eBanking_t+e_t$$

where GDP is the dependent variable which represents economic growth in Kosova; t represents years; e is the error term; while the explanatory or independent variables are: ATM, which represents the number or value of ATM withdrawals; POS is the number or value of payments through POS terminals, and E-banking are number or transaction values of E-banking in Kosovo.

The number of ATMs in Kosovo shows positive trends over 2007-2020. The number of ATM terminals from 2007 till 2015 has increased rapidly. Over 2015 -2020 number of ATMs has shown slight decrease due to the fact that commercial banks have oriented towards the development of other electronic and digital banking products such as POS terminals and e-banking. The largest number of ATMs was in 2015, a total of 540 ATMs, while in 2020 the number of ATMs was 513.

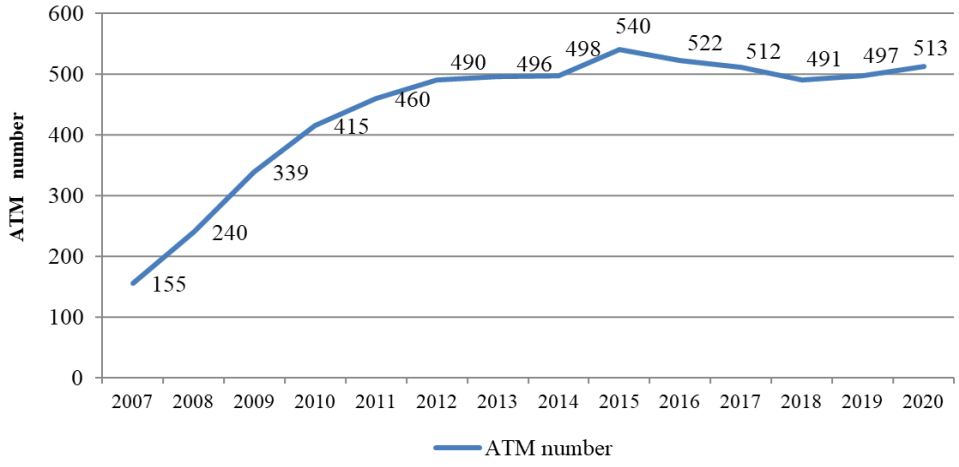

Figure 1. The number of ATMs in Kosovo
Source: Central Bank of Kosovo,2007-2020, author's calculations

In comparison with ATMs, number of POS terminals has increased faster. The number of POS terminals in Kosovo in 2009 was 525, while in 2019 number has significantly increased to 13769 POS terminals. In 2020, the number of POS terminals was 13421, or 2.53 % less than the previous year.

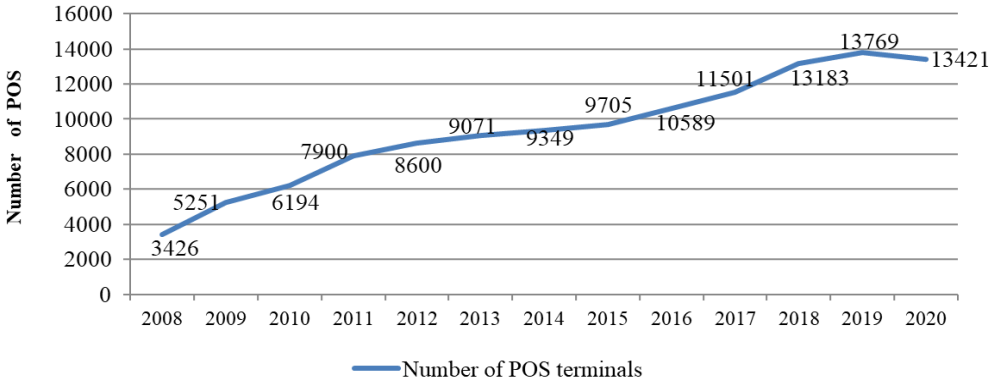

Figure 2. The number of POS terminals in Kosovo
Source: Central Bank of Kosovo,2008-2020, author's calculations

The number of e-banking accounts in Kosovo has increased rapidly during the last decade. In 2019, the total number of e-banking accounts reached 337693, and compared to the previous year (2018), it is shown an annual increase of 86960 e-banking account users, or 34.7 %. In 2020, the Covid-19 pandemic accelerated the access and use of digital payment products in Kosovo. The number of e-banking accounts reached 411346 e-banking accounts, showing a yearly increase of 73653 e-banking accounts, or 21.8 %.

