



Research Article

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Economic Growth and Household Expenditure Nexus: A Focus on Education and Health in South Africa

Mubanga Mpundu

Nolutho Diko

Walter Sisulu University, South Africa

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Abstract

The COVID-19 pandemic which was first recorded from China and spread globally in 2020 caused a massive response from many countries with most opting for national lockdowns. The move prohibited the movement of people across borders so as to control and limit the spread of the virus. In developing countries, the move contributed to ill performing economies even before the pandemic was rampant. The study focused on analysing time series data with a focus on the effects of changes in final consumer consumption on health and education on gross domestic product per capita. A Vector Error Correction Model was used as a suitable displaying technique when the factors were found to be cointegrated. Numerous economic variables showed persistent upward or descending movement which could be created by stochastic patterns in incorporated variables. Results showed the error correction coefficient was statistically significant showing the speed at which GDP per capita returned to equilibrium because of changes in the independent variables. What was interesting from the results was the fact that final consumption expenditures on health and education where not negatively affected by shocks in the economy prior and during COVID-19. Consumers where still spending on the health and education as they are considered vital for the development and wellbeing of households even with reduced foreign direct investment observed. Investment into high return projects both in health and education should be funded more as they in turn tend to have a positive impact on production.

Keywords: Corona virus, Health, Education, Economic growth, Gross Domestic Product per capita

1. Introduction

Corona viruses are a large family of viruses which may cause respiratory infections ranging from the common cold to more severe diseases such as Middle East Respiratory Syndrome (MERS) and Severe Acute Respiratory Syndrome (SARS) Department of Health (2021). The most recent Corona virus disease is COVID-19. There has been great debate on the origins of COVID-19 with most public mind being fixed on an origin story that in Wuhan, someone got infected at the Huanan seafood market with a virus from an animal, Readfearn (2020). It is postulated that COVID-19 spread from the capital of China's Hubei province resulting in a worldwide pandemic which would go on to kill a lot of humans globally. The limitation of the pandemic to China where it is believed to have originated from did not stand due to the nature of it being airborne and grounding of people was not done immediately. This in turn left room for carriers of the virus to move from one place to another thereby transmitting to other people. There have so far been 128 million confirmed cases, 72.4 million recoveries and 2.79 million deaths from COVID-19 globally, (Johns Hopkins

University COVID-19 Dashboard, 2021). The illness has been detected in more than 200 countries and with the United States, Brazil and Russia experiencing the most widespread outbreaks, followed by the United Kingdom, Spain and Italy including South Africa which is the epicentre in infections and death rate on the African continent, Reynolds and Weiss (2020).

The World Bank (2020), projects that the pandemic has not only caused economic setbacks in the short-term but will also have a huge impact on long-term growth prospects with a baseline forecast of 5.2 percent contraction in global GDP. Most economies went into lockdown mode in order to slow down the progression of the virus by mostly limiting or restricting the movement of people. All regions are expected to have declines in growth; East Asia and the Pacific are envisioned to grow by 0.5%, South Asia contracting by 2.7%, Sub-Saharan Africa contracting by 2.8%, Middle East and North Africa by 4.2%, Europe and central Asia by 4.7% while Latin America will contract by 7.2%, World Bank (2020). In Africa, where most countries already encountered hurdles in growth and development, the COVID-19 pandemic exacerbated the situation by bringing to light the struggles people went through relating to unemployment, income inequality, low production levels and inadequate health facilities and infrastructure, (AfDB; 2020). As some countries on the African continent had already borrowed heavily to sustain projects which where not giving the required returns on investment, it became very difficult to sustain the economies with companies shutting down due to lockdowns which were imposed by governments to protect the mass population. Defaults on loans where eminent and it became clear that the effect on growth and expenditure on COVID-19 related items in those African countries was going to be a challenge as it was also marred by corruption. There was a projection on African countries' exports and imports dropping by 35% from the level, which was reached in 2019, African Union (2020). That would translate into a loss in value of about 270 billion United States dollars estimated, African Union (2020). In fighting against the virus spreading and acquiring the right medical products, there would be an estimated increase in African public spending estimated at 130 billion United States dollars, AfDB (2020).

