



The Impact of E-Commerce on the Economic Growth of the Western Balkan Countries: A Panel Data Analysis

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ABSTRACT

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Today, economic development cannot be thought of without including innovation. Innovation is a promoter of economic growth. Since e-commerce is considered an innovation, it can be a driver of economic growth in some economic environments. This study investigates the impact of e-commerce through electronic transactions on economic growth in the Western Balkans during the period 2008 to 2020. The study applies the quantitative methodology using secondary data. This study uses panel data techniques, starting with estimators pooled OLS, fixed effects, random effects, and Hausman Taylor – IV. The findings show that e-commerce does not contribute to economic growth in the Western Balkan countries for the study period. Furthermore, this study shows that final consumption, exports, and foreign direct investment positively impact economic growth. The study also confirmed that the increased government expenditure does not contribute to economic growth in the Western Balkan countries. The study brings theoretical implications by bringing scientific evidence on the impact of e-commerce on economic growth in the western Balkan countries. The study provides an insight into the impact of e-commerce on the economies of the Western Balkan countries, which are developing countries, and paves the way for other studies in developing countries to look at the similarities and differences.

1. INTRODUCTION

Studies on economic growth are increasing interest to researchers, as this poses a fundamental challenge for states. So far, many studies have been conducted that emphasize economic growth by analyzing the various indicators that impact it. Recently, researchers have been interested in investigating the digital economy, e-commerce transactions, and the impact of these transactions on economic growth. According to the Eurostat report [1], Western Balkan countries have enough internet access. The rate of homes with internet access ranges from 71% to 96% in these countries. Kosovo, with 96%, has the largest access to the Internet compared to other countries of the Western Balkans, which as a country is part of this study.

There are an impressive number of studies analyzing the economic growth of countries. Impact of public debt on economic growth in the Western Balkan countries [2] and European countries in transition [3]. The impact of education on economic growth [4]. Some studies focus on the impact of information technology on economic growth [5]. Recent studies also focus on the importance of innovation in economic growth. Therefore, e-commerce is considered an innovation, and scientific research in this field is more than necessary, given that it may contribute to economic growth in some economic environments.

The following studies address the connectivity of e-commerce to economic growth [6-8]. Likewise, some other studies investigate the impact of e-commerce on the country's economic development, analyzing online purchasing power

[9]. Also, electronic transactions/payments as an e-commerce tool and their impact on economic growth have been of interest to researchers.

The following research analyzes the impact of electronic transactions/payments on economic growth [10-13], analyzing the total online transactions within a country, such as ATM withdrawals/deposits, and POS transactions. From the literature review, we identify the gap in this field of study. The study of Anvari and Norouzi [9] addresses the impact of e-commerce on the economic development of developed countries in the European Union. While studies on the impact of electronic transactions/payments on economic growth [10-13] investigate the mix of developed countries and developing countries.

Scientific evidence emphasizes that the development of electronic commerce is not the same in developed countries as in developing countries. Therefore the scientific community needs to bring scientific evidence from developing countries; such are Western Balkan countries. The purpose of this study is to adapt the model for economic growth to analyze whether electronic transactions as an essential tool of e-commerce have a positive impact on economic growth in the Western Balkans. Batyar [6] argued that e-commerce is not satisfactorily developed in developing countries. Therefore, a scientific experience from these countries is more important for the economics literature. We will bring in scientific evidence for five Western Balkan countries as developing countries based on this argument.

As the Western Balkans are developing countries, this study is expected to have theoretical, methodological, and practical

implications. As *theoretical implications*, we will highlight that such a study is of interest to economics researchers, bringing scientific evidence to the countries of the Western Balkans as developing countries. So far, very little has been written about the impact of electronic transactions as an e-commerce tool on economic growth in developing countries. Above we specified studies [10-13] that investigate electronic transactions as an e-commerce tool in economic growth. These studies investigate mixed countries, including developing and developed countries. We also do not even have a study that addresses this topic in the Western Balkan countries. Given that this study comes from a group of developing countries, this will fill a gap in the economics literature.

As *practical implications*, we will emphasize that e-commerce, seen from the perspective of electronic transactions, can contribute to economic growth, but only if they are developed satisfactorily [12]. Online transactions also help fight the informal economy of the country. Therefore, this study will bring scientific evidence for policymakers to emphasize the importance of e-commerce, in this way to design policies that promote the development of e-commerce as an indicator that can contribute to the country's economy in the long run.

