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The Impact of Government Expenditures in Education and Internet Penetration on GDP Per Capita in Indonesia

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Abstract- Government expenditure on education and health has important role to play in the form of stimulating the economy. Internet penetration as a part of the Information and Communication Technology (ICT) is also believed to be a significant contributor towards social and economic development. This study examined the trends as well as effects of education government expenditure, health expenditure, and internet penetration on the per capita GDP in Indonesia using econometrics model with Ordinary Least Square (OLS) and Error Correction Model (ECM) methods. The findings revealed that government education expenditure had positive effect on GDP per capita in the long-run and in the short run. Government expenditure on health was found to be insignificantly related to GDP per capita in the long run and in the short run. Internet penetration had positive effect on GDP per capita in long run and insignificantly related to GDP per capita in the short run.

Keywords: *government expenditures on education, internet penetration, GDP per capita.*

I. Introduction

The role of government in developing countries is significant both in terms of scope and importance for accelerated economic growth. For sustainable development, economic growth is important. This growth is mainly accomplished by infrastructures being extended and repaired, education and health facilities improved and investment from abroad and the country (Saad & Kalakech, 2009). Therefore, a strong dominant goal of the public spending strategy is balanced and inclusive economic development. Many public initiatives seek to encourage sustainable and equal economic development. In physical and human capital development over the course of time, public spending may and have played an important role (Idenyi et al., 2016; Saudi, 2018).

Economic growth is the indicator of a year-to-year GDP shift, whereas economic stability is determined by per capita GDP. GDP per capita is the amount, in one year, for a country that is divided by population (Bolt et al., 2018) of all goods and services generated by a state. Indonesia is still not satisfied with GDP per capita growth. GDP per capita in Indonesia is still well below Malaysia and Thailand's per capita rise. Figure 1 shows the per capita contrast of GDP per capita in Indonesia with Malaysia, Thailand and the Philippines.

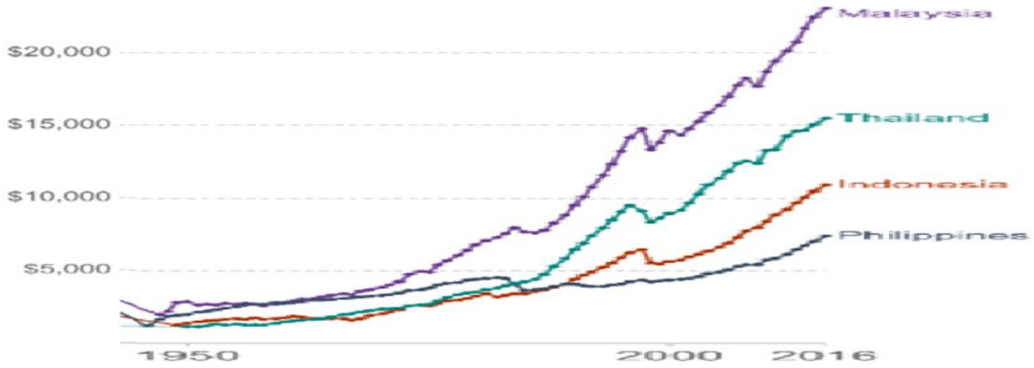

Figure 1. GDP per capita in Indonesia, Malaysia, Thailand, and Philippines
Source: Maddison Project database (2018)

The increasing importance of the social rights of people has contributed to an increase in transfer and social spending subsidies. Government data on education spending shows that in developed countries real expenditure per capita on education is growing. This rise was followed by concrete social indicator changes, meaning that increased education investment will ensure a more equitable distribution of benefits while speeding up human growth (Sagarik, 2014).

Government expenditure on education in Indonesia were increased from 122,697 IDR billion in 2014 to 138,507 IDR billion in 2019. Government education expenditures in 2014 amounted to 1.16 percent of total government expenditure, and decreased to 0.87 percent in 2019. In 2014, government expenditure on health in Indonesia increased to 59.675 IDR billion in 2019, from 10,893 IDR billion in 2014. Indonesia's government expenditure on health amounted to 0.10% in 2014 up to 0.38% of GDP in 2019 (BPS, 2018). However, the budget allocation for the Indonesia Ministry of Health has not met the mandate of Law No. 36 of 2009 on health. Article 171(1) of the health law states: "A minimum of 5% (Five%) of State revenues and expenditure excluding wages is distributed from the Government's health budget." (2) "A minimum of 10 percent of the regional revenues and expenditure budget is allocated for federal, district / city government health except salaries."

