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Full Length Research Paper

Stock returns, inflation and interest rate In Nigeria

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The generalized Fisher effect has attracted a great deal of controversy around the world. This is similar in the Nigerian scenario as study established that there exist no long-run relationship between stock returns and inflation while some studies reported that only a unidirectional causation of returns on stocks with money flow exist as the variation in the flow of money will alter returns on stocks significantly, but not in the opposite direction. Therefore, this study examined the relationship between stock returns, inflation and interest rate in Nigeria with objective of testing the Fisherian theory. The Fisherian theory of interest postulates that changes in the value of money would be reflected in nominal interest rates and stock returns in the same proportion over the long-run. This study tested the validity of this hypothesis in a small open economy, Nigeria. A battery of econometric techniques were employed (descriptive and inferential) for the sake of robustness. In line with the theoretical postulation of the Fisherian theory of interest, the findings established a long-run relationship among the selected series. Specifically, the study found that the price level coefficient exhibits a positive and significant relationship with stock price in the long-run. Therefore, evidence abounds of a great deal of the Fisherian postulation in the analyses carried out and conclude that common stocks are, indeed, a good hedge against inflation in Nigeria.

Key words: Fisherian theory, interest rates, Nigeria, small open economy, stock returns.

INTRODUCTION

The Fisherian theory of interest rate has attracted significant attention in finance and economics literature. The theory postulates that in an efficient market, the underlying value of goods accounts for the variations in interest rate over a period of time. If the monetary standard were always stable with reference to goods, the rate of interest, reckoned in terms of money, would be the same as if reckoned in terms of goods (Fisher, 1930). Mundell (1963) alluded to this postulation by arguing that purely monetary phenomenon triggers changes in real conditions in the economy. This postulation opened the flood gate of studies on how a nominal value can be discounted into its real value in such a way that

expectations regarding changes in values with passage of time should have minimal effects on asset values. Cifter (2015) stated that the 'generalized Fisher effect' asserts that common stocks can be taken as a hedge against inflation.

The generalized Fisher effect has attracted a great deal of controversies. Mundel (1963) posited that expected increase in prices will have partial effects on the money rate of interest while, Schwert (1981) pointed out that stock prices react negatively to unexpected inflation news. Fama (1981) attributed the negative relations between real stock returns and inflation 'proxy effects'. Fama (1981) adduced that stock returns are positively

related to measures of real activity but that evidence of negative relations between inflation and real activity existed pointing out that the hypothesis for both common stocks and bonds is that expected real returns are determined in the real sector. Other studies established a positive trend between stock returns and inflation (Alagidede and Panagiotidis, 2012; Chang, 2013; Tiwari et al., 2015).

On the other hand, Luintel and Paudyal (2006) showed that common stocks are not good hedges against inflation since their study revealed that the retail price elasticity of stock return is above unity. Lee (2010) and Antonakakis et al. (2016) found mixed results in the stock returns and inflation relations. Other factors such as regime switches/dependency (Lee, 2010; Li et al., 2010; Cifter, 2015), model specification (Oxman, 2012), time (Tripathi and Kumar, 2014) were found to have effects on the relations between stock returns and inflation.

In the case of Nigeria, similar ambiguity exists. Lawal (2016) established no long-run relationship between stock returns and inflation. Apart from this and few other studies, there is a dearth of literature on the relationship among stock returns, inflation and interest rates in Nigeria; hence, interest rate was adopted as augmentation variable in the regression analysis carried out in this study. This study, therefore, fills this void.

The studies on the relationship between stock returns and inflation in Nigeria rather than provide a consensus added to the ever growing controversy which has increased the problems associated with high levels of inflation and their effects on returns in the country's financial markets. Moreover, most of the studies have failed to take cognizance of Geske and Roll (1983)'s reverse causality hypothesis which corroborated the contention by Fama (1981) that the negative relations between real stock returns and inflation observed during the post 1953 period in the United States of America were the consequences of proxy effects. Stock returns are determined by forecasts of more relevant real variables, and negative stock return-inflation relations are induced by negative relations between inflation and real activity (Fama, 1981). This study strives to overcome this major short-coming by infusing interest rate into the analysis in order to provide augmentation for interest rate which is assumed to be a relevant real variable like inflation rate. In particular, this study intends to investigate the relationship among the inferred variables in the long-run following the argument of Boudoukh and Richardson (1993) that investors prefer holding stocks over the long-run. The essence is to test whether the relationship between stock returns and inflation is positive in line with the theoretical underpinnings of the 1970s and 1980s which enthused a positive relationship between stock returns and inflation. The question is "does this situation hold in the case of Nigeria being a small open economy? The outcome of this research will provide a clear understanding as to whether stocks are a good

hedge against inflation in a small open market with a high inflationary environment. Furthermore, the expected augmentation of interest rate in the analysis is to validate the Fisherian theory of interest which asserts that a fully perceived change in inflation would be reflected in nominal interest rates and stock returns in the same direction which was also re-stated by Hassan (2008). In fact, Hasan (2008) asserted that the Fisher effect encompasses returns of securities relating to both interest bearing instruments and equity based investments; hence, interest rate has become an integral part of the analysis carried out. The objective of the study is to establish whether stock returns are a good hedge against inflation in Nigeria. Consequently, the hypothesis to be tested is as follows: Null Hypothesis - H_o: There is no significant effect of stock returns on inflation in Nigeria.

Literature review

The stock market plays a major role in financial intermediation in both developed and developing countries by channelling idle funds from surplus to deficit units in the economy. It is also a mechanism for monetary transmission as interest rate and expected level of inflation play important roles in the achievement of macro-economic objectives. As the economy of a nation develops, more resources are needed to meet its rapid expansion. The stock market serves as a channel through which savings are mobilized and efficiently allocated to achieve economic growth (Alile, 1984). Large and long term capital resources are pooled through issuing of shares and stocks by industries in dire need of finance for expansion purposes. Thus, the overall development of the economy is a function of how well the stock market performs. Empirical evidences from developed economies as well as the emerging markets have proved that the development of the stock market is sacrosanct to economic growth (Asaolu and Ogunmuyiwa, 2010).

Inflation is one of the most frequently used terms in economic discussions, yet the concept is variously misconstrued. There are various schools of thought on inflation, but there is a consensus among economists that inflation is a continuous rise in the general prices of goods. According to Akinsola and Odhiambo (2017), inflation is seen as the continuous increase in the general level of prices of goods and services over time or more simply, as too much money chasing too few goods. Inflationary periods bring about a continuous decline in the purchasing power of money. Inflation can be seen as the surplus demand for commodities in the market as a whole. This indicates that the level of expenditure being engaged on home produced commodities surpasses the maximum yield of the home produced commodities that are achievable in the long run, based on the available

resources (Skene, 1992). Inflation refers to an overall rise in the Consumer Price Index (CPI), which is a weighted average of prices for different goods and services (Sinclair, 2010). Inflation rate occurs when the buying power of a currency falls due to a rise in the level of prices for goods and services in the economy (Comley, 2015).

Interest rate describes the amount of interest paid per unit of time expressed as a percentage of loans, - (Aluko et al., 2019). Chimaobi,- (2015) opined that interest rate can be regarded as prices of loanable funds and these prices affect decisions on the allocation of financial resources in the economy, therefore, serving as signals that direct financial resources in the economy. The concept of interest rate has objectives which cut across critical segment of the economy in the sense that its objectives are always in tandem with that of the overall monetary policy especially in the realm of maintaining price stability and generating rapid economic growth.

Theoretical framework

Theoretically, Fisher (1930)'s hypothesis which has evolved over the years as the 'generalized Fisher hypothesis' - simply postulated that the expected nominal return on common stocks comprised a real return in addition to the expected rate of inflation. This hypothesis provided the foundation for Mundel (1963)'s hypothesis which states that an increase in the expected rate of inflation causes portfolio substitution from money to stock returns which in turn reduces the real rate of stocks as well as interest rates; Fama (1981)'s proxy effect hypothesis and Modigliani and Cohn (1979) inflation illusion hypothesis provided further insights into the effects of inflation.

Chang (2013) explained that the Fisher hypothesis assumes a one to one relation between stock returns and inflation. The theoretical framework adopted by this study is the generalized Fisher Hypothesis by empirically testing the relation between stock returns, inflation and interest rate in Nigeria both in the short-and-long-run. Hasan (2008) pointed out that the Fisherian theory of interest asserts that a fully perceived change in inflation would be reflected in nominal interest rates and stock returns in the same direction. Mundel (1963) reviewing the basis for the Fisherian hypothesis; drew attention to some misgivings about the empirical reliability of Fisher (1981) explanation that the adjustment of money interest was only partial rather than the general understanding of the hypothesis which states that nominal interest should fully reflect changes in inflation.

Stock prices are expected to provide a hedge against inflation. Luintel and Paudyal (2006) argued that stock prices increase as inflation rate rises. However, Fama and Schwert (1977) provide some evidence that stock returns have negative relationship with inflation rate in the United States post 1953. Fama (1981) hypothesized that

the negative relations between stock returns and inflation proxy the positive relations between stock returns and real variables which are fundamental determinants of equity variables.

