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# PAYMENT CARD BUSINESS AS A DRIVER FOR BANK PERFORMANCE

## БИЗНЕС ПЛАТЕЖНЫХ КАРТ КАК ФАКТОР ВЛИЯЮЩИЙ НА РЕЗУЛЬТАТЫ ДЕЯТЕЛЬНОСТИ БАНКА

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**Abstract.** Based on the data of the European Central Bank (ECB), banks in EU27 markets perform better in countries with more developed retail payment services. The goal of the current research is to investigate the impact of the usage of payment cards and retail payment transaction equipment on bank performance. Research period covers 2008-2012. ECB statistics on the banking sectors of EU27 countries was processed by means of SPSS software. Regression analysis was conducted to define the relationship between retail payment variables and bank performance indices. The analysis yielded a statistically significant linear regression model that links bank operating income with two explanatory factors: value of transactions and number of automatic teller machines (ATM).

**Keywords:** payment cards, bank performance, regression analysis.

### 1. Introduction

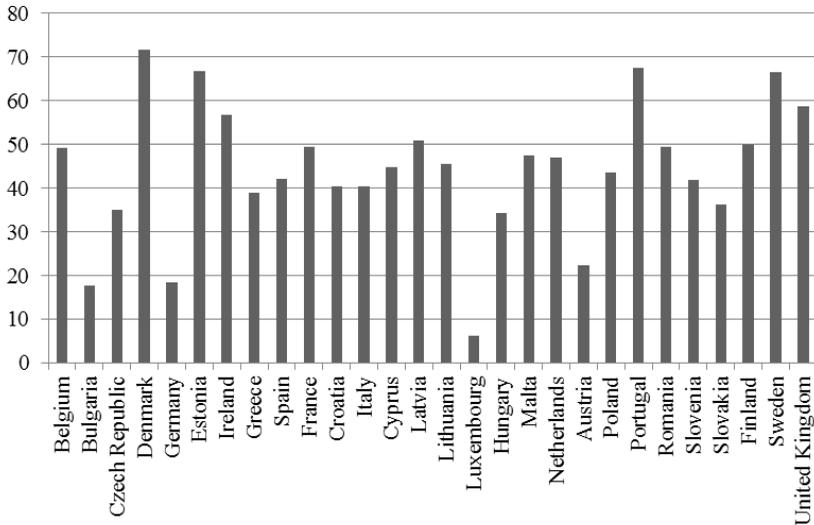
The global consumer payment market has more than doubled over the last decade and its volume in 2014 was 47 trillion US dollars. 2014 was the first year which the share of digital payment volume surpassed that of cash payment methods. [8]

More than 50 per cent of global non-cash payment growth comes from developing countries: the U.S. and the Eurozone are still ahead in the number of non-cash transactions made per inhabitant. [24]

The total number of non-cash payments in the European Union (EU), across the different types of instruments, increased by 6.0 per cent to 100 billion in 2013 compared with the previous year. In turn, card payments accounted for 44 per cent of all transactions. The number of cards with a payment function in the EU increased in 2013 by 3 per cent to 760 million. This represented around 1.5 payment cards per EU inhabitant. The number of card payments rose by 9.6 per

cent to 43.6 billion, with a total value of 2.2 trillion euro. This corresponds to an average value of around 49 euro per card transaction.

Despite the fact that payment instruments continued to differ widely across EU countries, payment cards remain the main payment instruments. Relative importance of payment cards (a percentage of total number of transactions) varies from 17.7 per cent in Bulgaria to 71.8 per cent in Denmark. However, this ratio exceeds 45 per cent in most European countries, including Latvia, Lithuania and Estonia with 50.93, 45.55 and 66.87 per cent respectively (Fig. 1). [10]



**Fig. 1.** The relative importance of payment cards across EU countries in 2013 [10].

Credit and debit cards have increasingly become the preferred methods for consumers to pay for goods and services [12]. Besides, credit cards are a key source of consumer credit.

Payment card business worldwide has been developed under the impact of several factors, such as intensifying regulation in the area of interchange fees, lowering of cross-border barriers, consolidation among industry players, rising economic uncertainty, the emergence of new technologies, and competitive pressures within the banking industry. [24]

Moody’s Analytics tested whether the long-term shift to credit and debit cards stimulates economic growth, and found that electronic card payments continue to have a meaningful impact on the world economy. These findings are notable as the global economy struggles to recover, and as individual countries consider whether to take steps to enable the wider use of cards [18].