South Africa is the epicentre of COVID-19 infections on the African continent with about 9, 819, 994 tests conducted, 1, 545, 979 positive cases identified, 1, 472, 645 recoveries and 52, 710 deaths recorded, DOH (2021). Another 548 new cases were identified in the various parts of the country, DOH (2021). The government imposed a level five lockdown from 26th March to 16th April 2020 which was later extended to different lockdown stages approach from levels 5 (hard lockdown with very minimal economic activity) to level 1 (return to full economy operations). The country is currently under lockdown level 2 which allows for most parts of economic activities to resume, however borders are still closed for human traffic except for returning residents and transportation of goods for trade. According to the Minister of Finance Mr Tito Mboweni's supplementary budget speech in June 2020 highlighted that the gross domestic product was projected to decline by 7.2% in 2020 with an expected rebound of 2.6% in 2021. He further stated that there would be a 15.7% consolidated budget deficit in the 2020 fiscal year with the gross debt-to-GDP ratio being set to move to 81.8% in 2020 and rise to 87.4% in 2023 - 2024. Many businesses have been affected negatively and job losses are set to worsen a 30.1% unemployment rate, National Treasury (2020). The Minister further highlighted that the supplementary budget conveyed resources to programs which were specifically aimed at containing the pandemic. In this regard, the health department got allocated an additional 40.9 billion rand in order to support struggling households for a period of six months while 20 billion rand was meant to cushion municipal finances and 15.5 billion rand was disbursed towards education, National Treasury (2020).

The objective of this study was to analyse the effect of pre- and on-going COVID-19 on the economic performance of the country with a focus on health, education and general wellbeing of households.

2. Literature Review

According to Pak *et al.* (2020), infectious disease outbreaks translate to worldwide threats which require a joint response from everybody affected. Most developed countries have real-time surveillance and health

systems which are used to control spreading of the disease, are able to improve their public health capacity. This is usually not the case in the developing countries which are hit with problems in the health sector ranging from the low number of qualified staff available to insufficient funding and inadequate infrastructure. The developing countries mostly rely on donor funding to run some sectors of their economy which unfortunately for some includes the health and education sectors. COVID-19 made it very difficult for the developed countries to continue funding health and education sectors of developing nations as they also had to focus on strengthening their own sectors to ensure the population was protected, DOH (2021). Investment into new technologies and research for vaccines was also another factor which reduced the amount of funds low income countries received from the developed countries.

Many countries had imposed lockdowns to protect the population from contracting the virus but in many African countries, because of the prevalence of poverty, people still used to go out in search of necessities. The risk of contracting the virus was therefore very high and protective measures where such as hand washing and mask wearing where rarely observed. In addition, non-access to clean water also made it hard to keep up with good hygiene (Lock, Gralki and Critchley, 2020).

At a worldwide level, healthcare spending is expected to rise to 10.4% of GDP from 10.1% in 2019 according to The Economist Intelligence Unit, (2020). The share will range from 16.7% of GDP emanating from the United States of America to 5.6% of GDP in Africa and the Middle East. Due to the fact that investors are expected to search for other areas to invest their money due to high risks which are associated with global pandemics, the dollar is expected to strengthen and expenditure on health depends also in part on the performance of the investors since revenue is generated from them by governments through taxes. Countries with low production levels are expected to have a challenge in generating finances for use to prevent the spread of COVID-19. More health personnel will also be required to ensure that testing is conducted in most places and the right health care provided, DOH (2021).

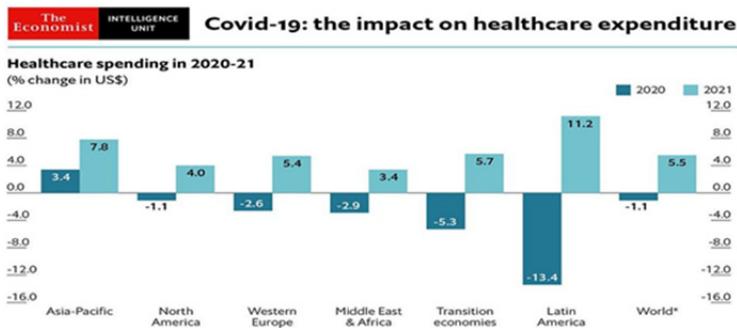


Figure 1: Global Health Care Expenditure Prediction
Source: The Economist Intelligence Unit, 2020.