Empirical review

Valcarcel (2012) used two different structural VAR specifications that incorporated time variation in the covariance and drift of the system which showed that volatility in US economic activity is estimated to have taken place far more gradually than that of stock prices. On the basis of the Fisherian theory of interest which asserts that a fully perceived change in inflation would be reflected in nominal interest rates and stock returns in the same direction in the long-run; Hasan (2008) found empirical evidence of positive and statistically significant relationship between stock returns and inflation which established common stock as a good hedge against inflation in the United Kingdom.

In the case of Brazil, Russia, India, China and South Africa (BRICS) countries, Tripathi and Kumar (2014) studied the long term relationship between inflation and stock returns from 2000-2013. Tripathi and Kumar (2014) stated inter alia "changes in inflation may bring some short run movement in stock return but certainly equity does not seem to be a good hedge against inflation in the long run at least in emerging BRICS markets". Alagidede and Panagiotidis (2010) concluded that important indication emerged that the stock market tends to provide a hedge against rising consumer prices in African countries.

Cifter (2015) who studied the relationship between stock returns, inflation and real activity in developing countries (Mexico and South Africa), using Markov-switching dynamic regression approach established that stock returns respond differently to inflation in a regime according to the regime-dependent proxy effect hypothesis and concluded that the negative relationship puzzle in the empirical finance literature can be explained with the regime-dependency effect.

Antonakakis, Gupta and Tiwari (2016) using a time-varying approach showed that the correlations between inflation and stock prices in the United States covering the period of 1791 to 2015 evolved heterogeneously overtime. The results of Antonakakis,- et al (2016) specifically revealed that the correlations between stock prices and inflation were significantly positive in the 1840s, 1860s, 1930s and 2011, and significantly negative otherwise.

Toan (2019) investigated the nexus between inflation and stock index in Vietnam. Using quarterly data and employing the Autoregressive Distributed Lag (ARDL) approach, the results revealed the unidirectional impact of inflation on stock index in the short run and long run, which was significantly negative.

In the case of Nigeria, Izunobi et al. (2019) employed

GARCH (1.1) techniques to evaluate the existence of high stock market returns volatility, and the impact of the exchange rate, interest rate and inflation on stock market returns; using time series data from 1995 to 2014 showed that interest rate had a negative relationship with stock market returns, while the inflation rate and exchange rate had a positive relationship.

Okonkwo (2019) explored the casual nexus between stock return volatility and selected macroeconomic variables in an emerging stock market from 1981 to 2018. The result of the Johansen Co- integration analysis indicated the presence of a casual nexus between stock return volatility and selected macroeconomic variables in an emerging stock market in the long run.

Sokpo et al (2017) investigated the effect of inflation on stock market returns in Nigeria employing a volatility modeling approach from 1995 to 2016 and found that inflation is not an important variable in explaining stock market return volatility.

Njogo et al. (2018) studied the relationship between inflation rate and stock returns using the Consumer Price Index and the All Share Index of the Nigerian Stock Exchange covering the period 1995 to 2014. The data were analysed for evidence of co-integration and causality using Error Correction and Granger co-integration model. The Pearson Correlation result showed that, there was significant negative relationship between stock returns and inflation rates in Nigeria. Augmented Dickey Fuller result showed that the series are non-stationary in their level form and are integrated of order one. Johansen co-integration test result showed evidence of co-integration implying that there was a long run relationship between stock market returns and inflation rates.

Kurotamunobaraomi and Ebiware (2017) studied the relationship between inflation and stock prices of firms quoted in Nigeria Stock Market using data that spanned 1986 to 2014 from the Central Bank of Nigeria and National Bureau of Statistics, Ordinary Least Squares, Unit Root (Stationarity) Test, Johansen Cointegration and Granger Causality Testa were employed to analyse the data. The study revealed that money supply and exchange rate portray statistically significant relationships with Stock prices. It also revealed that all but Interest Rate showed positive relationship with stock prices and no long run relationship were observed between any of the endogenous variables and the exogenous variable.

Fapetu et al. (2017) examined the impact of exchange rate on stock market performance using monthly data of market capitalization as indicators for stock market performance and monthly data on exchange rate as the parameters for measuring exchange rate volatility. The results revealed that exchange rate had a positive relationship with market capitalization rate in Nigeria. Emeka and Aham (2016) analysed the relationship between exchange rate and inflation volatility and stock prices volatility in Nigeria, using time series quarterly data from 1986 to 2012. The findings showed a negative relationship between stock market prices volatility and exchange rate and inflation volatility.

Lawal (2016), examined the long-run relationships and dynamics interactions between stock returns, inflation and exchange rate in Nigeria using data from the period of 1995 to 2014. She concluded that there was no evidence of the existence of a long-run relationship between stock returns and inflation but except in the short-run in Nigeria. The study by Nkoro and Uko (2016) investigated the relationship between exchange rate and inflation volatility and stock price volatility in Nigeria from 1986-2012 using a time series data and established a negative relationship between stock market prices' volatility and exchange rate and inflation.

Ahmed and Igbinovia (2015) studied the impact of inflation rate on stock returns in the Nigerian Stock Market using monthly data covering the period 1995 to 2010. Data were extracted from the Nigerian Stock Exchange Fact Book and the Central Bank of Nigerian Statistical Bulletin. The result indicated that inflation rate had a negative but weak impact on stock return; hence, inflation is not a strong predictor of stock returns in Nigeria. Inflation variable appeared to significantly respond to stock price changes.

Henry and Clinton (2015) investigated the effects of inflation on aggregate stock prices in Nigeria during the period of 1980-2012. Employing the Engle-Granger and Johansen-Joselius method of co-integration in a Vector Error Correction Model (VECM) setting, in addition to Granger causality Test, Augmented Dickey Fuller Test (ADF) was employed. The results showed that there exist a negative and significant long run equilibrium relationship between inflation rate and aggregate stock prices; Broad Money Supply (M_2) had a negative and significantly effects on aggregates stock prices, Narrow Money Supply (M_1) showed positive and significant effects on aggregate stock prices.

Taofik and Omosola (2013), analysed the long-run relationships and dynamic interactions between stock returns and inflation in Nigeria using monthly data of the All Share Price Index from the Nigerian Stock Exchange and Nigerian Consumers Price Index from January 1997 to 2010. The analytical technique of Autoregressive Distributed Lag (ARDL) bound test was deployed. The results showed that there is a short and long run relationship between stock returns and inflation.

Emenike and Nwankwegu (2013), investigated whether stock market returns protect investors against inflation, Engle and Granger two steps Co- integration model and Error Correction Model was used. Results showed that stock returns and inflation were co- integrated.

METHODOLOGY

The generalized Fisher hypothesis postulates that common stocks represent claims against real assets of a business, hence, serves as a hedge against inflation. This theory was hinged on a stable

rate of inflation and by extension, interest rate. Chang (2013) explained that the hypothesis assumes a one to one relation between stock returns and inflation.

The theoretical framework adopted by this study is the generalized Fisher Hypothesis by empirically testing the relation between stock returns, inflation and interest rate in Nigeria both in the short-and-long-run; in particular, trying to establish the relationship among the inferred variables in the long-run following the argument of Boudoukh and Richardson (1993) that investors prefer holding stocks over the long-run. The essence is to test whether the relationship between stock returns and inflation is positive in line with the theoretical underpinnings of the 1970s and 1980s which enthused a positive relationship between stock returns and inflation.

Empirical analysis and results

This study employed Augmented Dickey-Fuller (ADF) (1979) unit root test to check for the stationarity of the selected series after the description of the series and thereafter, robust inferential analytical techniques.

Unit-root

One basic requirement of econometric estimation is that the variables contained in a regression model should be stationary. If non-stationary variables are used in a regression model, it could lead to spurious results. To test the stationarity properties of our variables, Augmented Dickey Fuller test (ADF) is deployed.

Linear regression

Computationally and conceptually stock returns and inflation rate are derived from stock prices and consumer price index, respectively by way of log first differencing each of the series. The series should be stable, thereby confirming the time series property. Thus, the linear relation between stock returns and inflation in Nigeria in their level form is examined using linear regression. The rationale behind the underlying equation can be deduced from the assertion by Hasan (2008) that since the Fisher effect encompasses returns of securities relating to both interest bearing instruments and equity based investments, it is important to see the inter-relationship between stock returns, inflation and interest rates.

$$SR_t = \alpha + \beta \pi_t + \gamma \Delta \ln(i_t) + \varepsilon_t \qquad (1)$$

Where,

SR_t = stock return, _ α = constant, β = 1 following the joint hypotheses of efficiency and Fisherian theory of a constant real rate of return, γ coefficient of Interest rate, π_t= inflation rate and it is strictly exogenous, i = Interest rate and it is strictly exogenous and $[\varepsilon_t = u_t + v_t]$ is a composite error term. The above econometric equation is estimated to test the joint hypothesis of efficiency and Fisherian theory of a constant real rate of return. However, the preliminary analysis begins with estimating a regression model specified below to the relationship hypothesis between stock returns and inflation rate, viz:

$$SR_t = \alpha + \beta \pi_t + \varepsilon_t \qquad (2)$$

Where, all the parameters remained as described previously.