The goal of the current research is to examine the impact of payment card business on overall bank performance.

To achieve the established goal the following tasks should be accomplished:

- To select the appropriate ratios that could be used to measure bank performance and payment card business performance;
- To perform a correlation analysis to test regression assumptions (the existence of the relationship between dependent and independent variables and absence of multicollinearity between explanatory factors);
- To perform a regression analysis to define the relationship between bank performance and payment card business performance.

Bank performance was measured with return on equity ratio and operating income. In turn, seven different indices were used as proxies for payment card business performance.

The research hypothesis was stated, as follows:

*H1: There is a statistically significant relationship between payment card business performance and bank performance.*

The findings of the current research contribute to the existing data on the impact of retail payment services, in particular payment cards and payment transaction equipment, on bank profitability.

## **2. Impact of retail payment services on bank performance**

Retail payment services have a direct impact on banks' non-interest income, such as fee income arising from payment services and bank account management. Non-interest income has a very important impact on bank performance [15]. Boston Consulting Group's experts reported that payments business accounts for 30-50 per cent of bank revenues [6].

Payment cards are type of retail payment non-cash instruments along with credit transfers, direct debits and cheques. [9] Besides, debit cards and credit cards are key elements of electronic banking. Based on data of the Bank for International Settlements (BIS), most retail payments from customers to merchants using the internet take the form of credit/debit card payments [5]. In turn, it was proved that a greater use of electronic payment instruments can improve bank performance [15].

Many studies show that payment cards and e-payment in general have a positive effect on banking industry and on the economy as well. The usage of debit and credit cards varies by country, with generally being more widespread in developed countries, and close to non-existent in developing countries [23].

Based on the country-level retail payment service data from across 27 EU markets, evidence confirms that banks perform better in countries with more

developed retail payment services. This relationship is stronger in countries with more retail payment transaction equipment, like automatic teller machines (ATMs) and point-of-sale (POS) terminals [15].

Many researchers focus their attention on analysis of the relationship between bank performance and usage of retail payment instruments and equipment. The most frequently investigated issues are: (1) usage of payment cards and bank performance [19; 20] and (2) usage of ATMs and POS terminals and bank profitability. [13; 17; 21; 1; 14].

Table 1 summarizes the information about the retail payments related variables used in different studies to predict bank performance.

**Table 1.** Retail payments and bank performance: overview of studies

Source	Research description	Retail payment variables
Al-Qudah <i>et al.</i> 2012 [4]	Investigation of the impact of electronic credit cards usage on bank profitability	<ul style="list-style-type: none"> <li>• Number of credit cards</li> <li>• Operational expenses related to credit cards</li> <li>• Capital investments into credit card business</li> <li>• Income from credit card business</li> </ul>
Hasan <i>et al.</i> 2009 [15]	Investigation of the impact of retail payments on bank performance	<ul style="list-style-type: none"> <li>• Number of total transactions to population</li> <li>• Number of ATMs to population</li> <li>• Number of POS terminals</li> <li>• Value of transactions</li> </ul>
Itah & Ene, 2014 [16]	Investigation of the impact of cashless banking on bank profitability	<ul style="list-style-type: none"> <li>• number of ATMs</li> <li>• Number of POS terminals</li> <li>• volume of transaction on e-banking services</li> </ul>
Aduda & Kingoo, 2012 [2]	Analysis of the relationship between electronic banking and financial performance of banks	<ul style="list-style-type: none"> <li>• Number of payment cards</li> <li>• Number of ATMs</li> </ul>

Bank performance most frequently is expressed by return on assets (ROA) or return on equity (ROE) ratios. [1; 3; 22] However, profit-related ratios are influenced by huge range of factors that can reduce the reliability of the analysis.

### 3. Research methodology

To achieve the established research goal and to test the research hypothesis, two indices were chosen as proxies for bank performance and seven ratios for payment card business performance. Bank performance was expressed with return on equity (ROE) ratio and operating income (OI) ratio. Payment card business performance indices are, as follows:

1. Total card payments (TP);
2. Relative importance of card payments (Imp) - the percentage of payment card usage in the total amount of electronic payments;
3. Number of card transactions per capita (noT);
4. Value of transactions per capita (voT);
5. Number of payment cards (noC);
6. Number of ATMs (ATM);
7. Number of POS terminals (POS).

To define the relationship between dependent variables (ROE and OI) and factors affecting bank performance, correlation analysis was conducted.

Data for the analysis was extracted from European Central Bank statistical warehouse [11]. Analysis period covered 2008 – 2012.