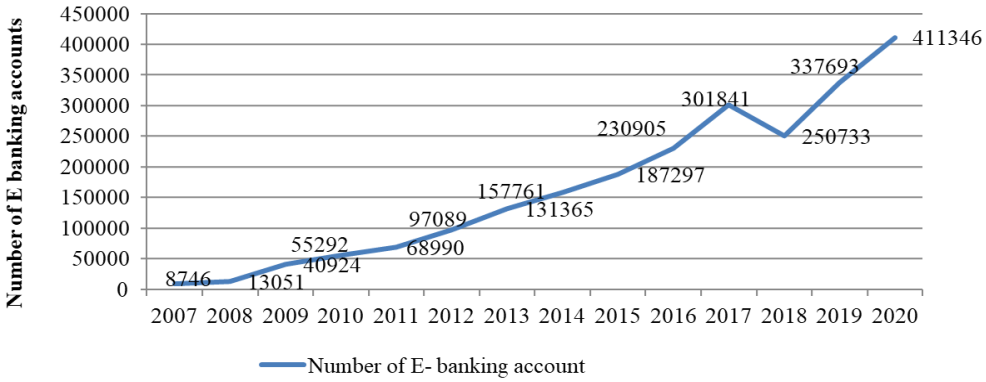

Figure 3. The number of E-banking accounts in Kosovo
Source: Central Bank of Kosovo,2007-2020, author's calculations

The annual transaction value of electronic payment products in Kosovo has also shown positive trends. The value of ATM withdrawals, POS payments, and e-banking payments in Kosovo has shown constant growth annually. The value of withdrawals in ATMs in 2019 increased by 16.6 %. The value of payments

in POS terminals in 2019 has annually increased by 23.2%, while E-banking payments volume increased by 13.7 % in 2019 (Central Bank of Kosovo, 2020). GDP has also shown positive growth annually. In 2019, the GDP in Kosovo was 7.080 billion euro, and an annual increase of 5.2 %. The data in the table below show a positive relation between the value of electronic payment products and GDP in Kosovo.

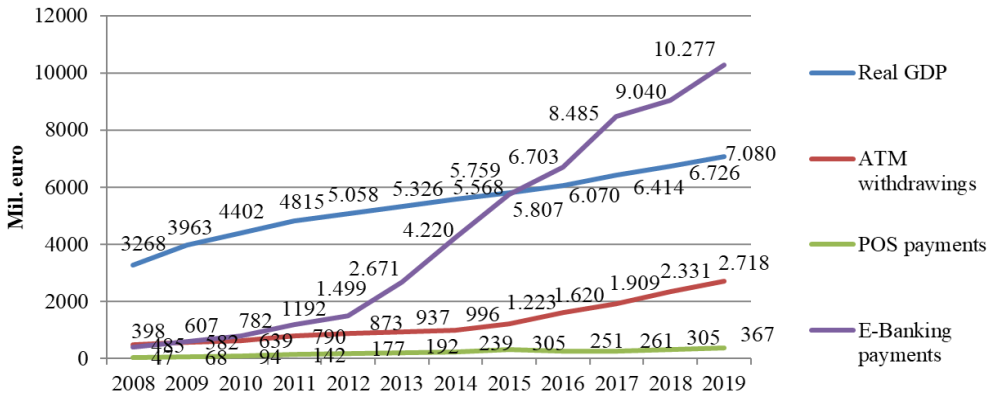

Figure 4. Annual transaction value of electronic payment products and GDP
Source: Central Bank of Kosovo, 2008-2019, authors calculation

The following section provides the estimates of the model and interprets the empirical regression results, estimating the impact of electronic banking products on real GDP in Kosovo.

4. Empirical results

In the empirical estimates, the endogenous variable is the real GDP in Kosovo, while exogenous variables are the number and value of electronic banking products of ATM, POS, and E-banking. Table 1 shows the regression results of such a relationship.

To test the hypothesis of this study, we have applied statistical tests through Stata software, such as Multiple Linear regression analysis: pooled OLS, Fixed Effects model, and Random Effects model. These tests are applied both for the number and value of transactions of electronic banking products in Kosovo: ATM, POS, and E-banking, on quarterly bases, over the period 2007/08-2019.