The internet rate and ICTs has proved crucial for linking people in remote locations to the market, enhancing education access, allowing knowledge access, promoting creativity, improving engagement of people in the democratic process and enabling the creation of small and medium-sized enterprises (Guerriero, 2015). Such a tremendous growth in the internet is attributable to the growing investment in deploying the bandwidth available for any form of communications infrastructure through fixed and wireless internet. All these Internet services, in view of productiveness, development and other macroeconomic consequences, are assumed to have been changing economies (Zhang, 2016).

In Indonesia the internet penetration in 2000 was only 0.9%, with 1,957,942 users out of 211,540,428 people. With 132,7 million users from a population of 256,2 million in 2016, the internet penetration already reached 51.8%. However, there remain variations in the distribution on the islands (Imansyah, 2018). Figure 2 presents Indonesia's GDP per capita and internet penetration in 1996-2014.

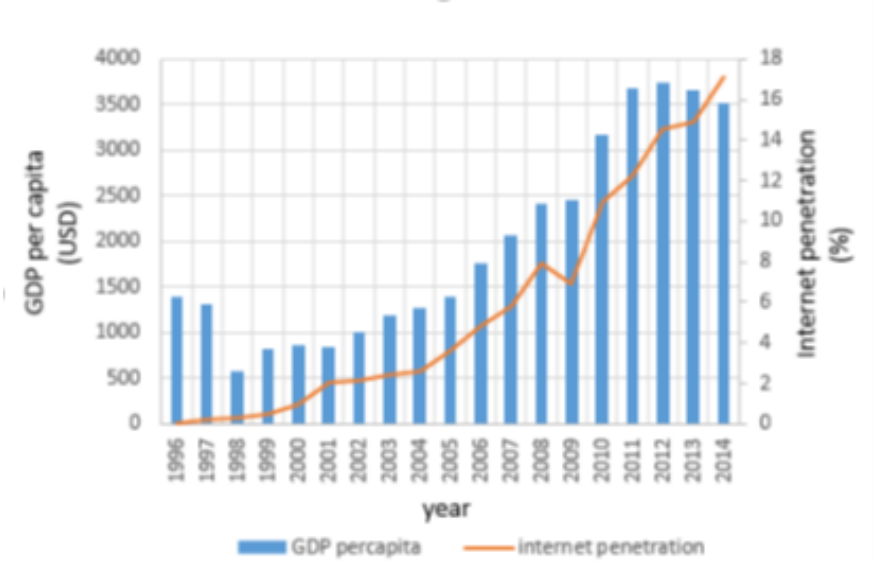

Figure 2. Internet Penetration and GDP per Capita in Indonesia

Indonesia's Gross Domestic Product (GDP) in 2015 amounted to US$ 861,93 billion. Indonesia's GDP value accounts for 1.39% of the global economy. Figure 1 shows the GDP per capita data and Indonesia's internet penetration between 1996 and 2014. The use of the Internet looks after the GDP per capita increase. Beginning in 2010, the Internet was particularly used for many purposes in order to support people's everyday activities. A comparison between internet and GDP is required to evaluate the impact of the Internet in Indonesia. In Indonesia, however, internet penetration reached just 36.5% in 2015. Therefore, the per capita GDP effect of the internet on Indonesia should be further studied.

This research is crucial to learn more about Indonesia's GDP per capita education and health spending. The research objectives have established the following goals: (i) to evaluate the impact of government spending on GDP per capita education in Indonesia; (ii) to investigate the impact on per capita GDP health costs in Indonesia; (iii) to examined the influence of Internet use on per capita Indonesian GDP.

II. Literature Review

The economy's Gross Domestic Product (GDP) is a calculation of total production. More specifically, all products and services manufactured in a particular country or area over a particular time period are of monetary value. GDP per capita is the value in a year divided into the population of a nation for all goods and services provided by a government. And attempts to compare the price, quality and currency differences over time and across borders (ourworldindata.org).