The panel data methodology has been used very little in the studies listed above. This represents a gap in the methodology context, which we will address in this study.

As evidenced by the gap in studies addressing such issues, it is noted that only in the Tee and Ong study [13] the panel data methodology was used. Since this methodology has been used very little, this study will also have *methodological implications* by applying the panel data technique. The panel data methodology is considered one of the most advanced methodologies in dealing with such problems when we have a group of countries under analysis at different periods. Such a methodology provides clear results avoiding the endogeneity problem. Therefore, this will be an added value to this study. From the elements mentioned above in the theoretical, practical, and methodological implications comes the motivation for this study, to bring scientific evidence for the countries of the Western Balkans as these countries are developing.

The study will focus on secondary data, where data will be obtained from the World Bank for GDP capita and electronic transactions from the central banks of the respective countries. The structure of the paper will start with the introduction, literature review, methodology, findings, and finally, the conclusion.

2. LITERATURE REVIEW

In this section, we will analyze the empirical literature relating to the impact of e-commerce on economic growth. Researchers Brynjolfsson and Saunders [14] conclude that technology has positively impacted productivity growth. Productivity growth also boosts countries' economic growth. The same argument can be found in the Jorgenson et al. [15] study, concluding that e-commerce was made possible by the technological revolution.

There is no doubt that this revolution boosts productivity and, as such, may have a positive impact on the economic growth of countries. E-commerce helps improve countries' social and economic issues [16]. It is also evident that e-commerce helps reduce poverty and improve living standards

in some countries, and its influence extends to economic growth [17]. Through e-commerce, companies can increase accessibility in foreign markets. The internationalization of businesses stimulates the economic growth of countries, increasing exports and sales in foreign markets [18]. The share of e-commerce in total retail sales in global trade is expected to be 22.3% in 2023 [19]. In the context of increasing sales in foreign markets, e-commerce enables product selection, payment through electronic transactions, and international logistics, until the product reaches the final destination [20]. There is a connection between e-commerce, logistics, and economic growth. In China's experience, it is argued that e-commerce and logistics were the main drivers of economic growth [21].

The following studies confirm the positive impact of e-commerce on the economic growth of the respective countries. Liu [7], through the spending method, confirms that e-commerce has a positive impact on China's economic growth. In this study, other variables are used, such as the number of internet users, the number of online stores, the number of domains, etc., by not focusing on electronic transactions.

The positive impact of e-commerce on China's economic growth is also found in the study Qu and Chen [8], which has also been analyzed by a similar method. Karpunina et al. [22] explains that the e-commerce sector can contribute to economic growth; Russia's experience as a developing country is significantly behind countries like China and the USA, where e-commerce contributes only 2% of GDP. Through the Vector autoregression econometric model, it is argued that e-commerce positively impacts Libya's economic growth, bringing a scientific experience from a developing country [23]. While in the Turkish experience, it is argued that e-commerce has a positive impact on women's employment in this country [24]. So, e-commerce's importance is being investigated in another essential segment in the economy, such as employment.

Various researchers have also investigated electronic payments as an essential e-commerce tool. Electronic payments enable businesses to cut back on their operations, save time, and reduce company transaction costs. For this reason, electronic payments are widely applied by companies in different countries [25]. Electronic payments are made using the internet [26]. Electronic payments are essential for developing e-commerce, enabling and facilitating transactions through online channels [27, 28].

ATM withdrawals, debit cards, credit cards, online transfers, and electronic checks are considered some of the most used forms of electronic transactions [29]. The future of payments will be through electronic forms, utilizing online transactions [30]. From the literature review, we can argue that many researchers confirm that electronic payments can be drivers of economic growth, facilitating transactions and contributing to increased consumption [31].

Hasan et al. [32] argue that there may be a link between electronic payments and economic growth. Other studies also argue the importance of electronic transactions in countries' economies. Benefits from electronic transactions can have final consumers and B2B. Therefore, electronic transactions have facilitated the operations of doing business, have contributed significantly to the growth of consumption, and have impacted the country's economy [33].

Electronic payments help countries fight negative phenomena such as corruption, informality, and money laundering [34]. This finding is consistent with Oyewole et al.

[12], the authors also confirm through multiple linear regression and the predictive method that short-term electronic transactions did not affect economic growth, so their long-term effect should be considered.