2.1 Education Financing

Financing the education sector and ensuring that the massive population is educated is one of the key policies which governments embark on globally to uplift the living standards and well-being of the population. Developed countries usually spend huge amounts on education and research investment which translates into high productivity levels in the different sectors including having trade surpluses and generating revenues necessary for use in various sectors. During the lockdowns in most countries, educators and students could not report face to face as a preventive measure to avoid the spread of COVID-19. In this regard, another way of delivering lessons had to be found. This is where the notion of online and blended learning came into play. Lessons had to continue online

which meant there had to be investment in technology. Investment on trainings of how to use the various online learning platforms had to also be undertaken, Al- Samarrai (2020). When face-to-face lessons were permitted, the schools had to ensure that proper protective gears are purchased and the environment was conducive for the lessons to go ahead, DOH (2021).

Developed countries could manage to pull the resources required for such activities but the main challenge remained for the African countries with limited resources and capacity. Investing in these new technologies was deemed a challenging task as most low-income countries were already battling with the issue of poor education infrastructure and low paid educators, Schleicher (2020). In rural areas, most learners could not access the gadgets required for them to continue learning nor could they access network or data as it usually comes at a very high cost. Governments had to re-adjust their budgets to ensure that they allocate more resources to the education sector. Most of the short-term stimulus packages did not work as was expected considering more funding was required for the long-term, National Treasury (2020). In addition, international students could not travel to other countries for education related activities due to the lockdowns. Revenue was also lost by most countries as international students usually pay high fees. The gap between the rich and the poor was brought to plain sight. The poor were disadvantaged in many ways including access to education or technology and connectivity, World Bank (2020).

3. Methodology

The study applies a quantitative method to analyse secondary yearly data comprising of gross domestic product per capita, balance of payments, total direct investment, final consumption expenditure by households on health and final consumption expenditure by households on education. The data was obtained from South African Reserve Bank and Statistics South Africa respectively. The timeframe of the data was from 1960 to 2019.

Equation formulation

$$GDPpc_t = \alpha + \beta_1 BOP_t + \beta_2 TDI_t + \beta_3 FCEH\ Health_t + \beta_4 FCEH\ Education_t + \varepsilon_t$$

Where:

$GDPpc_t$ = Gross Domestic Product per capita

BOP_t = Balance of Payments

TDI_t = Total Direct Investment

$FCEH\ Health_t$ = Final Consumption Expenditure by Households on Health

$FCEH\ Education_t$ = Final Consumption Expenditure by Households on Education

α = Intercept

β = Gradient Parameters

ε = error term

This study uses a time series econometric procedure called Vector Error Correction Model (VECM) to inspect the connection between Gross Domestic Product per capita and its autonomous factors. VECM is a suitable displaying technique when the factors are cointegrated. Numerous economic variables show persistent upward or descending movement which can be created by stochastic patterns in incorporated variables.

ECM joins long run data with a short run adjustment system. The ECM beats the issues of spurious regression by using appropriate differenced factors in order to determine the short term adjustment in the regression model. There are two conceivable particulars for error correction: the long run ECM and the transitory ECM. The long term components of our factors are to obey equilibrium constraints, while short-run segments have an adaptable dynamic specification, Dwyer (2015).

Estimation of the Error correction Model-

$$y_t = \alpha_0 + \gamma_0 x_t + \gamma_1 x_{t-1} + \alpha_1 y_{t-1} + \varepsilon_t$$

Where y_t is the dependent variable, x_t is the independent variable, y_{t-1} and x_{t-1} are lagged values of y_t and x_t respectively, $\alpha_0, \gamma_0, \alpha_1, \gamma_1$ are parameters, and ε_t is the error term.

This procedure is a vector cointegration test method. It has the advantage over the Engle-Granger method in that it can estimate more than one cointegration relationship, if the data set contains two or more time series.