Education is seen as long-term investment, which will contribute in the future to an increase in productivity. Education thus has a long-term and short-term beneficial impact on economic development. Gray et al. (2007) reported that more government education and health care spending was not necessarily related to improved education and results in terms of health, despite admitted good effects on economic growth. However, in several countries like Korea, Poland and Romania, where better education results are correlated with per capita income levels, Gray (2007) showed a positive correlation between per capita income and education output.

The influence of an increase in education expenditures on GDP per capita was calculated by Appiah (2017) and found positive impact on GDP per capita on the expansion of education spending of developed

countries. The literature on the relationship between education and economic growth in East Asia was reviewed by Permani (2009). Education is important in economic development, but not particularly important. Risikat (2010) analyzed educational and economic development expenditure in Nigeria, using a model of cooperation and error correction. The result shows that Nigeria 's expenditure in education and economic development has a long-term relationship.

The healthcare spending and economic development in Nigeria were examined by Bakare and Sanmi (2011). The analyzes of their data indicate an essential and significant relationship between spending on health care and economic development. They stated that the secret to good performance is not generally an increase in the allocation of individual appropriations for the budget but rather the implementation of a public finance mechanism that connects individual spending and income decisions and ensures the most efficient possible use of the allocated funds. The error correction model (ECM) was used to evaluate the relationship between public health and education expenditure and GDP or GDP per capita as an economic growth measure, depending on the co-integrated relationship between the variables (Liu et al., 2008).

The role that government spending on education and health has played in promoting India's Gross Domestic Product (GDP) over the last three decades has been assessed by Kundu (2017). The co-integration test of Johansen verified the co-integration relationship. The study further investigated the causal effects on GDP of education and expenditures on health. The findings have shown that there was no effect on GDP on public expenditures on education and health care. On the contrary, two-period GDP Granger has been shown to have contributed to government health spending.

The role of public expenditures over education and health care in support of the gross domestic product (GDP) of the 12 countries in Asia and the Pacific over the last three decades was examined by Maitra and Mukhopadhyay (2012). The co-integration tests of Johansen confirmed the presence of co-integrated relations in six such countries, namely Bangladesh, Republic of Korea, Maldives, Philippines, and Malaysia. Cointegrating ties have not been established in the rest of the countries, namely Nepal, Fiji, Sri Lanka, Singapore, and Vanuatu. The report further investigated the causal effect of education and health care expenses on GDP. In Bangladesh, Singapore, Nepal, Maldives and Sri Lanka, education expenditure has been found to have increased GDP. In Bangladesh, Nepal, the Philippines, Singapore and Sri Lanka, health care investment, on the other hand, has helped to raise GDP. Education expenditure in the Philippines has had a negative effect on GDP, while healthcare spending on GDP has a negative impact on Vanuattu and Maldives. Neither education or health expenditure has had a major effect on GDP for Malaysia and the Republic of Korea.

Saad and Kalakech (2009), in particular with four sectoral expenditures: defense, education, health and agricultural expenditure, examined the growth impact of government spending in Lebanon. The study showed that educational spending, with a co-integration approach, had positive and negative effects on long-term development and in the short term. Health expenditure has also been shown to correlate favorably with and bears little relation to short-term growth. In order to boost development, this study proposed that budget allocations be increased for the education sector.

The effect on economic growth of government spending on Malaysia, Indonesia and Singapore is assessed by Abdullah and Rudasti (2017). Economic growth suggested by GDP in Indonesia, Malaysia and Singapore will vary from one another, so an overview of the relationship between government expenditure and GDP will be important. Multiple regression analysis to the equation is used to evaluate results. The model used are secondary data that are normality test, multi-colinearity test, heteroscedasticity and autocorrelation test with classic assumption. This study shows that government spending in Indonesia, Malaysia and Singapore

has an effect on GDP. The study suggested that Government should pay attention to government spending and economic development, since this research in Indonesia, Malaysia and Singapore affects GDP is based on this research. Additional variables that impact GDP, including interest rates and currencies, may be introduced for further study.

Empirical evidence indicates that the internet can increase overall production and have a positive impact on economic growth (Zhang, 2016). International investment is promoted via the Internet (Choi, 2003). It also lowers inflation by lowering transaction costs and increased economic performance (Meijers, 2006). It helps to minimize inflation. Bilateral and foreign trade is improved by reducing costs of communication and transport (Choi, 2010), and possible unemployment reduction (Najarzadeh et al., 2014). The internet also supports exchange funds and thus boosts international activity (Lechman & Marszk, 2015).