Sample involved banks of 27 European countries and was subdivided into: (1) EU12 (NMS) – New Member States (Slovakia, Slovenia, Romania, Poland, Malta, Hungary, Lithuania, Latvia, Estonia, Cyprus, Czech Republic, and Bulgaria), and (2) EU15 – Old Member States (United Kingdom, Sweden, Finland, Portugal, Austria, Netherlands, Luxemburg, Italy, France, Spain, Greece, Ireland, Germany, Denmark, and Belgium).

Correlation was conducted separately for each country. In order to get more objective results and for better understanding of the trends in the regions, the aggregated data was calculated separately for EU, EU15 and EU NMS.

To avoid the problem of multicollinearity between the explanatory factors, the whole sample data was analysed.

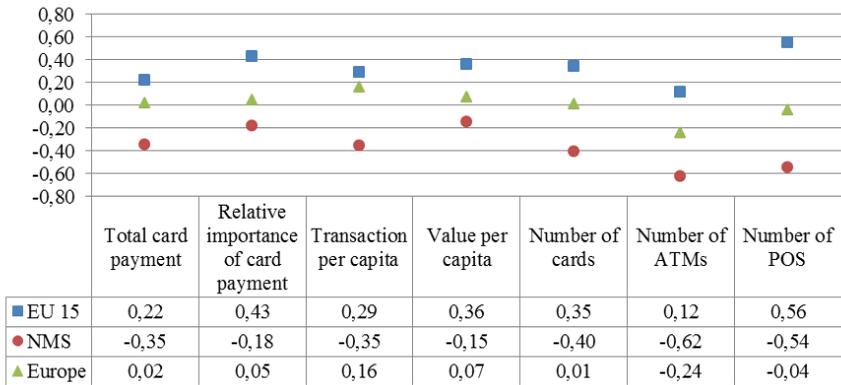
Based on the results of the correlation analysis, all possible combinations of variables were used to construct linear regression models.

#### **4. Research results**

Figure 2 demonstrates the results of the correlation analysis for ROE and payment card business performance indices. The results differ widely between the regions. Obviously, banking sector of EU15 countries has more developed retail payment system and services.

As a result, retail payment variables positively correlate with bank profitability. However, correlation coefficients are relatively small, except of the case in regards to the number of POS terminals.

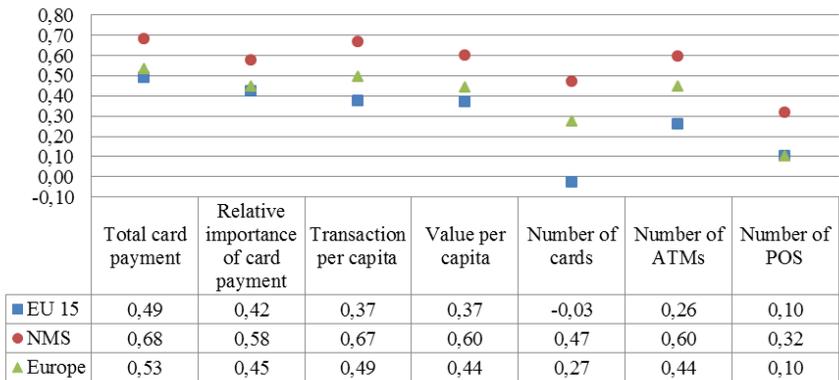
Such factors, as total payments and value of transactions have a great impact on fee-based income, and consequently on bank profitability. However, ROE ratio is affected by many other factors and it could be a reason for low correlation.



**Fig. 2.** Results of the correlation analysis: ROE vs. retail payments

Due to the fact that there is no strong relationship between ROE and selected variables, ROE ratio is not used as a dependent factor for making a regression analysis.

Figure 3 summarizes the correlation coefficients received from the analysis of the relationship between bank operating income and other variables.



**Fig. 3.** Results of the correlation analysis: OI vs. retail payments

Performed analysis revealed a much higher correlation between operating income and payment card industry indicators in both regions. The lowest coefficients were estimated for the relationship between dependent variable and two factors: number of payment cards and number of POS terminals.

Table 2 demonstrates the results of the correlation analysis between explanatory variables, conducted to avoid using the highly correlated indices in one model.