In another study by Zandi et al. [35], the importance of applying credit and debit cards are investigated. The authors conclude that electronic payment cards bring apparent contributions to the country, improving efficiency and increasing consumption. In his examination, Baytar [6] argues that developing countries have not satisfactorily adopted e-commerce in their economic environments. Hence, one of the variables most used by researchers to measure economic growth in these countries were electronic transactions/payments, which aid consumption.

The literature review shows that e-commerce through electronic transactions positively impacts different segments of the countries' economies, but without being satisfactorily developed, it cannot contribute to countries' economic growth. For the benefits of electronic payments from the literature review, we concluded that they help increase consumption, improve efficiency, and formalize countries' economies.

The following studies argued that e-commerce through electronic transactions did not contribute to the economic growth of the respective countries. Aldaas [10] used the linear regression method, bringing scientific evidence from several developed and developing countries together. Oyewol et al. [12] used the logarithmic predicted model and brought evidence from Nigeria. Ravikumar et al. [36] used the ARDL model to bring scientific evidence from India. Only the Tee and Ong study [13] used the panel data methodology to investigate the impact of e-commerce / electronic transactions on the economic growth of five developed countries: Austria, Belgium, France, Germany, and Portugal.

We can conclude that a gap appears that addresses this topic in the Western Balkans and some developing countries regarding the above argument. We also identified that the panel data methodology was used only in one study on a similar topic. As a gap appears in applying this methodology, this study will investigate economic growth through the panel data model, introducing these electronic transaction variables and final consumption expenditures.

In this way, we will bring scientific evidence from the countries of the Western Balkans with a methodology very little applied so far by researchers in this field of study. The study will enrich the literature in economics and be scientific evidence for policymakers on the importance of stimulating electronic payments and the development of e-commerce as this can bring benefit to countries' economies.

3. METHODOLOGY

This study will use the quantitative data approach to analyze the results of electronic commerce's impact on Western Balkan countries' economic growth. Gale et al. [37] argue that the quantitative methodological approach is the most adequate since the researchers bring a more accurate analysis of the results, and we also have objective conclusions of the study. When researchers work with secondary data in the design of econometric models for the analysis of different countries in different periods, it is important to apply panel data; such techniques help researchers to choose the endogeneity problem which appears in these cases [38].

The following section will elaborate on the design of the

econometric model in this study. The paper will investigate electronic transactions as an e-commerce tool in the economic growth of the Western Balkan countries. Since e-commerce has been developed recently, we have data for this study only for 13 years. So the data will be analyzed from 2008-to 2020.

For electronic transactions as an e-commerce tool, the data will be obtained from the central banks of the respective countries, while for other variables such as GDP per capita, government expenditure, final consumption expenditure, export, and FDI, which will enable us to enrich the model, will be obtained from the World Bank. The following models will be analyzed, pooled OLS, fixed effect, random effect the Hausman Taylor IV [39]. The Hausman test will help us choose between fixed effects, random effects, and Hausman–Taylor.

Since in this model, we have cross-sectional group units, the countries in this case, who are observed over time, the Hausman test helps us solve the endogeneity problem. The endogeneity of variables is a problem when the independent variable is correlated with the error term in the regression model, and in this case, we may have biased results.

3.1 Empirical model

This study will include the Western Balkan countries such as Albania, Bosnia & Herzegovina, Serbia, Kosovo, and North Macedonia, as shown in Table 1. Due to the lack of official data from Montenegro on the central bank for electronic transactions for the study period, this country will not be included in this research.

Table 1. Western Balkan countries

No.	Western Balkan Countries
1	Albania (AL)
2	Bosnia and Herzegovina (BH)
3	Serbia (SRB)
4	Kosovo (XK)
5	North Macedonia (NMK)

The study period will be from 2008 to 2020. A more extended study period is not possible due to the lack of data on electronic transactions in these countries, as e-commerce / electronic payments have been applied mainly in the last decade. Pooled OLS, fixed effect, and random effect estimators will be applied to compare these models for our data analysis.

The Hausam Taylor IV model is essential for data analysis in our study as it solves the problem of variable endogeneity. We explain the models separately to justify the advantages and disadvantages of these models.