Elgin (2013) has been using panel data on the impact of the Internet on the scale of the shade economy of 152 countries for 1999-2007. The research used regressions in countries and found that the relationship between economy and internet correlates heavily with GDP per capita. The impact of public spending on economic growth in Nigeria was examined by Nurdeen and Usman (2010). The study found that the overall public capital expenditure, overall recurring expenditure and public education expenses have a negative impact on economic development using cointégration and error correction approaches.

The effects of internet penetration on the economic growth in Nordic and Indonesia were compared in Imansyah (2018). The study showed that the internet penetration in Indonesia does not affect much of Indonesia 's economy, since internet penetration is not spread uniformly across all cities in Indonesia by assessing penetration or use of the internet, network readiness, index infrastructure, and government support, the connectivity settings, and country-specific readiness index analyses.

III. Methodology

From the publications of Bank Indonesia and BPS-Statistics Indonesia, the annual data series on GDP per capita, education and health government expenditure in Indonesia for the period from 1995 to 2019 was collected. The internet user (share of total population) data of Indonesia is collected from the World Bank. In order to explain the general functions of the data, the descriptive statistics are used and the line chart is created. The Ordinary Last Square (OLS) method and the Error Correcting Model (ECM) are used in this analysis to determine the relationship between the variables. The model employed in this analysis is:

$$LNGDPC = \alpha 0 + \alpha 1 LNEDU + \alpha 2 LNHEA + \alpha 2 LNINT + Ut$$

where: GDPC = Gross Domestic Product per Capita (IDR Million rupiahs);
EDU = Government Expenditure on Education (IDR Billion rupiahs);
HEA = Government Expenditure on Health (IDR Billion rupiahs);
INT = Internet Penetration
U_t = the white noise random element

IV. Results and Discussion

Based on Figure 3, the development of GDP per capita in Indonesia from 1995 to 2017 tends to increase. Government Expenditure on Education show the increase trend as shown in Figure 4.

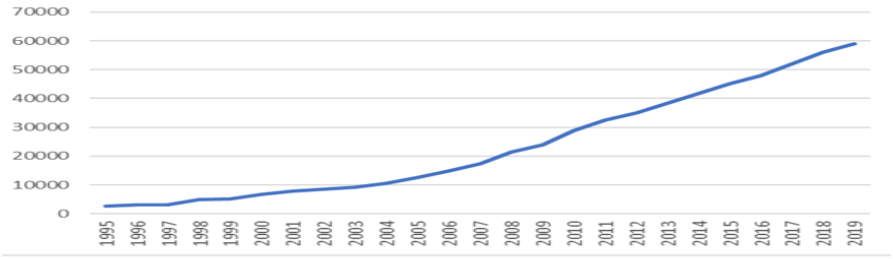

Figure 3. Indonesia's GDP Per Capita (IDR Thousand)

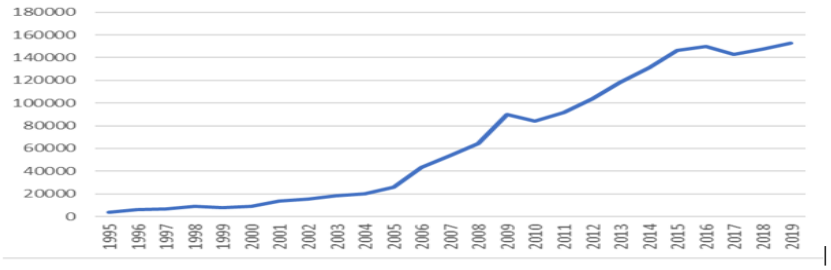

Figure 4. Indonesia's Government Expenditure on Education (IDR Billion)

Government Expenditure on health has increased and decreased in the same period (Figure 5). Internet penetration (% of total population) in Indonesia is shown in Figure 6.