To test the H_{0i}: $\beta = 1$, we used Wald-Coefficient Restriction Test approach as in:

$$t = \frac{\hat{\beta} - \beta}{se(\hat{\beta})} \qquad (3)$$

Where,

t= test statistic, $\hat{\beta}$= estimated regression coefficient of inflation, β=1 and $se(\hat{\beta})$ = standard error of the estimated regression coefficient of inflation.

Lag selection criteria

The Johansen Cointegration test and VECM involves the use of a VAR model and the different maximum likelihood ratios. The theoretical properties of the approaches require that they choose the number of lag k terms to be large enough to eliminate the effect of the correlation structure of the errors on the asymptotic distribution of the statistic. This Lag length selection describes the method for selecting the lags k for the co-integration test and VEC regression model. Different information criteria such as Akaike Information Criterion (AIC), Schwarz Information Criterion (SIC), Hannan-Quinn Information Criterion (HQ), Final Prediction Error and Sequential Modified test Statistic are used in determining the lag length. The appropriate lag length is selected using VAR Lag Order Selection Criteria and the lag order selected by the criterion is usually AIC or SIC or HQ or the majority becomes the optimal lag length.

Johansen cointegration test and VEC model

It is important to state here that due to the time series property of the data as revealed by the unit-root test results, the above models were - in line with Hasan (2008) approach - estimated using stationary series and these do not reveal both the long-run and short-run relationships among the variables. Therefore, to fulfill the time series econometric modeling requirements that accounts for the unit-root property of the selected series and capable of producing adequate estimates; they further employed Johansen and Juselius (1990) maximum likelihood procedure to test for cointegration (long-run relationship) while causal long run relationship is determined using a time series Vector Error Correction Model (VECM) which will reveal both the short run and long run relationship among the variables of interest.

Cointegration analysis

VEC specification relies on co-integrated series; the authors first ran the Johansen cointegration test to determine the number of cointegrating relations. Besides, co-integration analysis enables them to test for spurious regressions. A cointegration test that shows cointegrating relation between series that are integrated of order one (I(1)) validates the regression parameter estimates and on the other hand, failure to find cointegration signals spurious regressions; hence, invalidating the inferences drawn from such regressions. In this study, we estimate the cointegrating relations using the Johansen approach. This would be used in constructing the error correction terms from the estimated cointegrating relations. We then proceed to the estimation of a VAR in first differences including the error correction terms as repressors (VECM).

Vector error correction (VEC) model

A vector error correction (VEC) model is known as a restricted VAR

Table 1. Summary statistics.

Variable	s	p	i	sr	π
Mean	8.30	80.81	12.17	0.27	18.61
Median	8.19	56.16	12.50	0.09	12.83
Maximum	27.61	274.57	28.00	8.45	72.80
Minimum	0.88	5.54	1.04	-0.90	0.92
Std. Dev.	4.48	70.09	4.96	0.89	15.57
Observation	348	348	348	348	348

Source: Authors' Computation 2020; Note: **s** represents share price, **p** represents price level, **i** represents interest rate, **sr** represents stock return and **π** represents inflation.

intended for use with non-stationary series that are known to be co-integrated. The VEC has cointegration relations built into the specification so that it restricts the long-run behaviour of the endogenous variables to converge to their cointegrating relationships while allowing for short-run adjustment dynamics. The cointegration term is known as the error correction term since the deviation from long-run equilibrium is corrected gradually through a series of partial short-run adjustments. In this study, the VEC model was estimated with the aid of Seemingly Unrelated Regression (SUR) model proposed by Zellner (1962). This is due to the fact that this approach produces more robust estimates that allow each of the variables to be considered as dependent variables and the error terms are assumed to be correlated across the equations. The VECM model in a vector form is as shown below:

$$\begin{pmatrix}\Delta s_t \\ \Delta p_t \\ \Delta i_t\end{pmatrix} = \begin{pmatrix}C_1 \\ C_2 \\ C_3\end{pmatrix} + \begin{pmatrix}d^k_{11}(\beta_1) d^k_{12}(\beta_2) d^k_{13}(\beta_3) \\ d^k_{21}(\beta_1) d^k_{22}(\beta_2) d^k_{23}(\beta_3) \\ d^k_{31}(\beta_1) d^k_{32}(\beta_2) d^k_{33}(\beta_3)\end{pmatrix}\begin{pmatrix}\Delta s_t \\ \Delta p_t \\ \Delta i_t\end{pmatrix} + \begin{pmatrix}\gamma_1 \xi_{t-1} \\ \gamma_2 \xi_{t-1} \\ \gamma_3 \xi_{t-1}\end{pmatrix} + \begin{pmatrix}v_{1t} \\ v_{2t} \\ v_{3t}\end{pmatrix} \quad (4)$$

The lag polynomial d^k_{ij} represents the 4-lag coefficients on variable j in equation i, Δ is the operator for a first differenced series to achieve stationarity, ξ_{t-1} is the error correction term, β is the coefficient of the series, γ is the coefficient error correction term, C_i is constant and v_t is the error tem. All the series are in their log first difference forms. However, it should be noted that one-step VECM model in Equation (4) implemented using Eviews 10 is employed for a more precise parameter estimate as against unlike the two-step (General –to- Specific) approach.

Data

The study utilized monthly time series data from January, 1990 to December, 2018. The data were collected from Central Bank of Nigeria Statistical Bulletin (2018) and the Nigerian Stock Exchange Annual Reports (1990 to 2018). The variables selected for this study are stock price (s) measured by monthly average stock prices, price level (p) measured by monthly consumer price index, interest rate (i) measured by the 3-month Treasury bill rate, stock return (sr) measured as change in share price (Δs) equivalent to log first difference of stock price (s) and inflation rate (π) measured as change in price level (Δp) equivalent to first difference of the log transformed consumer price index (CPI).

Summary statistic

Table 1 presents the results in this study for the considered

variables' descriptive statistics. Share price (s) which is measured by monthly average stock price (s) has an average value of N8.30 of which its values spanned N0.88 to N27.61, being minimum value and maximum value respectively, with standard deviation of 4.48. Price level (p) measured by consumer price index is seen to have an average value of 80.81 with standard deviation of 70.09 and its values are found to be between 5.54 and 274.57 that is   its minimum and maximum values respectively. Interest rate (i) measured by 3-month Treasury bill rate has a minimum value of 1.04% and maximum value of 28.00%, with its rate of dispersion (standard deviation) being 4.96, and its average value being 12.17%. Also, the minimum and maximum values of Stock return (SR) measured as change in share price (Δs) equivalent to log first difference of stock price are seen to be -0.90 and 8.45 respectively, with an average value of 0.27 and standard variation of 15.57 which depicts wide range of variation in the values of this particular variable. Furthermore, inflation (π) measured as change in price level (Δp) equivalent to first difference of the log transformed consumer price index (CPI) takes its values between 0.92% and 72.80%, lowest and highest values respectively, in which the value of rate of spreading out (standard deviation) is 15.57, which also reflects wide range in variation in the values of these variables; its average value being 18.61%.

Stationarity test

The summary of the results of the unit root tests carried out in their level and first difference forms using Augmented Dickey Fuller (ADF) _approaches is presented in Table 2. The ADF test results revealed clearly that all the series besides stock return (sr) and inflation (π), have unit roots that can be safely accepted at level within the 1% and 10% alpha levels of significance. In other words, the acceptance of null hypothesis indicates that the series are not stationary at level. In addition, the results also showed that the series can only be made stationary by first difference. However, the rejection of the null hypothesis at level within the 1% to 10% alpha levels of significance when stock return (sr) and inflation (π) series are tested for unit roots; strongly indicates that the series are integrated of order zero (0). It is, therefore, worth concluding that stock price (s), price level (p) and interest rate (i) are integrated of order One (I(1)) and they have to be first differenced to achieve stationarity while stock return (sr) and inflation (π) are integrated of order zero (I(0)).

Linear Regression models for Equation (1) and Equation (2)

Following the unit root test results in Table 2, the Fisher Hypothesis was tested empirically and results are depicted in Table 3.
In row (2) of Table 3, the estimates of regression model specified

Table 2. Unit root test.

| Variable/t-stat/critical value | Augmented dickey-fuller | | Order |
	@Level	@1st Difference	
s			
t-Stat	**-2.975**	**-16.992***	
1% level	-3.985	-3.985	
5% level	-3.423	-3.423	I(1)
10% level	-3.134	-3.134	
p			
t-Stat	**3.465**	**-17.817***	
1% level	-3.985	-3.985	
5% level	-3.423	-3.423	I(1)
10% level	-3.134	-3.134	
i			
t-Stat	**-2.979**	**-16.923***	
1% level	-3.985	-3.985	
5% level	-3.423	-3.423	I(1)
10% level	-3.134	-3.134	
sr			
t-Stat	**-14.513***	**-16.244***	
1% level	-3.985	-3.985	
5% level	-3.423	-3.423	I(0)
10% level	-3.134	-3.134	
π			
t-Stat	**-4.349***	**-4.049***	
1% level	-3.985	-3.985	
5% level	-3.423	-3.423	I(0)
10% level	-3.134	-3.134	

Source: Authors' Computation 2020. Note: s represents share price, p represents price level, i represents interest rate, sr represents stock return and $π$ represents inflation, ***, ** and * represents the level of significance at 1%, 5% and 10% , respectively.