3.2 Pooled OLS

The pooled OLS model is applied in panel data analysis as a starting point in data analysis. In our case, the OLS model is specified as follows:

$$Y_{it} = B_0 + B_1EC + B_2GE + B_3FC + B_4EX + B_5FDI + u_i \quad (1)$$

The variables are as follows: Y_{it} , represents GDP per capita growth % in the Western Balkan countries, i represents countries, t years which is the model-dependent endogenous variable. B_0 , is constant variables, B_1EC - electronic

transactions (% of GDP), B_2GE - government expenditure (% of GDP), B_3FC - final consumption expenditures (% of GDP), B_4EX - export (% of GDP), B_5FDI - foreign direct investments (% of GDP) are exogenous disturbance, u_i is the error term. Table 2 also details the variables of the study. In the OLS model, there must be no autocorrelation between error terms in the different observations so that the error terms are not homoscedastic.

Table 2. Variable descriptive

No.	Variables	Code
1	GDP per capita	gdpperc1
2	E-Commerce (%GDP)	EC
3	Government expenditure(% of GDP)	GE
4	Final Consumption (% of GDP)	FC
5	Export (% of GDP)	EX
6	Foreign direct investment (% of GDP)	FDI

The panel data presents the problem of heterogeneity in the data over time through the evaluation of the OLS method. However, in many studies, pooled OLS is used as a starting point in data analysis in the panel data. The results of pooled OLS are compared with other results of sophisticated models in data analysis with panel data. Therefore, many researchers rightly consider it a good starting point for analysis.

3.3 Fixed and random effects models

As mentioned above, other models in the panel data will also be used to solve the endogeneity problem. This section will analyze the fixed and random effect model, and then we will focus on the Hausman Taylor - IV model. The model specified above will be considered, calculating the structure of the panel data:

$$Y_{it} = B_0 + B_1EC + B_2GE + B_3FC + B_4EX + B_5FDI + u_{it} \quad (2)$$

Fixed and random models differ in assuming whether μ_i is related or not to the set of explanatory variables. The fixed effect model assumes that the term μ_i is correlated with the explanatory variables $\text{cov}(X_{it}, \mu_i)$.

The random model assumes that the term μ_i is not correlated with explanatory variables. Individual effects unchanged over time are taken into account in both models, not solving the problem of heterogeneity of variables. In this way, these two models bring the following constraint if there is a correlation between the term μ_i and the explanatory variables, also if it is assumed that the term μ_i is related to the explanatory variables. Then the evaluation of these variables at different times and places becomes difficult [40].

Given that the variables are considered to be endogenous in our study, as we have to analyze different locations and different periods, this way the results can be biased, so the application of the fixed and random model may be inadequate in our study, therefore sophisticated model such as Hausman Taylor - IV should be used.

3.4 Hausman Taylor Effect – IV

As the Hausman Taylor - IV econometric model is considered the most efficient model; we will use it in this paper to support the results of this model to analyze our data in this study. This model was designed by the authors Hausman and

Taylor [41]. In our case, we can specify it as follows:

$$Y_{it} = c + B_1(Y_{it-1}) + B_2(EC_{it}) + B_3(GE_{it}) + B_4(FC_{it}) + B_5(EX_{it}) + B_6(FDI_{it}) + u_{it} \quad (3)$$

This model enables the combination of the fixed effects and random effects model. The model also makes it possible to identify whether the explanatory variables are correlated with the term μ_i . It also eliminates the correlation of country-specific effects with the μ_i error term. As such, it also identifies possible correlations of variables and also invariant regressors over time.

Given the specifics of this study, the Hausman Taylor - IV model is the most adequate in our study. The following studies have applied Hausman Taylor IV to solve the problems of endogeneity of variables in the analysis of various indicators of economic growth [3, 4, 42, 43]. The authors in their studies argue that the Hausman Taylor IV model is considered the most appropriate and efficient model.

3.5 Descriptive statistics

This study aims to investigate the impact of e-commerce and other indicators on the economic growth of Western Balkan. Preliminary studies have investigated the same indicators over more extended periods, but as electronic transactions as an essential e-commerce tool have developed more in the last decade, in this study, the study period will be covered from 2008-to 2020. The countries to be analyzed are Albania, Bosnia & Herzegovina, Serbia, Kosovo, and North Macedonia.

Data were obtained from credible institutions such as the World Bank and central banks of the respective countries in this study. GDP per capita for economic growth will be applied based on King and Levine [44]. E-commerce through electronic transactions (POS and ATM) has been analyzed by the authors [10-13, 36], government expenditures (as % of GDP) are analyzed in transition countries and the Western Balkans by [2, 45, 46], final consumption (as % of GDP) in transition countries is also analyzed by the authors [3], exports (as % of GDP) are analyzed by Ahmad et al. [47] which brought the experience of Nigeria. As well as FDI by researchers [43, 46, 48]. The following Table 3 explains the data in this study and the data source.