Based on the output from empirical regression analysis, the p-value of the overall F test in our model is significant. The model is statistically significant; the P-value is zero to four decimal places. The R-square or coefficient of determination in the model has high values, showing that data fits the model or explaining the dependent variable of GDP by independent variables in the regression model.

Table 1. Regression results based on the number and value of transactions of ATM, POS and E-banking

Variables	Pooled OLS	Fixed Effects	Random Effects
Real GDP			
Number of.ATM	.8794809 (0.010)***	1.777259 (0.228)*	.9038047 (0.011)**
Number of POS	.1913266 (0.000)***	.0459122 (0.559)*	.1882152 (0.000)***
Number of Ebanking	.0045762 (0,000)***	.0080509 (0.000)***	.0046588 (0.000)***
Constant	2635.018	2978.292	2639.116
Nr. of Observation	52	52	52
Prob >F	0.0000	0.0000	0.0000
R-squared	0.9885	0.9781	0.9885
F	(3,48) 1375.59	(3,36) 12.92	13
Chi2 ; Prob>F	-	0.0000	0.0000
Log_Real GDP			
Log_ATM withdrawings	.1248413 (0.000) ***	.0698153 (0.013)**	.0615123 (0.051)**
Log_POS payments	.1436354 (0.000)***	.0308875 (0.301)*	.0816703 (0.012)**
Log_E-Banking	.0454617 (0.019)**	.0607067 (0.012)**	.0947346 (0.000)***
Constant	7.023778	7.657432	7.292557
Nr. of Observation	48	48	48
Prob >F	0.0000	0.0000	0.0000
R-squared	0.9805	0.9733	0.9763
F	(3,44) 737.79	(11,33) 14.61	(11,33)
Chi2			0.0000

Notes: p-values: statistically significant at 1% level ***; statistically significant at 5 % **; statistically significant at 10 %

*Source: Central Bank of Kosovo, Payment System data over the period 2008-2019.

Firstly: In our first multiple linear regression analysis, we will regress the dependent variable, real GDP, in all of the predictor variables: number of ATM terminals, number of POS terminals, and number of E-banking accounts in Kosovo, based on quarterly

data, over the period 2007-2019. The model is statistically significant since the F test in the model is statistically significant. Linear regression results are positive according to OLS, Fixed, and Random effects. The interpretation of regression analysis is based on Random effects results. An increase of ATM for one unit will indicate an increase in GDP for .9038047, assuming that all other variables in our regression model are held constant. The p-value for coefficients is 0.011, indicating that the relationship between GDP and ATM is statistically significant at 0.05. We expect an increase in dependant variable for .1882152 units, for one unit increase in Pos terminals number in our model. The p-value is 0.000, the model is statistically significant. An increase of E-banking for one unit will indicate a positive in real GDP in Kosovo, with a coefficient of .0046588, holding constant all other factors in the model. This relationship has a p-value of 0.000, showing high significance between coefficients in our model. The regression results of the relationship between real GDP and the number of electronic banking products, like the number of ATMs, number of POS, and number of E-banking, using pooled OLS, Fix Effects as well as Random Effect technique, generate a positive relationship between electronic banking products and real GDP in Kosovo, confirming the first hypothesis in our model.

Secondly, we have regressed real GDP in Kosovo with the transaction value of electronic banking products: the value of withdrawals in ATMs, and the value of payments through POS and E-Banking. Because of the high data values in the model (high values of transactions of electronic banking products), we have transformed or logged the data to create the normal distribution of data and obtain reliable empirical results. The regression model has a p-value of 0.000, and the model is statistically significant. R-square or coefficient of determination has high values, too.

The regression model results of pooled OLS, Fix, and Random effects techniques between real GDP and value of transaction of ATM, POS and E-banking, confirm the second hypothesis that electronic banking products positively impact real GDP in Kosovo. Based on Random effects techniques, the coefficient .0615123 in the model means that an increase in ATM withdrawal for one unit will reflect positively on real GDP for .0615123, holding all other factors or variables in the model constant, the p-value for this coefficient is 0.051. The increase of payments through POS terminals for one unit has a positive impact on real GDP for .0816703, with a p-value of 0.012, showing the high significance of the model. The increase of E-banking value payments for one unit has shown positive effects on real GDP, with a coefficient of .0947346. The p-value is 0.000, and the model is statistically significant, too.