4. Empirical Results

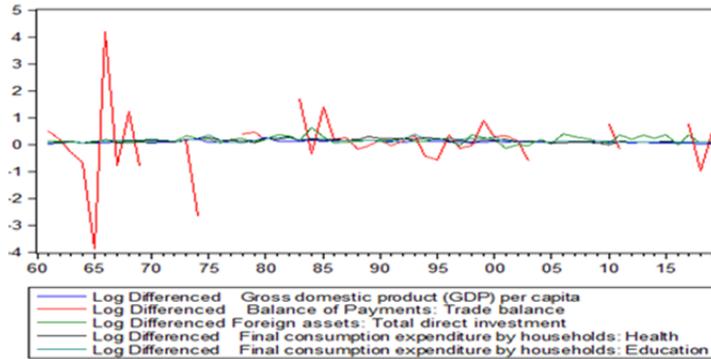


Figure 2: Stationarity of variables in differenced form

Source: Authors analysis

Figure 2 shows that the variables are stationary after 1st difference. This means that the time series does not change over time. The mean and variance revolve around the zero mean and do not change over time. This statistical characteristic makes it easier to conduct more tests and determine the relationship among the variables. The breaks in the balance of payments were mainly due to the lapses in data over some time periods when the variables were logged.

Table 1: Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None*	0.943218	328.9358	69.81889	0.0001
At most 1*	0.756845	165.4290	47.85613	0.0000
At most 2*	0.697863	84.82773	29.79707	0.0000
At most 3*	0.251437	16.60588	15.49471	0.0339
At most 4	0.001730	0.098669	3.841466	0.7534

Trace test indicates 4 cointegrating eqn(s) at the 0.05 level, *denotes rejection of the hypothesis at the 0.05 level, **MacKinnon-Haug-Michelis (1999) p-values

Table 2: Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None*	0.943218	163.5069	33.87687	0.0001
At most 1*	0.756845	80.60124	27.58434	0.0000
At most 2*	0.697863	68.22185	21.13162	0.0000
At most 3*	0.251437	16.50721	14.26460	0.0217
At most 4	0.001730	0.098669	3.841466	0.7534

Max-eigenvalue test indicates 4 cointegrating eqn(s) at the 0.05 level, *denotes rejection of the hypothesis at the 0.05 level, **MacKinnon-Haug-Michelis (1999) p-values

Tables 1 and 2 show the cointegration results for trace and max-eigenvalue test statistics. Both confirm 4 cointegrating equations at 0.05 level with probabilities lower than 5%. This means that there is a long run relationship among the variables. A change in one or more of the independent

variables will have an effect on the dependent variable given by the gross domestic product per capita. The first 4 equations for the trace and max-eigenvalue statistics have critical values which are larger thereby enabling us to reject the null hypothesis of no cointegration at 0.05.

Table 3: Vector Error Correction Estimates

Error Correction	D(GDP)	D(BOP)	D(TDI)	D(FCE Health)	D(FCE Education)
CointEq1	-0.168139	-0.279909	21.08504	-0.429351	0.043698
Standard error	0.03723	1.10064	5.43832	0.10554	0.04063
t-statistic	-4.51675	-0.25431	3.87712	-4.06803	1.07543
R-squared	0.932760	0.643866	0.875975	0.943789	0.968957
Adj. R-Squared	0.915950	0.554833	0.844969	0.929736	0.961196

Table 3 shows an estimated coefficient of D(GDP) value of -0.168139 which is statistically significant. The coefficient directly estimates the speed at which the dependent variable returns to equilibrium after a change in the independent variables. The R-squared which is a goodness of fit measure shows that about 93% of the variance in the dependent variable is explained collectively by the independent variables. In this case, the model fits the data well.