Table 3. Summary statistics of exogenous and endogenous variable

Variable	Obs	Mean	Std. Dev.	Min	Max
gdpcaplag1	239	2.55318	2.508799	-6.18	8.33
ecommerce	240	15.17467	10.99394	2.7	39.04
gex	240	16.29183	3.496313	10.38	23.37
finalcons	240	94.18033	7.296631	79.69	109.34
export	240	35.635	11.22195	15.66	62.3
fdi	240	5.327833	2.632942	0.54	11.17

Source: Author's calculations

4. EMPIRICAL FINDING AND DISCUSSIONS

Table 4 presents the results between estimators, pooled OLS, fixed effects, random effects, and Hausman - Taylor. The coefficient from pooled OLS estimator can produce one-sided results due to heterogeneity. For this reason, we have

calculated the fixed effect and random effect estimator presented in Table 4. The Hausman test was applied to compare fixed effects and random effects (Table 5).

The Hausman test statistics are 42.16, concluding that the null hypothesis is rejected for the fixed effects estimator. We

can conclude that the random effect estimator is inconsistent, and the fixed effects estimator is more efficient. To solve the problem with endogeneity, which can lead to biased coefficients in regression, the Hausman-Taylor estimator is applied (Table 4).

Table 4. Regression model

Variables	Pooled OLS	Fixed Effects	Random Effects	Hausman Taylor - IV
GDP_Cap Lag1				0.6112582* (0.000)
E-Commerce	-0.1849533* (0.000)	-0.1932505* (0.001)	-0.1849533* (0.000)	-0.1632361* (0.000)
Government EX	-0.190349** (0.062)	-1.015922* (0.000)	-0.190349** (0.060)	-0.2496717** (0.087)
Final Cons	0.1300002** (0.078)	0.231086* (0.008)	0.1300002** (0.077)	0.1257417* (0.040)
Export	0.2447461* (0.000)	0.1299309* (0.039)	0.2447461* (0.000)	0.1420455* (0.000)
FDI	0.4648032* (0.000)	0.6039916* (0.000)	0.4648032* (0.000)	0.3364148* (0.000)
Observation	240	240	240	239
R-squared	0.2608			
F	16.52	21.76		
Chi 2			82.58	369.75
Model	Pooled OLS	Fe	Re	Ht

Note: (*) 5% statistically significant, (**) 10% statistically significant

Source: author's calculation

The Hausman test calculation helped us choose between the fixed effect estimator and the Hausman-Taylor estimator to identify whether technique IV eliminated the correlations between the specific individual unobservable effect and the explanatory variables. The statistic of the Hausman Test is 64.09, where we conclude that the null hypothesis was not rejected in favor of Hausman – Taylor estimator (Table 5).

Table 5. Hausman tests

Test	Chi 2	Prob>Chi2	Result
Fixed Effects vs. Random Effects	42.16	0	Reject Ho
Fixed Effects vs. Hausman-Taylor IV	0	64.09	Does not reject Ho

Also, technique IV enables us to solve the problem of the endogeneity of variables.

From all this, we can conclude that the best choice in our case turns out to be the Hausman Taylor IV estimator, also from the fact that some of the variables are exogenous in this study.

In the following, we are commenting on the results achieved by this study and the consistency of these results with the previous studies conducted. Referring to Table 4, we see that e-commerce through electronic payments (POS + ATM) has a negative coefficient of -0.163261 (s.e. 0.000) statistically significant, which means e-commerce through electronic payments does not contribute to economic growth in the Western Balkans. This result is consistent with previous studies [10, 12, 13, 36]. These studies argue that electronic payments through POS and ATMs have a negative impact on economic growth. Tee and Ong [13] further argued that electronic payments from e-commerce do not contribute to economic growth in the short term. Given that e-commerce has not been very well developed in the Western Balkan countries, we can conclude that its effect is negative in the economies of these countries. Batyar [6] also argues that e-commerce has

not developed satisfactorily in developing countries.

The result in Table 4 shows that the coefficient of the government expenditures is negative -0.2496717 (s.e. 0.087) and statistically significant; thus, government expenditure has a negative effect on real GDP per capita growth. Negative results were also confirmed in other studies that have investigated this issue in the Western Balkan countries [3, 45, 46]. Final consumption expenditures have a positive coefficient of 0.1257417 (s.e. 0.040) and are statistically significant, which means final consumption expenditures positively impact real GDP per capita growth in the Western Balkan countries.