Table 3. Linear regression models for equation (1) and equation (2).

Dependent Variable	C: Constant (t-stat.)	π : Inflation rate (t-stat.)	Δi: interest rate (t-stat.)	R^2	F (Sig.)	DW
Equation (1)	3.3970 (0.428)	1.2469*** (3.406)	- -	0.0472	17.1580 (0.000)	1.5791
Equation (2)	3.2936 (7.327)	1.2572*** (0.303)	3.294 (29.501)	0.0476	8.6022 (0.000)	1.5804

Source: Authors' computation, 2020. Note: for H_{01}: β = 1 and H_{02}: β = 1 tests, the computed t-statistics are t_1 = 0.674 and t_2 = 0.848 respectively. ***, ** and * denote 1%, 5% and 10% levels of significance.

in Equation (1) to test Fisherian direct relationship hypothesis between stock returns and inflation rate shows that the inflation rate (π) exhibits positive relationship with stock return (SR) [$\hat{β}$ = 1.247; p = 0.001] and the positive relationship is significant at 1% level. This supports the result of Hasan (2008) and some other previous studies. Also, we tested the hypothesis of whether $β$ is not significantly different from unity using Wald-Coefficient Restrictions Test approach as in Equation (3) to investigate the hypothesis that assumes a one to one relation between stock returns and inflation. Given the computed t = 0.674 (which is < 1.96; the Conventional Table value), the null hypothesis of H_{01}: $β = 1$ is accepted suggesting that a one to one relation exists between stock returns

and inflation. This is consistent with the Fisherian theory that the expected nominal return on common stock varies in one-to-one correspondence with expected returns. Furthermore, the regression model diagnostics, F- stat = 17.158 (p = 0.000), R^2 = 0.047 and Durbin-Watson stat (DW) = 1.579 confirmed that the model is significant (fit) and free from serial correlation problem.

Again, in row (3) of Table 3; the estimates of regression model specified in Equation (2) to examine the relationship between stock return, inflation and interest rates showed that the inflation rate (π) exhibited positive relationship with stock return [$\hat{β}$ = 1.257; p = 0.000] _ and the positive relationship is significant at 1% level as expected. However, the coefficient of interest rate (i) appears

Table 4. Lag order selection criteria.

Lag	LogL	LR	FPE	AIC	SC	HQ
1	481.5097	NA	1.27e-05	-2.763214	-2.662298	-2.723012
2	509.7719	55.53278	1.13e-05	-2.875859	-2.674027*	-2.795455
3	521.2328	22.31860	1.12e-05	-2.890250	-2.587502	-2.769644
4	545.2555	46.35966*	1.02e-05*	-2.978103*	-2.574438	-2.817294*
5	551.1036	11.18314	1.04e-05	-2.959670	-2.455090	-2.758659
6	558.6869	14.36843	1.05e-05	-2.951386	-2.345889	-2.710172

Source: Authors' computation, 2020. Note: *indicates lag order selected by the criterion, LR: sequential modified LR test statistic (each test at 5% level), FPE: Final prediction error, AIC: Akaike information criterion, SC: Schwarz information criterion and HQ: Hannan-Quinn information criterion.

negative (rightly signed) but statistically insignificant [$\hat{\gamma}$ = -2.966; p – = 0.920].

Focusing on the hypothesis of whether β is not different from unity; using Wald-Coefficient Restrictions Test approach as in equation (3), the computed t = 0.848 (which is < 1.96; the conventional table value), supports the null hypothesis of $H_{01}: \beta = 1$, thus we conclude that a one to one relation exists between stock returns and inflation. Besides, the regression model diagnostics, F-stat = 8.602 (p = 0.000), R^2 = 0.048 and Durbin-Watson stat (DW) = 1.580 confirmed that the model is significant (fit) and free from serial correlation problem.

Lag selection criteria

Following the argument of Boudoukh and Richardson (1993) that investors prefer holding stocks over the long-run and due to the fact that the linear regression equations above are assumed to be carried out using differenced series that have lost their long run properties; there is a need to investigate the long run properties of the variables of interest. To achieve this, the authors began by selecting the appropriate lag length using VAR Lag Order Selection Criteria and the results are presented in Table 4. As in Table 4, for the selection of the appropriate lag length; Sequential modified LR test statistic (LR), Final prediction error (FPE), Akaike information criterion (AIC), Schwarz information criterion (SC) and Hannan-Quinn information criterion (HQ) are reported tested at 5% level each. However, the majority (especially AIC) of the criterion showed the optimum lag of 4. Therefore, they considered the optimal lag length of 2 in our subsequent analysis.

Johansen system cointegration test and long-run relationship

To investigate the long run properties of the variables of interest, Johansen System Cointegration Test approach is considered using the variables: Stock price (s), Price level (p) and Interest rate (i) all in their log first difference form since the unit root tests results showed that they are integrated of same order (I(1)) and the result is presented in Table 5.

From the result in Table 5, both the trace and maximum – eigenvalue test statistics suggest that the null hypothesis of no co-integration (Ho) among the variables can be rejected. It showed that there is at least 1 cointegrating relation among the variables. This means that long run relationship exists among the variables of interest. Furthermore, the normalized cointegrating equation in the lower portion of Table 5 showed that the coefficient of price level (log first difference:$\Delta\ln(p) \approx \pi$) exhibits positive and significant relationship with stock price (log first difference:$\Delta\ln(s) \approx sr$) in the long-run [coefficient = 1.285; t – stat. = 4.105]. It suggests that

the stock market provide hedge against inflation. Using equation (3), the computed t-statistic = 0.911 suggests that stock prices move one-to-one with price level. Additionally, the coefficient of interest rate (log first difference: $\Delta\ln(i)$ is found to have negative and significant relationship with stock price (log first difference: $\Delta\ln(s) \approx sr$) [coef. = 2.657; t – stat. = 5.570].

VEC model using SUR for efficient estimates

Following the series of tests carried out in this study and in line with the argument of Boudoukh and Richardson (1993) that investors prefer holding stocks over the long-run, there is a need to construct a model that would combine both the short run and long run properties of the variables in the model. Therefore, the estimates of the VEC model using SUR (seemingly unrelated regression) implemented through the make model/system precise option to obtain more efficient parameters estimates as postulated by Hasan (2008) is presented in Table 6. However, it should be noted that one-step VECM model in Equation (4) Implemented using Eviews 10 is employed for a more precise parameter estimate unlike the two-step (General –to- Specific) approach usually employed by other researchers.

According to the results in Table 6, the R^2 values of the Stock return (s), Price level (inflation) and Interest rate (i) models (0.414, 0.207 and 0.072) showed that the explanatory variables explain about 41.4%, 20.7% and 7.2%, respectively of the variation in dependent variables. Furthermore, the F-Statistics values which are 19.416, 4.981 and 2.146 for the Stock return, Price level (inflation) and Interest rate models, respectively indicate that the models are significant. The Durbin-Watson statistic values which are approximately 2 suggest that the models are free from autocorrelation problem. The negative and significance of the coefficients of error correction terms provide the evidence that each of the dependent variables responds to disequilibrium from its own lag and lags of other variables as the case maybe. Overall, the short run effect estimates of parameters associated with the lagged differences of the independent variables showed that neither Price level (inflation) nor Interest rate (i) exhibits significant relationship with Stock return.

VEC granger causality/block exogeneity wald test

The study proceeds by examining the joint significance of each of the explanatory variables in Table 6 in the short-run. VEC Exogeneity Wald Chi-squared Test is utilized and the results are presented in Table 7. As can be seen in Table 7, the results showed that Price level (inflation) and Interest rate do not have joint significant effect on Stock return, $\chi^2 = 4.470$ ($P - value = 0.813$).

Table 5. Johansen system cointegration test.

Hypothesized no. of CE(s)	Trace statistic	5% critical value	Prob.
R =0	41.263**	24.276	0.000
R = 1	10.810	12.321	0.088
R = 2	3.033	4.130	0.097

Hypothesized no. of CE(s)	Maximum eigenvalue statistic	5% critical value	Prob.
R =0	30.452**	17.797	0.000
R = 1	7.777	11.225	0.189
R = 2	3.033	4.130	0.097

Long-run relationship (Normalized cointegrating coefficients)

s: stock price	p : price level (CPI)	i: interest rate
1.000	-1.285**	2.657**
	(0.313)	(0.477)
	[-4.105]	[5.570]
	$s = 1.285p - 2.657i$	

Source: Authors' computation, 2020. Note: Standard Error in Parenthesis, T-statistic in square bracket and ** denotes 5% level of significance.

Table 6. VEC model using SUR for efficient estimates.