**Table 2.** The results of the correlation analysis for explanatory indices

		TP	Imp	noT	voT	noC	ATM	POS
TP	ρ	1	.130	.284	.271	.555**	.627**	.701**
	Sig.		.518	.152	.171	.003	.000	.000
Imp	ρ	.130	1	.541**	.297	-.012	-.075	.094
	Sig.	.518		.004	.133	.951	.709	.642
noT	ρ	.284	.541**	1	.871**	.079	-.048	.078
	Sig.	.152	.004		.000	.697	.814	.698
voT	ρ	.271	.297	.871**	1	.197	.073	.180
	Sig.	.171	.133	.000		.325	.719	.369
noC	ρ	.555**	-.012	.079	.197	1	.956**	.837**
	Sig.	.003	.951	.697	.325		.000	.000
ATM	ρ	.627**	-.075	-.048	.073	.956**	1	.873**
	Sig.	.000	.709	.814	.719	.000		.000
POS	ρ	.701**	.094	.078	.180	.837**	.873**	1
	Sig.	.000	.642	.698	.369	.000	.000	

Correlation coefficients marked with “\*” and “\*\*” are significant at the 0.05 and 0.01 level, respectively. Highly correlated variables cannot be used in the regression model simultaneously.

Based on the results of two-step correlation analysis, operating income was chosen as a dependent variable for the regression analysis. Besides, ten possible combinations of a regression model were constructed to be tested (Table 3).

**Table 3.** Model with different combinations of variables

Independent variables	Models with Constant			Models without Constant		
	R <sup>2</sup>	Adj. R <sup>2</sup>	Sig.	R <sup>2</sup>	Adj. R <sup>2</sup>	Sig.
voT, Imp, TP	.511	.448	.001	.635	.589	.001
noT, TP	.499	.457	.000	.623	.593	.000
ATM, voT, Imp	.913	.901	.000	.926	.917	.000
ATM, noT	.912	.904	.000	.915	.908	.000
voT, ATM	.911	.904	.000	.916	.910	.000

The data summarized in the Table 3 indicates the fact that all the tested models are statistically significant (Sig. < 0.05). However, the only model with

independent variables voT (value of transactions) and ATM (number of ATMs) has statistically significant regression coefficients (Table 4).

**Table 4.** Model summary (independent variable OI)

Model summary						
R	R <sup>2</sup>	Adj. R <sup>2</sup>	F	Sig.	Durbin-Watson	
0.955	.911	.904	14.16339	0	1.620	
Coefficients						
Model	Coefficients		T	Sig.	Collinearity Statistics	
	B	Std. Error			Tolerance	VIF
Constant	-11.921	4.518	-2.638	.014		
voT	2.640	.811	3.254	.003	.995	1.005
ATM	1.772	.117	15.105	.000	.995	1.005

For a confidence level of 95 per cent, if „significance F" is less than 0.05, then the null hypothesis is rejected (there is a statistically significant association between dependent variable and independent variables). The significance F for the model is equal to 0.000. R-squared of the model is equal to 0.911, indicating that 91.1 per cent of the variability in the banking sector performance is explained by this model. Durbin-Watson statistics is greater than its upper critical value ( $D_U = 1.023$ ), which indicates that there is no autocorrelation in the residuals.

As for regression coefficients, p-values for both are less than 0.05 (for voT  $p = 0.003$ , for ATM  $p = 0.000$ ). It means that both coefficients are not equal to zero with a probability of 95 per cent. The variance inflation factor ( $VIF = 1.005 < 10$ ), which indicates that there is no multicollinearity [7]. Constant was included in this model. The developed model is expressed by the following equation:

$$OI = 2.64 \times voT + 1.772 \times ATM - 11.921 \tag{1}$$

Based on the model, increasing the value of payment card transactions, it is possible to triple the volume of bank operating income.

## 5. Conclusions

The current research is based on the literature review on the investigation of the relationship between retail payment services and performance in the banking industry.

Various studies provide the empirical evidence of the fact that retail payment services foster innovation and growth in the banking sector and create value to bank shareholders. Retail payment services have a larger impact on bank

performance in countries with a relatively high adoption of retail payment transaction technologies. In particular, bank efficiency increases with the increased number of retail payment transactions which have been done through ATMs or POS terminals.

Payment cards are basic instruments for retail payment system. The hypothesis about the impact of payment card business impact on bank profitability was tested and confirmed within the current research.

The given study yielded a regression model linking bank operating income with the value of payment card transactions and number of ATMs. The developed model could be tested in different countries to make a conclusion on its applicability and universality. Besides, the range of the analysed variables could be extended, involving more indices. For instance, net interest margin could be used as a proxy for bank performance.

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