The results of final consumption expenditures are consistent with studies [3, 43, 47, 49]. Table 4 shows that Exports have a positive result of 0.1420455 (s.e. 0.000) statistically significant, which means that exports positively impact real GDP per Capita Growth in the Western Balkan countries. The positive results also confirmed the following studies [3, 43, 47, 49]. Foreign direct investment positively impacts real GDP per Capita Growth in the Western Balkan countries 0.336148 and is also statistically significant (s.e. 0.000). The result of foreign direct investment is consistent with previous studies [43, 46, 49].

5. CONCLUSIONS

In this study, we applied the endogenous empirical growth model and various econometric techniques to examine whether e-commerce through electronic transactions contributes to GDP per capita growth in the Western Balkan countries during 2008-2020. The study included five Western Balkan countries: Albania, Bosnia and Herzegovina, Serbia, North Macedonia, and Kosovo.

The study was based on the results obtained from the Hausman Taylor IV model, which also helped us solve the problem of the endogeneity of variables. As in other countries,

the results of this study confirmed that e-commerce through electronic transactions does not contribute to GDP growth per capita in the Western Balkan countries. Therefore, we answer the purpose of this study. Further, in this study, other variables were analyzed as GDP per capita growth indicators, which are the control variables in our case. The study also confirmed that the increase in government expenditure does not contribute to GDP per capita growth in the Western Balkan countries.

The following variables confirmed that they positively impact real GDP per capita growth in the Western Balkan countries while also consistent with previous studies. The study also confirmed that the increase in final consumption expenditures positively contributes to real GDP per capita growth. Additionally, exports and foreign direct investment are also in a positive impact on real GDP per capita growth in the Western Balkans.

Limitations: Like other studies, this study has some limitations. The research period was for 13 years, as long as official data on e-commerce variables through electronic payments was provided. Montenegro is not included in the study as there is a lack of data for this country on electronic transactions.

Future Research: Given that this study uses one of the most advanced methodologies for measuring economic growth, studies argue that the impact of e-commerce through electronic payments on the country's economy is more significant in the long run than in the short one. Other studies may focus on the future by analyzing for two decades whether the impact of electronic payments on economic growth in the Western Balkan countries is changing.

This way, the number of observations will be more significant, and the results may vary. Oyewol [12] argued that the impact of electronic transactions on the country's economy could be more satisfactory in the long run. Also, once the data for Montenegro are provided, the same methodology can be used by analyzing this issue.

The same problem can also be investigated in other developing countries to see the similarities and differences.