Variable	$\Delta ln(s)$ (Stock return model) Coefficient (Sig.)	$\Delta ln(p)$(Price (inflation) model) Coefficient (Sig.)	$\Delta ln(i)$ (Interest rate model) Coefficient (Sig.)
ξ_{t-1}	-0.0627** (0.012)	-0.0161*** (0)	0.0066 (0.512)
$\Delta ln(s_{t-1})$	-0.7306*** (0)	0.0138* (0.053)	0.0039 (0.862)
$\Delta ln(s_{t-2})$	-0.5835*** (0)	0.0107 (0.187)	0.0118 (0.645)
$\Delta ln(s_{t-3})$	-0.4681*** (0)	0.0062 (0.434)	0.012 (0.637)
$\Delta ln(s_{t-4})$	-0.1592*** (0.003)	0.0044 (0.516)	0.0013 (0.95)
$\Delta ln(p_{t-1})$	-0.0012 (0.998)	-0.0528 (0.328)	-0.0166 (0.923)
$\Delta ln(p_{t-2})$	-0.3674 (0.387)	-0.0547 (0.311)	0.0158 (0.926)
$\Delta ln(p_{t-3})$	0.1351 (0.75)	-0.0255 (0.637)	0.1194 (0.486)
$\Delta ln(p_{t-4})$	-0.2615 (0.537)	-0.0869 (0.107)	0.0885 (0.605)
$\Delta ln(i_{t-1})$	0.1144 (0.394)	-0.0076 (0.654)	0.2256*** (0)
$\Delta ln(i_{t-2})$	0.1751 (0.197)	-0.0015 (0.93)	0.0293 (0.593)
$\Delta ln(i_{t-3})$	-0.0807 (0.553)	-0.012 (0.486)	-0.1488*** (0.007)
$\Delta ln(i_{t-4})$	0.0759 (0.572)	-0.0048 (0.778)	0.0322 (0.553)
F-stat.	19.416	4.981	2.146
R-squared	0.414	0.207	0.072
Durbin-Watson stat	1.986	2.007	1.993

Source: Authors' computation, 2020. Note: ***, ** and * denote 1%, 5% and 10% levels of significance.

The joint effect of Interest rate and Stock return on Price level (inflation) is not significant $\chi^2 = 4.235$ ($P = 0.835$). Additionally, it is found that Stock returns and Price level (inflation) failed to exhibit joint significant effect on Interest rate $\chi^2 = 1.120$ ($p = 0.997$). These are consistent with the parameter estimates in Table 6 and suggest that each of the explanatory variables does not have joint significant effect on each of the dependent variables in the short-run.

DISCUSSION OF FINDINGS

The study investigated the generalized Fisher hypothesis that common stocks represent claims against real assets of a business, hence, serves as a hedge against inflation. The study utilized time series data that covered the period

Table 7. VEC granger causality/block exogeneity wald test.

Model	ξ_{t-1}	Wald χ^2 Test $\Delta ln(s)$	Wald χ^2 Test $\Delta ln(p)$	Wald χ^2 Test $\Delta ln(i)$
$\Delta ln(s)$ (Stock return)	--0.063** (0.012)		3.669 (0.453)	0.361 (0.986)
$\Delta ln(p)$ (Price (inflation))	--0.016*** (0.000)	1.190 (0.880)		0.714 (0.950)
$\Delta ln(i)$ (Interest rate)	0.0066 (0.512)	3.086 (0.544)	0.927 (0.921)	
Joint Effect		4.470 (0.813)	4.235 (0.835)	1.120 (0.997)

Source: Authors' computation, 2020. Note: P- values (sig.) in parentheses. ***, ** and * denote 1%, 5% and 10% levels of significance.

from January 1990 to December 2018 in Nigeria. The major empirical tools that were used in this study are unit root test, co-integration test, and VECM based granger causality. The unit root test results showed that all the series are integrated of order 1, except stock return and inflation rate which are assumed to be log first difference series originally derived from stock price and consumer price index (CPI). The linear regression models adopted revealed a one to one positive relation between stock returns and inflation (using Wald-Coefficient Restrictions Test approach) which corroborated the Fisherian theory that the expected nominal return on common stock varies in one-to-one correspondence with the expected return. Furthermore, the results showed a negative but insignificant relationship between interest rate and stock returns. This study is in tandem with Hassan (2008) and Alagidede and Panagiotidis (2010) which states that Fisherian hypothesis that the expected nominal return on common stock varies in one-to-one correspondence with inflation. The Wald-Coefficient Restrictions Test approach also supports the null hypothesis of $H_{01}: \beta = 1$. In a bid to examine both the long-run and short-run relationship among stock price, inflation and interest rates, Johansen co-integration test and VECM based granger causality were used. The Johansen co-integration test indicated that long-run relationship exists among the selected series. Besides, it was established that the coefficient of price level (log first difference:$\Delta \ln(p) \approx \pi$) exhibits positive and significant relationship with stock price (log first difference:$\Delta \ln(s) \approx sr$) in the long-run which supports the long-run Fisher effect suggesting that stock prices move one-to-one with price level. Additionally, the coefficient of interest rate (log first difference: $\Delta \ln(i)$ was found to have negative and significant relationship with stock price (log first difference: $\Delta \ln(s) \approx sr$) which are in line with previous findings from some previous studies and the Fisherian theory that the expected nominal return on common stock varies in one-to-one correspondence with the expected return. However, VEC granger causality/Exogeneity Wald Chi-squared Test revealed that inflation and interest rates do not have joint significant effect on stock prices in the short-run.

Conclusion

The findings revealed that there is a one-to-one relation

between stock returns and inflation as the results of the regression analysis showed a positive and significant relationship between stock returns and inflation in Nigeria. This empirical evidence is consistent with the findings by Hasan (2008), Alagidede and Panagiotidis (2010) and the Fisherian hypothesis that the expected nominal return on common stock varies in one-to-one correspondence with inflation. A slightly different result was established in the relation between stock returns and interest rate as a negative and significant relationship was found between interest rate and stock returns.

Additionally, the result of the study showed that the coefficient of interest rate has a negative and significant relationship with stock prices in line with English (2018) who found a unidirectional causation of returns on stocks with money flow. In terms of causality, the study showed that inflation and interest rate do not have joint significant effects on stock returns and equally established the fact the effect of both interest rate and stock returns on inflation is not significant. Furthermore, it was found that stock returns and inflation failed to exhibit joint significant effects on interest rate. Based on the findings of this study, the conclusion is that common stocks are a good hedge against inflation in Nigeria.

RECOMMENDATION

Based on the findings and conclusion, the study recommends that government, monetary and other regulatory authorities in Nigeria should use macro-economic tools like interest and inflation rates reduction to achieve macro-economic objectives in order to boost real activity towards making common stocks better hedges against inflation.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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The economic impact of unemployment and inflation on output growth in South Africa

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Unemployment is not only pertinacious to output growth, but it has other social costs. As economies seek to develop through elimination of inequalities, alleviating poverty and ensuring output growth, inflation and unemployment stand as scarecrows to investors. This research aims to evaluate the economic effects of unemployment and inflation on output growth in South Africa. An ARDL model was employed to estimate short-run and long-run impact of unemployment rates and inflation rate among controlled variables on real GDP in South Africa for the period of 1994-2019. The results show that inflation depresses real GDP; human capital and physical capital promotes real GDP. Based on the findings, unemployment can best be tackled through increase supply of and improvement in the quality of physical capital which increases labour productivity as well as investment in human capital. The results found that an in increase in the real GDP will increase investment, which further generates employment.

Key words: Unemployment, inflation, output growth.

INTRODUCTION

When South Africa became liberated, it inherited an economy that had disadvantaged in many aspects. "South Africa has high level of manpower supply with shortage of critical manpower; low level of physical capital stock, which have resulted in the huge rate of unemployment" (Levinsohn, 2007, p. 1). Unemployment is a term used when "a person desires to work and is taking active steps to find employment but unfortunately is unable to find it" (Barker, 1999, p. 165). Unemployment has negative influence on economic welfare, production, human capital, social exclusion, crime, and social instability that is a matter of serious concern. The high level of unemployment constitutes one of the most

serious threats facing South African society and its governance (Kingdon and Knight, 2016).

South Africa has a serious problem of unemployment because many of her people who are unskilled and are not experienced to drive the economy forward. There is a gap between real wages and productivity which results in limitation of job creation in South Africa. The primary concern is to "reduce the skill shortage that contributes to the gap and therefore making skills development and education a priority" (RSA, National Treasury, 2011, p. 6). Resolving youth unemployment problem requires short and long-term policies, such as public work programs and development of higher critical manpower needs for the

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economy through education system. If the problem of youth unemployment is not dealt with, it may lead to high social and economic costs to the country (Levinsohn, 2007, p. 22). The shortage of resources and the scarcity of critical skills will eventually cripple the South African economy. To solve the critical manpower resources in the short-run, South Africa has resorted to such practices like importing critical skilled manpower as means of corrective measures.