Empirical findings or regression results based on the number and value of electronic banking products answer our research question: that electronic banking products positively impact real GDP. These results align with other empirical studies of Hasan et al. (2012) and Zandi et al. (2016), confirming that electronic retail banking products, ATM, POS and E-banking are positively related to real GDP. The results

confirm the hypothesis that electronic banking products' number and value positively impact Kosovo's real GDP.

5. Conclusions and Recommendations

The purpose of this study was to show the relationship between electronic banking products and economic growth in Kosovo. This study makes several contributions to the literature on financial development, proving the importance of electronic banking products or financial inclusion banking products on economic growth. The findings of this paper, over the period 2007-2019, on quarterly bases, show that the number of electronic banking products: ATM, POS, and E-Banking, positively impact economic growth, expressed by real GDP in Kosovo. Moreover, the linear regression of GDP and value of electronic retail products, over the period 2008-2019 also has shown a positive impact on real GDP. These results correlate with empirical studies of Hasan et al. (2012) and Zandi et al. (2016), confirming a positive relationship between electronic banking products and economic growth. This paper's findings are helpful for government and monetary policy authorities and central and commercial banks in Kosovo and provide them with valuable information about the importance of electronic banking products for increasing the level of financial inclusiveness and the level of economic growth in the country. It will help them to design sound financial development and inclusion policies, to create better and more efficient financial services for individuals and businesses, and to enhance economic growth. The paper presents many possibilities for future studies. Therefore, researchers would extend further studies focusing on the relationship between different indicators of financial access and usage and socio-economic development.

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Linear Regression based on Quarterly Data of Real GDP and Number of ATM, Number of POS and Number of E-banking in Kosovo

Table 1. Descriptive statistics on GDP and number of electronic banking products

Variable	Obs	Mean	Std. Dev.	Min	Max
Log_real Gdp	52	8.52059	.2397415	8.055158	8.878916
Log_nrATM	52	5.992344	.3790706	4.85203	6.295266
Log_nrPOS	52	8.883924	.5318548	7.501082	9.530175
Log_nrEbanking	52	11.28389	1.240558	8.203031	12.62347

Source: Central Bank of Kosovo, author's calculations

Table 2. OLS Regression results

Source	SS	df	MS
Model	69015374.5	3	23005124.8
Residual	802741.437	48	16723.7799
Total	69818115.9	51	1368982.67

Number of obs =	52
F (3, 48) =	1375.59
Prob > F =	0.0000
R-squared =	0.9885
Adj R-squared =	0.9878
Root MSE =	129.32

RealGDP	Coef.	Std. Err.	t	P>|t|	(95% Conf.	Interval)
NrATM	.8794809	.3275862	2.68	0.010	.2208248	1.538137
NrPos	.1913266	.0225658	8.48	0.000	.1459551	.2366981
NrEBanking	.0045762	.0006102	7.50	0.000	.0033492	.0058032
_cons	2635.018	80.06765	32.91	0.000	2474.031	2796.004

Source: Central Bank of Kosovo, author's calculations

Table 3. Fixed effects model results

Fixed-effects (within) regression		
Group variable: Code		
R-sq:	within	= 0.5184
	between	= 0.9859
	overall	= 0.9781
	corr (u_i,Xb)	= 0.3655

Number of obs =	52
Number of groups =	13
Obs per group: min =	4
avg =	4.0
max =	4
F(3, 36) =	12.92
Prob > F =	0.0000

RealGDP	Coef.	Std. Err.	t	P> |t|	(95%Conf.Interval)	
NrATM	1.777259	1.1448238	1.23	0.228	-1.159904	4.714422
NrPOS	.0459122	.0778346	0.59	0.559	-.1119437	.2037682
NrEBanking	.0080509	.0020759	3.88	0.000	.0038407	.0122611
_cons	2978.292	541.4237	5.50	0.000	1880.234	4076.351
sigma_u	152.88624					
sigma_e	124.61363					
rho	0.60083661	(frac.of var due to u_i)				

Source: Central Bank of Kosovo, author's calculations

Table 4. Random Effects model results

Fixed-effects (within) GLs regression			Number of obs =	52
Group variable: Code			Number of groups =	13
R-sq:	within	= 0.4670	Obs per group: min =	4
	between	= 0.9973	avg =	4.0
	overall	= 0.9884	max =	4
	corr (u_i,X)	= 0 (assumed)	Wald chi2 (3) =	
			P Prob > chi2 =	0.0000