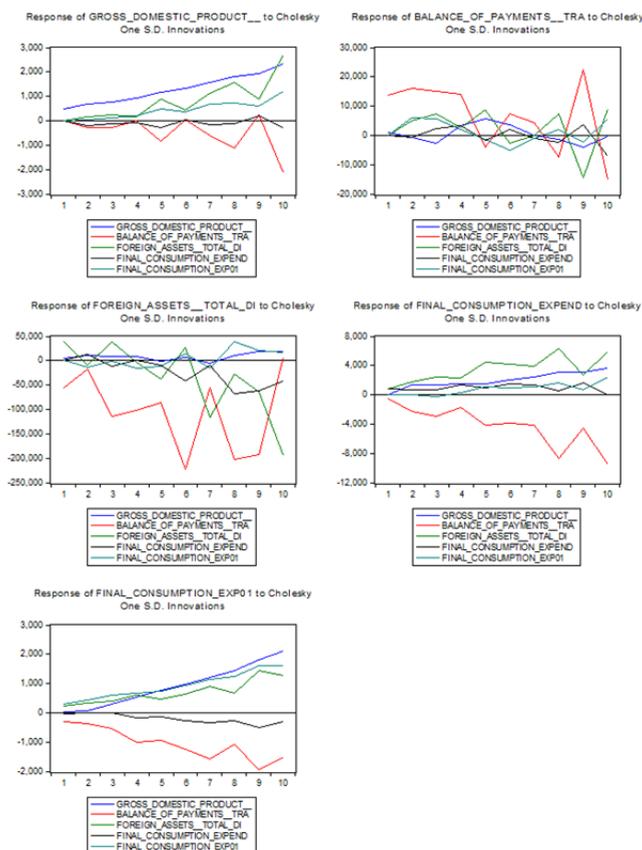


Figure 3: Generalised Impulse Response Functions

Generalised impulse responses in Figure 3 trace out the responsiveness of the dependent factors in the VECM to shocks from every factor. For each of the factors from every condition independently, a unit shock is connected to the error and the impacts upon the VECM framework after some time are noted. The GIRF examination depicts the impacts of a shock to a condition in the model on the majority of the factors in the framework without giving an economic elucidation to the shock. While this examination cannot give a comprehension of the reaction of the full scale economy to determine auxiliary shocks, in this way, it provides an important characterisation of the dynamic reactions of the large scale economy to 'practical' shocks.

The GIRF shows shock applied to each variable and its effect on the VECM system. In the study, one to three quarters is considered as the short term, three to seven quarters as the medium term and eight to ten quarters is considered as the long run. The figure shows the response of variable to shocks in the VECM model (10 quarters ahead). The movement above the zero line has a positive effect while below the zero line are the negative effects. The response of gross domestic product per capita to the independent variables was first analysed in the study. The gross domestic product per capita shows a relative increase even when hit by shocks. Diversity of the South African economy and a stable financial sector usually cushion and prevent excessive negative impact of shocks on GDP. The total direct investment from foreign firms and corporations declined and fell sharply with a shock in the economy from periods 6 to 10. The final consumer expenditure on both health and education were not negatively affected by shocks to the economy. Consumers were still spending on the health and education as they are considered vital for the development and wellbeing of households.

5. Conclusion

The COVID-19 pandemic, which led to an estimated 72 million reported cases and 2.7 million deaths worldwide, caused panic and havoc in many countries globally. The speed at which the pandemic was spreading influenced countries to enforce measures, which would protect their populations. There were lockdowns introduced in many countries inhibiting the movement of people to control spread of the corona virus. The lockdown measures were applauded in most cases but with them came economic setbacks, which affected the welfare of households especially in developing countries. The developed countries managed to quickly introduce stimulus packages to ensure their population's financial stress was minimised and they had capacity to build and acquire medical facilities, which would assist in quarantine for the infected masses.

The developing countries on the other hand had many challenges with enforced lockdowns. These countries depend on trade and tourism for revenue generation and closing of borders came with serious economic consequences. Most of the population also depends on informal jobs for survival meaning they could not do any work during lockdown adding to the burden of poverty. Medical facilities and staff were constrained with limited funding available to acquire the required equipment. Corruption and mismanagement of resources was another negative factor affecting the fight against COVID-19.

The study focused on the effect of changes in balance of payment, foreign direct investment, final consumption expenditure on health and education on the gross domestic product per capita in South Africa. Cointegration results showed that there was a long run relationship among the variables. Any changes in the independent variables had a long run effect on GDP per capita. The error correction coefficient was significant showing the speed at which GDP per capita returns to equilibrium when there is a change in the independent variables. What was interesting from the results was the fact that final consumption expenditures on health and education were not negatively affected by shocks in the economy. This shows and supports theory which proposes that in ensuring production and development in an economy, health and education are vital factors which should not be overlooked. The South African government had further allocated more funds towards health and education when the COVID-19 pandemic hit. Even as GDP per capita fell in 2020 due to

low production and output, external finances had to be sourced in order to support the health and education sectors. Investment into high return projects both in health and education should be funded more as they in turn tend to have a positive impact on production.

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