Research evidence has shown that several labour market barriers exist that prevent people from overcoming unemployment and earning a living, "most of which affect mainly the poor and arise from a pool of poverty leading to marginalization, inequality and further poverty" (Fourie, 2011, pp. 10-44). Most importantly, however, is the overall impact of the South African unemployment situation on the economy from a macroeconomic perspective. This is accentuated by the influence of labour market fluctuations on monetary policy, changes in gross domestic product (GDP) as accounted for by unemployment, as well as the relationship between unemployment and inflation in South Africa.

There appears to be a theoretical relationship between unemployment that is caused by critical manpower shortages and scarcity of productive inputs in the form of modern machineries, equipment and other critical inputs. The result is that, the domestic production falls short of required output which has to be met by imported goods and services. The tendency is for the country to demand for more imports than its exports. The consequence is building trade deficit which in the long-run requires devaluation of the 'Rand' with consequential devaluation of the local currency with its attendant inflation implications. To control inflation, South African government has put in place the Inflation Targeting (IT) framework of 3-6%. This further affects people who are employed as their real wages are eroded via inflation. The Phillips Curve was developed to explain the trade-off between unemployment and changes in wages (inflation).

There is scant literature on inflation, unemployment and output growth, which are the three tremendously vital macroeconomics variables in the South African economy. The success of the country's economy is hinged on these variables and they are indispensable fundamentals of the economic policies of a country. Therefore, this study tries to close the literature gap and provide policy recommendations for sustainable development of the South African economy.

Another reason for this particular study is that there are differences in the finding of extant studies of the impact of inflation and unemployment on economic performances in different countries. For instance, Tenzin (2019) has established that unemployment has no impact on output in Bhutan; Muryani and Pamungkas (2018) have demonstrated using ECM that unemployment has significantly contributed to output growth in Indonesia. While Makaringe and Khobai (2018) have shown using ARDL regression that unemployment has a depressing effect on output in South Africa. In the same South Africa, Banda et al. (2016) have demonstrated that unemployment promotes output growth. In the case of inflation, however, there are more consistent findings that inflation depresses output. For instance, Tenzin (2019), Saidu and Muhammad (2018), Muryani and Pamungkas (2018), and Munyeka (2014), among others, have all established that inflation depresses growth in the studies across different economic settings. The differences in the findings on the impact of unemployment on output may be explained by the nature of data at different time periods. The different impact of unemployment may be caused by non-consideration of omitted variables or incomplete model. This study is designed to avoid the problem of omission of relevant variables by considering the major factors that affect output such as physical and human capital. Labour force has been dropped because of its high correlation with physical capital (a correlation of over 0.94). The reason for dropping labour force is to avoid multi-collinearity. The opinion of this study is that having included most of the variables that affect output, the finding of the impact of unemployment will likely reflect the true relationship in South Africa in the period under review. The paper has also carried out Karl Pearson's correlation test to establish the nature of the relationship among the variables to see how the variables are statistically related, to know the nature of their correlation, apart from the nature of impact one has over the other (their regression coefficients and their t-ratios). Moreover, the knowledge of correlation gives us information about the likely presence of multi-collinearity and how to avoid it. This has the potency of improving the quality regression outcomes. This has the potency of improving the quality regression outcomes. From the foregoing, this study has hypothesized that inflation, unemployment, human capital, and physical capital stock have not significantly influenced output in South Africa.

LITERATURE REVIEW

In every economy around the world, labour is a driving force that induces consumer spending as well as output, more importantly for companies – ultimately contributing to the total output of a country. Similarly, unemployment represents unused potential that could have contributed to the economic output and thus affects the macro economy to a large extent (Simpson, 2013). Inflation erodes the buying power of the currency and must be harnessed for any economy to function well.

Theoretical literature review

In pursuit of an investigation between the statistical relationship of unemployment and a country's output

growth, economist Arthur Melvin Okun developed research on the topic which tells us how much of the country's GDP is lost when its unemployment rate is above its natural rate, better known as Okun's law, which is discussed herein.

Okun's law

Quite simply, Okun's law states that a unit increase in cyclical unemployment is associated with two percentage points of negative growth in real GDP, depending on the country and period that is being considered (Fuhrmann, 2016). Since output of a country is dependent on the labour that it has used, it can be understood that a positive relationship exists between output and employment, which further explains the negative relationship between output and unemployment since the unemployed are not participants of the labour force (Snowdon and Vane, 2005). A positive relationship exists between output and employment because output depends on the amount of labour used in production. Inversely, a negative relationship exists between output and unemployment because unemployment is the labour force minus total employment. According to this principle, a one-percentage point decline in the rate of unemployment in one year produces 2% increase in real GDP growth rate per year. Therefore, if, for instance, the potential rate of GDP growth is 2% per annum, then Okun's law holds that real GDP should grow at approximately 4% a year in order to achieve a two-percentage point fall in the unemployment rate (Fuhrmann, 2016). In order to hold the unemployment rate steady, the growth in GDP rate must usually be twice the growth rate of employment potential. To reduce the unemployment rate, therefore, the economy must grow at a pace indicated above.

Phillips' curve and the augmented Phillips' curve

The effects of any monetary policy can be divided between output growth and prices. With the role of expectations, and price-stickiness, elected governments have an incentive to conduct its monetary policy with an inflationary bias. The Phillips' curve plots the relationship between the recorded level of unemployment and the rate of change in wages, where the rate of change of money wages is used as a proxy for inflation. As unemployment falls the rate of inflation increases. This means that there is no change in real values, as the rate of inflation adjusts to new pressure demands due to wage increases (Howells and Bain, 2008).

Classical growth theory

The classical growth theory asserts wages/inflation is determined at the natural market wage level. Classical economists confess that the economy will decline with the increase in prices. Persistent increases in prices usually erode the value of a currency and lead to decline in growth of the economy. This leads to negative growth being experienced.

Empirical literature

Tenzin (2019) has investigated the impact of unemployment and inflation on economic growth in Bhutan using data from 1998 to 2016. The study uses autoregressive distributed lag (ARDL) model to estimate the parameters of the regression model. The results show that unemployment has no impact on economic growth in Bhutan, both in the short-run and the long-run. Inflation has impact on economic growth in the long-run. The reason given is that inflation causes uncertainty.

Saidu and Muhammad (2015) have studied the interaction between unemployment, inflation and economic growth in Nigeria. The paper uses Granger causality to investigate the line of causality. Before applying Granger causality, unit root analysis was applied to determine the time-series features of the data to ascertain if the variables applied are stationary. The results show that the data are trending. The results of Granger causality indicate that inflation affects economic growth, but growth does not cause inflation. There is no relationship between economic growth and unemployment.

Muryani and Pamungkas (2018) have explored the impact of unemployment, inflation, government expenditure, labour force and gross fixed capital formation on economic growth in Indonesia. The paper estimates the parameters of the population regression using error correction model (ECM). The results show that unemployment and gross fixed capital formation promote economic growth. Labour force and inflation depress economic growth. Government expenditure has no effect on economic growth.

Munyeka (2014) explored the relationship between inflation and economic growth in South Africa. The study applies quarterly data from 1993 to 2016. The study applies correlation and OLS regression methods. The results of both analytical methods show that there is a negative and a significant relationship between the two variables. Mohseni and Joazaryan (2016) have explored the impact of inflation and unemployment on economic growth in Iran. The paper uses the ARDL regression model to estimate the parameters of the population regression model, using time-series data from 1996 to 2012. The results show that both inflation and unemployment impact negatively on economic growth in the long-run.

Makaringe and Khobai (2018) have investigated the impact of unemployment and economic growth in South Africa, using quarterly data from 1994 to 2016. The study

Table 1. Description of variables.

Acronym of variable	Variable	Measurement of variable
INFL	Inflation rate	Inflation as measured by the consumer price index reflects the annual percentage change in the cost to the average consumer of acquiring a basket of goods and services that may be fixed or changed at specified.
RGDP	Real GDP	Annual percentage growth rate of GDP at market prices based on constant US dollar.
UNEMPL	Unemployment rate	Unemployment rate refers to the percentage of the labour force that is without work but available for and seeking employment.
HUCAP	Human capital	This is defined as the mean value of secondary enrolment and life expectancy
KAPSTC	Capital stock	KAPSTC is estimated as the gross fixed capital formation of the country based on a constant US dollar

Source: Researchers' own computations (World Bank data, 2020).

applies ARDL regression model to estimate the coefficients of the regression. The results of the regression show unemployment depresses economic growth in South Africa. Temitope (2013) explores the relationship between employment and economic growth in South Africa. The study uses Toda-Yamamoto causality tests to estimate the relationship. The paper uses quarterly data from 2000Q1 to 2012Q3. The results show that employment does not cause economic growth, but GDP causes employment.

Banda et al. (2016) have explored the effect of log of output, real effective exchange rates, labour productivity, and budget deficit on unemployment in South Africa. The study uses error correction model (ECM) in estimating the parameters of the regression model. The results show that the log of GDP, labour productivity and budget deficit increase unemployment. Real effective exchange rate has no effect on unemployment. Osinubi (2005) has explored the interaction between economic growth, poverty, unemployment, inflation, money supply and saving rates in Nigeria. The paper uses OLS to estimate the relationship. The results show that unemployment significantly promotes growth and saving reduces growth. The results also show that growth has no impact on unemployment.