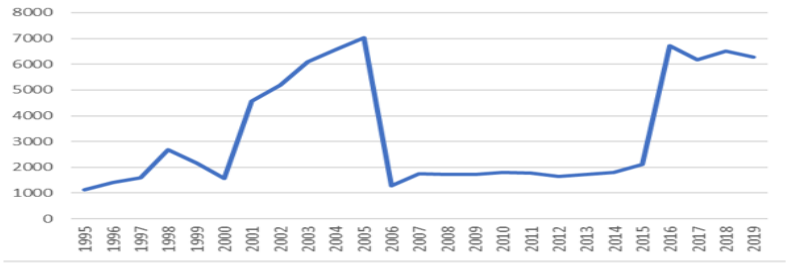

Figure 5. Indonesia's Government Expenditure on Health (IDR Billion)

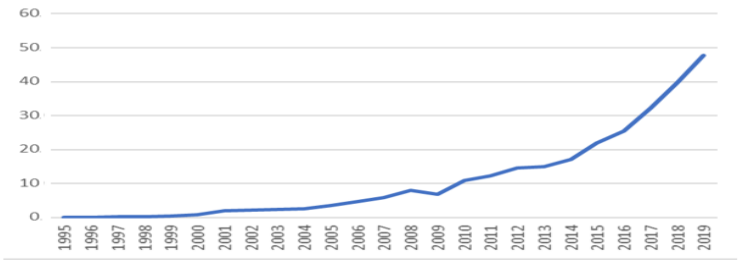

Figure 6. Internet penetration in Indonesia (%)

This analysis involves a three-stage method to evaluate the correlation between the variables. These techniques include root unit checking, Johansen technique for co-integration and Error Correction. Tests on the stationarity of the time series data used in this analysis included the Augmented Dickey Fuller (ADF). In order to find out long-term balance convergence and speed of imbalance change, Johansen's co-integration test and error corrections modeling were also used.

Stationarity Test

Stationarity test was carried out using the ADF test on all research variables. The stationarity test is carried out on the level and first difference data to determine whether the variable has a unit root or not. The summary of the results of the stationarity test using the ADF is as follows:

Table 1. Augmented Dickey Fuller Unit Root Test Result

Variable	p-value		
	Level	First Difference	Remarks
LNGDPC	0.2097	0.0009	Stationary I(1)
LNEDU	0.1584	0.0003	Stationary I(1)
LNHEA	0.7343	0.0002	Stationary I(1)
LNINT	0.1582	0.0026	Stationary I(1)

Table 1 shows that at the first difference, all variables are stationary. If variables known to be I(1) generate a stationary series, the cointegration between them is feasible over the long term.

Co-integration Test

A co-integration test is carried out with the Johansen co-integration test to determine the presence of a long term relationship between variables as shown in Table 2.

Table 2. Johansen co-integration test for the series

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.860506	76.95819	47.85613	0.0000
At most 1 *	0.644563	31.65433	29.79707	0.0302
At most 2	0.220832	7.862945	15.49471	0.4802
At most 3	0.088203	2.123779	3.841466	0.1450

Trace test indicates 2 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

The statistics from Table 2 indicate that in favor of an alternative hypothesis at 0.05 stage, the null hypothesis of no cointégration has been rejected. Their values are higher than the critical values at level 0.05. This means that the variables have a long-run relationship. The long run equation can be formed from the coefficients estimate in Table 3.

Table 3. The Coefficient

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3.373400	0.684415	4.928878	0.0001
LNEDU	0.543844	0.084431	6.441317	0.0000
LNHEA	0.043583	0.074220	0.587211	0.5633
LNINT	0.131166	0.044297	2.961102	0.0075
R-squared	0.986413	Mean dependent var		9.668624
Adjusted R-squared	0.984472	S.D. dependent var		0.994471
S.E. of regression	0.123921	Akaike info criterion		-1.192703
Sum squared resid	0.322483	Schwarz criterion		-0.997683
Log likelihood	18.90879	Hannan-Quinn criter.		-1.138613
F-statistic	508.2131	Durbin-Watson stat		0.930980
Prob(F-statistic)	0.000000			

The resulting Adjusted R^2 value in Table 4 is 0.984472, which means 98.44 percent of the variation in GDP per capita can be explained by government expenditure on education, government expenditure on health, and internet penetration. In addition, a partial test was conducted to determine the effect of each independent variable on the dependent variable. With a significance level of five percent, it can be concluded that the variables affecting GDP per capita in the long run are government expenditure on education and internet penetration, while the variable government expenditure on health does not affect GDP per capita. After carrying out the stationarity test, the next process is to carry out cointegration testing by testing the stationarity of the residuals generated by the long-term equation.