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REFERENCES

- [1] Eurostat. (2021). Basic figures on enlargement countries. Luxembourg: European Union.
- [2] Fetai, B., Avdimetaj, K. (2020). Public debt and economic growth in the western Balkan countries. *Global Policy and Governance*, 9(2): 45-56. <https://doi.org/10.14666/2194-7759-9-2-004>
- [3] Fetai, B., Avdimetaj, K., Bexhet, A., Malaj, A. (2020). Threshold effect of public debt on economic growth: An empirical analysis in the European transition countries. *Zbornik Radova Ekonomski Fakultet u Rijeka*, 38(2): 381-406. <https://doi.org/10.18045/zbefri.2020.2.381>
- [4] Marmullaku, B., Fetai, B., Arifi, A. (2020). Education and its impact in economic growth in lower middle income countries. *Journal Global Policy and Governance*, 9(1): 79-91. <https://doi.org/10.14666/2194-7759-9-1-006>
- [5] Bahrini, R., Qaffas, A.A. (2019). Impact of information and communication technology on economic growth: Evidence from developing countries. *Economies*, 7(1): 21. <https://doi.org/10.3390/economies7010021>
- [6] Baytar, C.U. (2015). The Impact of e-commerce on economic growth: A bibliometric study. In *Global Business Research Symposium*, pp. 1-7.
- [7] Liu, S. (2013). An empirical study on e-commerce's effects on economic growth. In *2013 Conference on Education Technology and Management Science (ICETMS 2013)*, Atlantis Press, pp. 81-84. <http://dx.doi.org/10.2991/icetms.2013.260>
- [8] Qu, L., Chen, Y. (2014). The Impact of e-commerce on China's Economic Growth. In *WHICEB*, pp. 66-72.
- [9] Anvari, R.D., Norouzi, D. (2016). The impact of e-commerce and R&D on economic development in some selected countries. *Procedia-Social and Behavioral Sciences*, 229: 354-362. <https://doi.org/10.1016/j.sbspro.2016.07.146>
- [10] Aldaas, A. (2021). A study on electronic payments and economic growth. *Global evidences. Accounting*, 7(2): 409-414. <http://dx.doi.org/10.5267/j.ac.2020.11.010>
- [11] Grzelczak, M., Pastusiak, R. (2020). Cashless payments and economic growth in selected European countries. *Annales Universitatis Mariae Curie-Skłodowska, sectio H-Oeconomia*, 54(3): 33-46. <http://dx.doi.org/10.17951/h.2020.54.3.33-46>
- [12] Oyewole, O.S., Gambo, J., Abba, M., Onuh, M.E. (2013). Electronic payment system and economic growth: A review of transition to cashless economy in Nigeria. *International Journal of Scientific Engineering and Technology*, 2(9): 913-918.
- [13] Tee, H. H., Ong, H. B. (2016). Cashless payment and economic growth. *Financial Innovation*, 2(1), 1-9. <https://doi.org/10.1186/s40854-016-0023-z>
- [14] Brynjolfsson, E., Saunders, A. (2009). *Wired for Innovation: How Information Technology is Reshaping the Economy*. Cambridge, MA: Mit Press. <http://dx.doi.org/10.7551/mitpress/8484.001.0001>
- [15] Jorgenson, D.W., Ho, M.S., Stiroh, K. (2005). *Productivity: Information Technology and the American Growth Resurgence*, Vol. 3. Washington: Library Congress Cataloguing-in-Publication Data.
- [16] Georgiou, M.N. (2009). E-commerce has a positive impact on economic growth: A panel data analysis for Western Europe. <https://doi.org/10.2139/ssrn.1484687>
- [17] Karine, H.A.J.I. (2021). E-commerce development in rural and remote areas of BRICS countries. *Journal of Integrative Agriculture*, 20(4): 979-997. [https://doi.org/10.1016/S2095-3119\(20\)63451-7](https://doi.org/10.1016/S2095-3119(20)63451-7)
- [18] Lund, M.J., McGuire, S. (2005). Institutions and development: Electronic commerce and economic growth. *Organization Studies*, 26(12): 1743-1763. <https://doi.org/10.1177/0170840605059149>
- [19] eMarketer. (2019). eMarketer. Retrieved from <https://www.insiderintelligence.com/content/global-e-commerce-forecast-2021>, accessed on Feb. 15, 2023
- [20] Chen, N. (2022). Analysis of the correlation between cross-border E-commerce and economic growth based on hierarchical multilevel gray evaluation model. *Journal of Mathematics*, 2022: 1-10. <https://doi.org/10.1155/2022/8455404>