Mokgola (2015) investigates the effect of inflation on economic growth in South Africa. The paper uses error correction method to estimate the parameters of the population. The paper establishes that inflation has not impacted on economic growth in South Africa. Also, Madito and Khamalo (2014) explored the impact of unemployment and inflation on economic growth in South Africa. The paper uses quarterly data from 1967 to 2013. The study uses Johansen co-integration method to establish the existence of long-run relationship among the variables applied in the study. The paper applied error correction regression model to estimate the coefficients of the regression model. The results show that unemployment has no impact on economic growth in South Africa.

METHODS

The most extensively famous single equation approach to co-integration is the Engle-Granger two-step procedure. This approach has some limitations. One, it does not indicate which of the variables is a dependent variable and which variable is an independent variable. This issue is important as the determination of the dependent variable can affect the significance of the results. Second, when there are more than two variables, the Engle – Granger model cannot handle this. A more versatile model must be applied because we do not have a unique co-integrating relationship. This second problem explains why this study applies autoregressive distributed lag (ARDL) model by Pesaran et al. (1999, 2001) in this study. The study uses the ARDL to carry-out the empirical study design. The ARDL model can be presented as follows:

$$Y_t = \sum_{j=1}^{p} \lambda_j Y_{t-j} + \sum_{j=1}^{q} \delta_j X_{t-j} + \varepsilon_t. \tag{1}$$

Where, X_{t-j} are the $K \, x1$ vector of explanatory variables; and the Y_{t-j} are the lagged dependent variable. The above ARDL model can be presented using vector equilibrium or error correction model (VECM) as follows:

$$\Delta Y_t = \theta_j (Y_{t-1} - \beta_t' X_{t-1}) + \sum_{j=1}^{p} \lambda_j Y_{t-j} + \sum_{j=1}^{q} \delta_j X_{t-j} + \varepsilon_t. \tag{2}$$

In equation, the β_t' s are the estimated long run parameters and the θ_j s are the equilibrium error corrections parameters. The ARDL model is also call pool mean group (PMG) and it uses generalized likelihood estimation technique and the lag length are determined by one of the information criterions like the Schwarz Bayesian information criterion.

The data that are used are obtained from the World Bank development indicators and these include 26 observations, starting from 1994 to 2019. The starting period is chosen to coincide with the post-apartheid regime and the ending period reflects the latest data that is available as at the time of the study. Eviews-10 is used in estimating the regression model. Table 1 shows the variables that are used in the study.

Hejase et al. (2012) contend that informed objective decisions are based on facts and numbers, real, realistic and timely information. Furthermore, according to Hejase and Hejase (2013), descriptive statistics deals with describing a collection of data by

Table 2. Descriptive statistics-result.

Description	lnRGDP	lnKAPSTC	UNEMP	INFL	HUCAP
Mean	26.52	24.77	27.90	5.83	98.80
Median	26.58	24.93	28.35	5.71	99.23
Std. Dev.	0.22	0.37	2.93	2.35	4.13
Skewness	-0.28	-0.32	-0.09	-0.50	0.13
Kurtosis	1.58	1.45	1.98	3.85	2.75
Jarque-Bera	2.52	3.06	1.15	1.85	0.13
Probability	0.28	0.23	0.56	0.40	0.94

Source: Researchers' own computations (World Bank data, 2020).

Table 3. Correlation matrix.

Variable	RGDP	KAPSTC	UNEMPL	INFL
KAPSTC	0.985**	-	-	-
UNEMP	-0.751**	-0.839**	-	-
INFL	-0.300	-0.229	0.039	-
HUCAP	0.804**	0.792**	-0.689**	-0.307

Correlation range between 0-0.19 is very weak; 0.2 -0.39, weak; 0.4-.59, moderate; 0.6-0.79, strong; and 0.8-1.0, is very strong. The guide is suggested by Evans (2002) and Hejase and Hejase (2013). Note: (*) and (**) indicate significance at 5 and 1% levels, respectively.

condensing the amounts of data into simple representative numerical quantities or plots that can provide a better understanding of the collected data (p. 272). Therefore, results of data analyzed are presented using descriptive statistics, Karl person correlation coefficients, unit root test, Johansen co-integration test and regression model using Pesaran et al. (1999, 2001) (Table 2).

The variables of real GDP (RGDP) and capital stock (KAPSTC) were measured using natural logarithms. While unemployment (UNEMP) and inflation rates (INF) are measured using percentages, human capital is measured using the mean of secondary schools' enrolment and life expectancy. The mean and median logarithm of RGDP and KAPSTC are about 26 and 25, respectively. The mean and median inflation rates, unemployment rates and human capital index are about 7, 28% and 99 units, respectively. The inflation rate of about 7% appears to be slightly above the targeted rate of 6% per annum. The unemployment rate of 28% is very high.

The spread around the mean appears to be low for all the variables as the standard deviation values are low. The low values of the skewness and Kurtosis tend to give evidence in favour of normally distributed variables. While the low values of Jarque Bera statistic and their associated probabilities tend to show that the distributions are not statistically significant.

Correlation analysis

Table 3 shows the correlation matrix of the variables under study. The correlation matrix was evaluated based on Evans (2002) and Hejase and Hejase (2013) to determine the relationships between the variables.

To determine the relationship among the variables, correlation analysis is employed. Correlation is described as the strength of association between two variables.

Based on the correlation range suggested by Evans (2002) and Hejase and Hejase (2013), unemployment has a very strong negative relationship with the RGDP, the dependent variable and KAPSTC. Inflation rates (INFL) are weakly correlated with the dependent variable (RGDP) and capital stock (KAPSTC) and unemployment rates (UNEMP). Human capital (HUCAP) is highly correlated with both the dependent variable and the independent variables, except inflation rates.

Unit root test

It is important for variables to be stationary; this is to avoid problems associated with non-stationarity of a time series, such as spurious regression and persistent of shocks. The unit root tests used in the study is the Augmented Dickey-Fuller (ADF) and Phillips and Perron (PP) tests.

Unit root results

The analysis of stationary test was carried out with intercepts only as shown in Table 4. Examining the ADF test results at levels, none of the variables are significant and the null hypothesis is rejected. At first difference three of variables which are INFL, UEMPL and HUCAP are significant at 5% level of significance and the null hypothesis of no unit root in the variable is not rejected. The null hypothesis of unit root in the data is rejected in the case of RGDP and KAPSTC. This null hypothesis is not rejected after the second differencing. Looking at the results for PP at levels, none of the variables are significant and the null hypothesis is rejected. At first difference, like in the case of ADF test, three variables of UNEMPL, INFL and HUCAP are significant at 5% level of significance, the null hypothesis that unit root exist in the variable is rejected. In the remaining two variables which are logarithms of RGDP and KAPSTC the null hypothesis cannot be rejected. After the second differencing the null hypothesis is rejected, and this study has

Table 4. Intercepts.

Variable	Level			First difference		
	ADF	5% Critical value	Prob.	PP	5% Critical Value	Prob.
lnRGDP	0.467	-3.603	0.99	0.091	-3.603	0.99
$\Delta lnRGDP$	-3.107	-3.612	0.12	-3.081	-3.612	0.13
$\Delta^2 lnRGDP$	-5.578	-3.622	0.00	-9.465	-3.622	0.00
lnKAPSTC	-1.309	-3.602	0.86	-0.993	-3.603	0.93
$\Delta lnKAPSTC$	-3.104	-3.612	0.12	-3.105	-3.612	0.12
$\Delta^2 lnKAPSTC$	-6.022	-3.622	0.00	-6.531	-3.522	0.00
UNEMP	-1.262	-2.986	0.63	-1.262	-2.986	0.63
$\Delta UNEMP$	-3.673	-2.992	0.01	-3.633	-2.992	0.01
INFLA	-1.377	-1.955	0.15	-1.312	-1.955	0.16
$\Delta INFLA$	-5.047	-2.958	0.00	-6.063	-1.955	0.00
HUCAP	-1.280	-3.004	0.61	-1.571	-3.012	0.47
$\Delta HUCAP$	-3.090	-3.012	0.04	-3.043	-3.3012	0.04

Source: Researchers' own computations. Note: (***), (**) and (*) indicate significance at 1, 5 and 10% levels, respectively.

Table 5. Johansen co-integration test.

Maximum Eigenvalue Statistics (ME Stat.)				Trace statistics (T Stat.)			
H_0	H_1	ME Stat.	5% critical value	H_0	H_1	T Stat.	5% critical value
$\Gamma = 0$	$\Gamma = 1$	251.42	88.80	$\Gamma = 0$	$\Gamma >= 1$	121.87	38.33
$\Gamma <= 1$	$\Gamma = 2$	129.55	63.88	$\Gamma <= 1$	$\Gamma >= 2$	55.49	32.12
$\Gamma <= 2$	$\Gamma = 3$	74.06	42.92	$\Gamma <= 2$	$\Gamma >= 3$	36.66	25.82
$\Gamma <= 3$	$\Gamma = 4$	37.40	25.87	$\Gamma <= 3$	$\Gamma >= 4$	25.04	19.39
$\Gamma <= 4$	$\Gamma = 5$	12.37	12.52	$\Gamma <= 4$	$\Gamma >= 5$	12.37	12.52

Source: Researchers' own computations.

concluded the logarithms RGDP and KAPSTC are stationary after the second differencing. Having established that all the variables are trending at a level, this study has tested the existence of co-integration using Johansen co-integrating method.