RealGDP	Coef.	Std. Err.	z	P> |z|	(95% Con.Int)	
Nr ATM	0.9038047	.3546506	2.55	0.011	.2087023	1.598907
Nr POS	0.1882152	.0243262	7.74	0	.1405367	.2358938
Nr EBanking	0.0046588	.000658	7.08	0	.0033691	.0059485
_cons	2639.116	86.92289	30.36	0	2468.751	2809.482
sigma_u	30.744272					
sigma_e	124.61363					
rho	.05737669	(fraction of variance due to u_i)				

Source: Central Bank of Kosovo, author's calculations

Linear Regression of log GDP and transaction value of electronic banking products

Table 5. Descriptive statistics on GDP and transaction value of electronic banking products

Variable	Obs	Mean	Std. Dev.	Min	Max
log_Gdp	48	8.557244	.2109497	8.124743	8.878916
log_ATM withdrawings	48	5.596332	.5602622	4.521789	6.659294
log_POS payments	48	3.763831	.6450657	2.302585	4.624973
log_Ebanking payments	48	6.471238	1.140078	4.29046	7.977968

Source: Central Bank of Kosovo, author's calculations

Table. 6. OLS regression results

Source	SS	df	MS
Model	2.05072285	3	.683574285
Residual	.040766649	44	.000926515
Total	2.0914895	47	.044499777

Number of obs	=	4
F (3, 44)	=	737.79
Prob > F	=	0.0000
R-squared	=	0.9805
Adj R-squared	=	0.9792
Root MSE	=	.03044

log_Gdp	Coef.	Std. Err.	t	P>|t|	(95%Con.Int)	
log_ATM withdrawings	.1248413	.0248144	5.03	0.000	.0748312	.1748514
log_POS payments	.1436354	.0230015	6.24	0.000	.0972789	.1899919
log_Ebanking payments	.0454617	.0187491	2.42	0.019	.0076753	.0832481
_cons	7.023778	.0704261	99.73	0.000	6.881843	7.165712

Source: Central Bank of Kosovo, author's calculations

Table 7. Fixed effects model results

Fixed-effects (within) regression		
Group variable: Code		
R-sq:	within	= 0.8219
	between	= 0.9831

Number of obs =	48
Number of groups =	12
Obs per group: min =	4
avg =	4

	overall	= 0.9733	max =	4
	corr (u_i,X)	= 0.9309	F(3,33) =	50.77
			P Prob > F =	0.0000

log_Gdp	Coef.	Std. Err.	t	P> |t|	(95% Conf. Interval)	
log_ATM withdrawings	.0698153	.0265497	2.63	0.013	.0157995	.123831
log_POS payments	.0308875	.0294156	1.05	0.301	-.0289589	.090734
log_Ebanking payments	.0607067	.0227937	2.66	0.012	.0143326	.1070807
_cons	7.657432	.0813063	94.18	0.000	7.492013	7.822851
sigma_u	.09130447					
sigma_e	.01450535					
rho	.97538232	(fraction of variance due to u_i)				

F test that all u_i = 0 F(11, 33) = 14.61 Prob > F = 0.000

Source: Central Bank of Kosovo, author's calculations

Table 8. Random effects model results

Fixed-effects (within) GLs regression			Number of obs =	48
Group variable: Code			Number of groups =	12
R-sq:	within	= 0.8133	Obs per group: min =	4
	between	= 0.9855	avg =	4
	overall	= 0.9763	max =	4
	corr (u_i,X)	= 0 (assumed)	F(3,33) =	600.14
			P Prob > F =	0.0000

log_Gdp	Coef.	Std. Err.	z	P>|z|	(95% Con.Int)	
log_ATM withdrawings	.0615123	.0314908	1.95	0.051	-.0002085	.1232331
log_POS payments	.0816703	.0325475	2.51	0.012	.0178784	.1454623
log_Ebanking payments	.0947346	.0243901	3.88	0.000	.0469309	.1425383
_cons	7.292557	.090491	80.59	0.000	7.115198	7.469916

sigma_u	.01861317	
sigma_e	.01450535	
rho	.62215456	(fraction of variance due to u_i)

Source: Central Bank of Kosovo, author's calculations