- [21] Huirong, J. (2014). The study of dynamic effect relationships between the e-commerce, the logistics and economic growth based on the VAR model. *International Journal of u-and e-Service, Science and Technology*, 7(3): 187-196. <http://dx.doi.org/10.14257/ijunesst.2014.7.3.16>
- [22] Karpunina, E.K., Isaeva, E.A., Galieva, G.F., Sobolevskaya, T.G., Rodin, A.Y. (2021). E-commerce as a driver of economic growth in Russia. In: Popkova, E.G., Sergi, B.S. (eds) *Modern Global Economic System: Evolutional Development vs. Revolutionary Leap. ISC 2019. Lecture Notes in Networks and Systems*, vol 198. Springer, Cham. https://doi.org/10.1007/978-3-030-69415-9_179
- [23] Almier, N.M., Lusta, A., Abomahdi, M. (2017). The impact of electronic commerce on Lybia's economic growth. *International Journal of Research in Commerce & Management*, 8(4).
- [24] Sovbetov, Y. (2018). Impact of digital economy on female employment: Evidence from Turkey. *International Economic Journal*, 32(2): 256-270. <https://doi.org/10.1080/10168737.2018.1478868>
- [25] Al-ma'aitah., Shatat, A. (2011). Empirical study in the security of electronic payment systems. *International Journal of Computer Science Issues (IJCSI)*, 8(4): 393.
- [26] Ogedebe, P.M., Jacob, B.P. (2012). E-payment: Prospects and challenges in Nigerian public sector. *International Journal of Modern Engineering Research*, 2(5): 3104-3106.
- [27] Kaur, K., Pathak, A. (2015). E-payment system on e-commerce in India. *International Journal of Engineering Research and Applications*, 5(2): 79-87.
- [28] Oladeji, K. (2014). Integrated personnel and payroll information systems (IPPIS) for universities and other higher institutions of learning. A paper presentation at Northwest University, Kano–Nigeria.
- [29] Bouri, N. (2019). Digital payment in Algeria: opportunity to redefine the economic growth model. *Journal of Management and Economic Sciences*, 3: 295-308.
- [30] Bezovski, Z. (2016). The future of the mobile payment as electronic payment system. *European Journal of Business and Management*, 8(8): 127-132.
- [31] Deloitte. (2013). *The Economics Impacts of Online Payments: Breaking Barriers Across Europe*.
- [32] Hasan, I., De Renzis, T., Schmiedel, H. (2012). Retail payments and economic growth. *Bank of Finland Research Discussion Papers*. <https://dx.doi.org/10.2139/ssrn.2100651>
- [33] Cirasino, M., García, J.A. (2008). Measuring payment system development. *World Bank*, Washington, DC.
- [34] Akhalumeh, P.B., Ohiokha, F. (2012). Nigeria's cashless economy. The imperatives. *International Journal of Management and Business Studies*, 2(2): 31-36.
- [35] Zandi, M., Singh, V., Irving, J. (2013). The impact of electronic payments on economic growth. *Moody's Analytics: Economic and Consumer Credit Analytics*, 217(2).
- [36] Ravikumar, S., Suresha, B., Sriram, M., Rajesh, R. (2019). Impact of digital payments on economic growth: Evidence from India. *International Journal of Innovative Technology and Exploring Engineering (IJITEE)*, 8(12): 553-557.
- [37] Gale, N.K., Heath, G., Cameron, E., Rashid, S., Redwood, S. (2013). Using the framework method for the analysis of qualitative data in multi-disciplinary health research. *BMC Medical Research Methodology*, 13(1): 1-8. <https://doi.org/10.1186/1471-2288-13-117>
- [38] Brooks, C. (2008). *RATS Handbook to Accompany Introductory Econometrics for Finance*. Cambridge Books. <http://dx.doi.org/10.1017/CBO9780511814082>
- [39] Baltagi, B.H. (2013). *Econometrics Analysis of Panel Data*. England: John Wiley & Sons Ltd.
- [40] Greene, W.H. (2008). *Econometric Analysis* (6th ed.). New Jersey: Pearson Education, Inc.
- [41] Hausman, J.A., Taylor, W.E. (1981). Panel data and unobservable individual effects. *Econometrica*, 49(6): 1377-1398. <https://doi.org/10.2307/1911406>
- [42] Fetai, B.T. (2018). Does financial development accelerate economic growth? An empirical analysis of European countries in transition. *Journal of Financial Economic Policy*, 10(3): 426-435. <https://doi.org/10.1108/JFEP-11-2017-0118>
- [43] Selimi, N., Sadiku, M., Sadiku, L. (2017). The impact of tourism on economic growth in the Western Balkan countries: An empirical analysis. *International Journal of Business and Economic Sciences Applied Research*, 10(2): 19-25. <http://dx.doi.org/10.25103/ijbesar.102.02>
- [44] King, R.G., Levine, R. (1993). Finance and growth: Schumpeter might be right. *The Quarterly Journal of Economics*, 108(3): 717-737. <https://doi.org/10.2307/2118406>
- [45] Fetai, B. (2015). Financial integration and financial development: Does financial integration metter? *European Research Studies*, 18(2): 97. <http://dx.doi.org/10.35808/ersj/447>
- [46] Fetai, B.T., Mustafi, B.F., Fetai, A.B. (2017). An empirical analysis of the determinants of economic growth in the Western Balkans. *Scientific Annals of Economics and Business*, 64(2): 245-254. <https://doi.org/10.1515/saeb-2017-0016>
- [47] Ahmad, D., Afzal, M., Ghani, U. (2016). Impact of monetary policy on economic growth empirical evidence of Pakistan. *International Journal of Applied*, 4(1).
- [48] Lyroudi, K., Papanastasiou, J., Vamvakidis, A. (2004). Foreign direct investment and economic growth in transition economies. *South-Eastern Europe Journal of Economics*, 2(1): 97-110.
- [49] Batrancea, L., Rathnaswamy, M.M., Batrancea, I. (2021). A panel data analysis of economic growth determinants in 34 African countries. *Journal of Risk and Financial Management*, 14(6): 260. <https://doi.org/10.3390/jrfm14060260>