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MODELING THE IMPACT OF EPS ON THE ECONOMIC DEVELOPMENT OF COUNTRIES

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Abstract

The modern economy no longer needs quantitative but qualitative changes for its further development. One aspect of such changes is the digitalization of the financial sector, in particular through the introduction of electronic payment systems. The impact of the introduction and spread of electronic payment systems on the level of GDP growth and other macroeconomic indicators that characterize the economic development of the country through the use of different econometric models was analyzed on the example of countries of different levels of development: Nigeria and Italy. Two econometric models have been built to assess the interaction between electronic payment systems and the economic development of the Eurozone countries. The abstracts also present the causal links between the development of payment systems and their impact on the economic situation in the country.

Keywords: EPS, electronic payment systems, digitalization, economic development, economic growth.

Introduction

Today's digitalization trends apply to all areas of people's lives and the economy as a whole, including trade and payments. It has become common to make purchases online and immediately pay for them with your bank card or go to the store without any wallet, but only with your smartphone with PayPass. The development of electronic payment systems has become part of the modern economic market and directly affects its development. At the same time, it is important to understand how strong this impact is and how it can be used to benefit the country's economy.

Various studies conducted in recent years (Moody's Analytics (2016), Deloitte (2013)) show the positive impact of electronic payment systems on the economies of different countries. However, there is a necessity of building a model for quantifying such an impact by comparison of the costs of the transition to EPS and expected income.
What is more, it is valuable to compare countries of different level of economic development: Nigeria and Italy.

Literature review

Usually, electronic payment systems are associated with the countries of the highest level of development. However, the implementation of the EPS will have no fewer positive consequences for third world economies. This is proved by Saidi Atanda (2018) on the example of Nigeria. The development of EPS in this country began in 2012 after a directive from the National Bank. The author calculated the sortino index for first 5 years of implementation of non-cash payments in the country. The value of electronic payments is accepted as a regressor, and the effectiveness of such implementation – performance index and risk exposure – are defined as dependent variables in regression. The results of the study show that the performance of Nigerian banks has increased since the introduction of EPS in all four areas of implementation: ATM, POS, Mobile Money, Online Banking. Moreover, performance does not depend on the previous period (lag data was analyzed), but is affected by the current situation of banks, the amount of resources at their disposal to meet current commitments.

Another study of electronic payments in Nigeria uses the ARDL model to test their relationship between economic development. Efanda (2018) tested three hypotheses: there is no significant link between EPS, POC systems, and web payments and Nigeria's economic development. The author used a regression of real GDP growth, which depended on the value of the growth of the previous period, as well as Automated Teller Machine Payment System, Point of Sales Payment System, Web Payment System, as econometric model. All indicators of electronic payment systems had a positive impact on Nigeria's GDP growth.

At the same time, the analysis of electronic payment systems allows to make a forecast of the level of economic activity in the country for a certain period of time. In particular, this is shown in the article Aprigliano (2019) on the example of Italy. As for Nigeria, the author showed a positive relationship between the level of change in GDP by sectors

of the economy, as well as consumption, investments, and the use of payment systems through the MIDAS model. Indicators for model were chosen by LASSO. What is more, the author made an important conclusion on the collection, processing and analysis of large data on trade transactions through electronic payment systems in contrast to cashless payments, which are important for further research and conclusions.

Purpose

The purpose of this work is to build econometric models to determine the quantitative relationship between the implementation of the EPS and the economic development of the Eurozone, in particular: regression model, which shows the relationship between the number of bank cards and macroeconomic indicators.

Methodological approach and discussion

Cashless payments using electronic payment systems are drivers of the development of a transparent economy, reducing the level of shadowing of trade. This is confirmed by the IMF study (2018), according to which the lowest level of the shadow economy (Switzerland - 7.24%, USA - 8.3%) is shown by the countries with the highest level of non-cash payments (Switzerland - 83% of GDP, USA - 76 % of GDP). Cashless transactions are under monitoring of the payment systems and it is more difficult to hide real turnover of funds in a company.

In addition, electronic payment systems facilitate trade and therefore speed up trade operations, which in turn accelerates GDP growth and the economy development as a whole. As a result, we have the development of certain sectors of the economy, the creation of additional jobs and improving the general standard of living. It is a great opportunity to provide immediately transactions between entities everywhere in the world (cross-border trade). The market receives greater choice of goods and services which stimulates competition in the markets, as well as innovative approaches in production.

Another advantage of the electronic payment systems is the increase in bank capitalization, which has a positive impact on the stability of the country's financial market.

Moreover, electronic payment systems are becoming a priority for the growing economically active population, which opting online payments as opposed to cash payments.

To confirm these theses, the impact of the spread of electronic payment systems on the economic development of the world was modeled.

The analysis was performed using linear regression. ECB data for the Eurozone for 2000–2020 were selected, namely: the number of bank cards, the amount of transactions through EPS in monetary terms, as well as basic macroeconomic indicators (GDP, unemployment, inflation, the level of shadowing of the economy, the volume of exports, the volume of imports, etc.).

The simulation was implemented using the packages pandas, statsmodels.api in the Python.

The final version of linear regression model explains the relationship between the number of bank cards and GDP per capita. The number of transactions through electronic payment systems has a positive effect on the dynamics of GDP per capita (R^2 = 0.94). According to the model, it can be concluded that each 1,000,000 cards issued brings additional 40 euros to the GDP per capita, which is 0.14% of the average value of this indicator for the period under study (28 thousand euros). Thus, we can conclude that the expansion of the network of customers of electronic payment systems has a positive impact on the economic growth of the territory where such implementation takes place. It is worth noting that the figure of 0.1% to the cumulative GDP growth in the world was obtained in a study by Moody's, which confirms the correctness of our calculations [1].

Conclusions

Electronic payment systems have a positive impact on economic development. The analysis of statistics allow to conclude, that EPS help to reduce the percent of shadow “cash” economy, speed up trade operations, make them more accessible and more attractive to the growing generation of the economically active population. What is more, electronic payment systems increase the financial stability of country, especially banking system.

Econometric models have demonstrated a direct quantitative impact of the use of electronic payments and economic growth of the country (EPS contributes 0.1% to a country's or region's GDP). In addition, with the help of using machine learning models, it is possible to assess the relationship between the directions of change in real GDP and indicators of development of electronic payment systems.

Thus, according to the results of the study, there is the positive impact of electronic payment systems on the economic development of countries, and therefore strategies and concepts for the development of macroeconomic entities should consider the possibilities of digitalization of the financial sector.

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