Error Correction Mechanism (ECM)

The formation of the ECM model is used to explain how government expenditure on education, government expenditure on health, and internet penetration affects GDP per capita in the short term. Estimation in Table 4 is performed using the results of the cointegration test that have been obtained and the variables that are stationary (first difference data).

Table 4. ECM

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.075786	0.023869	3.175042	0.0050
D(LNEDU)	0.198618	0.091666	2.166750	0.0432
D(LNHEA)	-0.005192	0.043653	-0.118941	0.9066
D(LNINT)	0.062745	0.047003	1.334933	0.1977
RESID01(-1)	-0.421058	0.127070	-3.313592	0.0037
R-squared	0.435008	Mean dependent var		0.127970
Adjusted R-squared	0.316062	S.D. dependent var		0.080577
S.E. of regression	0.066638	Akaike info criterion		-2.396038
Sum squared resid	0.084371	Schwarz criterion		-2.150610
Log likelihood	33.75245	Hannan-Quinn criter.		-2.330925
F-statistic	3.657196	Durbin-Watson stat		2.382584
Prob(F-statistic)	0.022633			

The short-term equation produces an F-stat value of 3.657196 with a Prob (F-stat) of 0.022633. A Prob (F-stat) value that is smaller than the 5% significance level indicates that at least one independent variable affects GDP per capita. The resulting Adjusted R-square value is 0.316062, indicating that 31.60 percent of

the variation in the GDP per capita can be explained by the independent variables in the model. Partially, not all independent variables in the short-run equation have an effect on GDP per capita. The independent variable that affects GDP per capita in the short term is the variable government expenditure on education.

In the long and short term, the variable government expenditure on education has a positive effect on GDP per capita in Indonesia. In the short term, the variables of government expenditure on health and internet penetration have no effect on GDP per capita. However, in the long run the internet penetration variable has a positive effect on GDP per capita in Indonesia.

The short-run model formed through the ECM model must meet classical assumptions. The classical assumptions that must be met are the assumption of normality, homoscedasticity, non-autocorrelation, and non-multicollinearity.

Checking the normality assumption was carried out using the Jarque-Bera (JB) test with the zero error hypothesis normally distributed. The JB test probability value obtained is 0.277568 which is greater than 5% significance level. This indicates that the residuals are normally distributed or the assumption of normality is fulfilled.

To detect homoscedasticity with the proposed null hypothesis being a constant error variant, the White test was performed. The chi-square probability value obtained in this test is 0.1500. This value is greater than the significance level used, which is 5%, so it can be concluded that the variance of constant residuals or the assumption of homoscedasticity is fulfilled.

Non-autocorrelation assumptions are fulfilled when there is no correlation between errors, which is used as a null hypothesis in testing non-autocorrelation assumptions. Tests were carried out using the Breusch-Godfrey Serial Correlation LM Test. The obtained value of chi-square probability in this test is 0.4277 which is greater than the significance level used. This shows that there is no correlation between residuals so that the non-autocorrelation assumptions are fulfilled.

Multicollinearity occurs when the independent variables used in the model are correlated. Multicollinearity checking is done by looking at the Variance Inflation Factors (VIF) value produced by each independent variable in the study. The non-multicollinearity assumption is violated if the VIF value of the independent variable is greater than ten. The VIF value generated by all independent variables in this study is around one, which means it is less than five so that the non-multicollinearity assumption is fulfilled.

Based on the description above, it can be concluded that the short-term equation model that is formed has fulfilled the classical assumptions in the form of normality, homoscedasticity, non-autocorrelation, and non-multicollinearity assumptions. With these assumptions fulfilled, the resulting estimator can be said to have BLUE characteristics so that it can be used to estimate the effect of government expenditure on education, government expenditure on health, internet penetration on GDP per capita in Indonesia.

Conclusion

Based on the results and discussion that has been done, the conclusions of this study are obtained. In the period 1995 to 12019 the development of government expenditure on education, government expenditure on health, and internet penetration on GDP per capita in Indonesia it has an upward trend. In the long term, government expenditure on education and internet penetration has a positive effect on GDP per capita in Indonesia, while government expenditure on health has no effect on the growth of non-cash transactions in Indonesia. In the short term, government expenditure on education has a positive effect on GDP per capita, while the variables of government expenditure on health and internet penetration have no effect on GDP per capita in Indonesia.

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