Table 5 shows that the maximum eigenvalue statistics (ME Stat.) test of co-integration rejects the null hypotheses (H_0) of no co-integration from having zero co-integration ($\Gamma = 0$) to having less than or equal to 3 co-integrating relationships ($\Gamma <= 3$). The null hypotheses of having less than or equal to 4 co-integrating equations ($\Gamma <= 3$) could not be rejected. The rationale for rejecting the null hypotheses up to $\Gamma <= 3$ is that the computed maximum eigenvalue statistics are greater than their 5% critical values; while the reason for accepting the null hypothesis that $\Gamma <= 4$ is that the computed 5% critical value is lesser than their 5% critical value. This means that there are one, two, three and four co-integrating equation relationships in the model. Based on the trace statistics, Table 5 also shows that the null hypotheses of having zero co-integrating relationship ($\Gamma = 0$) to having less than 3 co-integrating relationships ($\Gamma <= 3$) could not be accepted. This implies that the alternative trace hypothesis (H_1) that there is 1 co-integrating relation to greater than or equal to 4 co-integrating relationships could not be rejected. Thus, under both methods, there is evidence of having up to four co-integrating relationships among the

variables applied in this study. The reason is that the computed trace statistics are greater than their 5% critical values. Thus, this study applies autoregressive distributed lagged (ARDL) or pooled mean group (PMG) model developed by Pesaran et al. (1999) to estimate both the short-run and the long-run relationship among the variables in Table 6.

ARDL model results

Diagnostic tests

Table 6 shows that the estimated VAR model has a good fit of over 90%. Overall, its explanatory power is high. The high F- statistic with low probability value shows that the overall model is significant. The low values of Ljung-Box (1979) Q-statistics and its high probability values of more than 5% indicate the absence of autoregressive conditional heteroskedasticity (ARCH) in the residuals of the estimated ARDL regression. The Breusch and Godfrey (B-G) Lagrange multiplier (LM) test for serial correlation based on F-statistic test along with its associated probability value could not reject the null hypothesis of no serial correlation in the residuals. The reason for accepting the null hypothesis is predicated on low F-statistic and its associated high probability

Table 6. ARDL Regression model (lnRGDP is the dependent variable).

Variable	Long-run relationship			Short-run relationship		
	Coef.	t-Stat.	Prob.	Coef.	t-Stat.	Prob.
ECM	-	-	-	-0.328	-6.780	0.000
Constant	4.600	1.071	0.30	-	-	-
lnRGDP	-0.328	-1.548	0.14	-	-	-
lnKAPSTC	0.154	2.362	0.03	0.471	2.714	0.01
UNEMP	0.003	1.601	0.13	0.009	1.130	0.27
INFLA	-0.004	-2.753	0.01	-0.011	-1.23	0.23
HUCAP	0.002	2.342	0.03	0.007	1.350	0.19
Adjusted R^2				0.99		
F – Statistics/probability				1591/0.00		
ARCH test: Q - stat. lags 1 to 5				0.939-9.037		
ARCH test Q-stat. prob. Lags 1 to 5				0.33 to 0.11		
B-G Serial Cor. LM test – F- Stat/Prob.				2.218/0.13		
B-P-G Heteroske. Test: F-Stat./Prob.				0.556/0.78		
Residual normality test: Jarque. Bera/ Prob.				1.601/0.45		
Residual Normality test: Skewnes/Kurtosis				-0.608/3.24		
2 highest variance decomposition proportion of the first column				0.512 and 0.146		

Source: Researchers' own computations.

values which are consistent with the null hypothesis. Similarly, the estimated F-statistic of Breusch-Pagan-Godfrey (B-P-G) test along with its associated probability values have confirmed that the null hypothesis that the variances of the ARDL regression model are homoscedastic. The reason for accepting the null hypothesis is that the computed F-statistic value is low giving credence to the null hypothesis. In the same way, the computed probability value is high. Again, this supports the null hypothesis of homoskedasticity of residuals. The estimated correlations of the explanatory variables are not too high as evidenced by the highest two variance decomposition of the first column which are 0.512 and 0.146. Obviously, this is an indication of lack of severe multicollinearity. Thus, these evidences have shown that the estimated ARDL model has not suffered from serial correlation, heteroskedasticity and multicollinearity. It is important to carry out the stability of the estimated coefficients, using cumulative sum (COSUM) of recursive residuals as recommended by Brown et al. (1975) as seen in Figure 1.

Figure 1 shows that the estimated parameters are stable as they have not gone outside the critical lines. Thus, the estimated regression coefficients are stable. Based on all these diagnostic tests, this study uses the estimated ARDL regression model results as demonstrated below as the research findings of this study.

FINDINGS AND DISCUSSION

Table 6 results have shown that the logarithm of capital stock and investment in human capital (HUCAP) have significantly stimulating impact on the logarithm of output in South Africa in the long-run. The result shows that a 1% increase in capital stock is liable to increase the real gross domestic by 0.154% in the long-run, holding all other factors constant. A unit increase in human capital investment is susceptible to increase real GDP by 0.003% in the log-run, assuming all other factors are held constant. Inflation rate, however, has a depressing impact on real GDP in South Africa in the long-run. A 1% increase in inflation is liable to reduce real GDP by 0.004% in the long-run, holding other factors constant. The results have also shown that unemployment (UNEMPL) has no any significant impact on the logarithm of real GDP in the long-run. The reason is that their probability values are greater than 0.05.

The short-run results have shown that if the log real GDP deviates from its long-run; it recovers over 32% in one year. It is likely that it would take about three years for the economy to recover from shock in the system. The results of short-run regression coefficients have also shown that only the logarithm of capital stock (lnKAPSTC) has impact on the logarithm of real GDP (lnRGDP).

This study has investigated the impact of unemployment and inflation on economic performances in South Africa while using the logarithm of capital stock and human capital as control variables. The essence of the study is to find out if after controlling for the above variables, inflation rates and unemployment rates would still impact on logarithm of real GDP in South Africa as shown in extant studies in this area. For instance, Tenzin (2019), Saidu and Muhammad (2018), Muryani and Pamungkas (2018), and Munyeka (2014), to name but a few extant literatures, have found that inflation depressed real GDP. Muryani and Pamungkas (2018) have established that unemployment stimulates real GDP. Makaringe and Khobai (2018) and Mohseni and Jouzaryan (2016) have shown that unemployment depresses real GDP.

This study has established that inflation does significantly depress economic performances in South
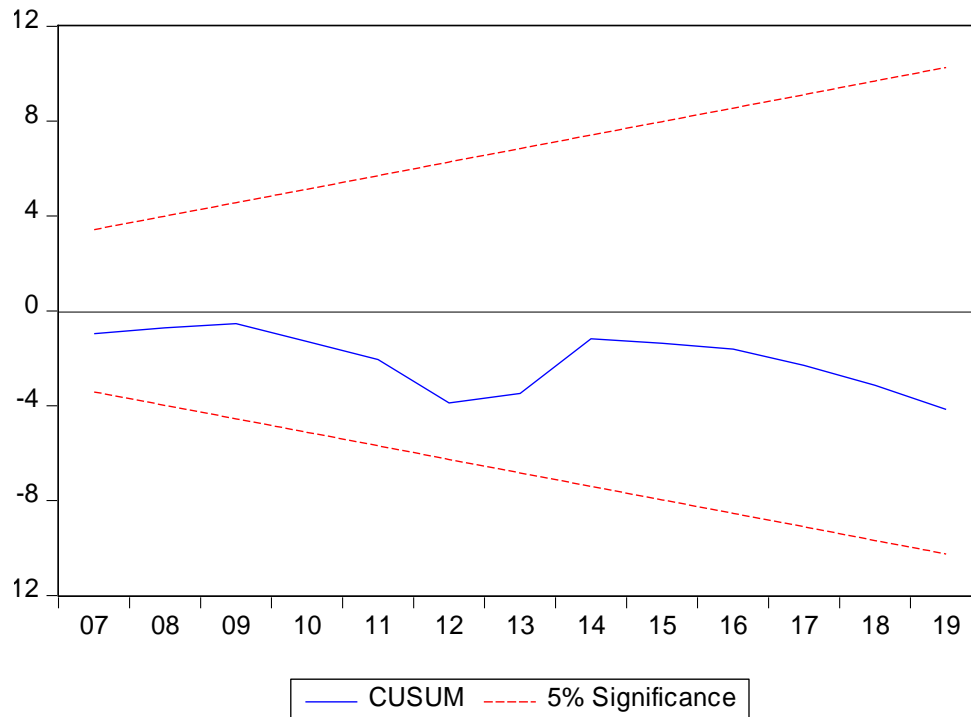
Figure 1. Estimated coefficients using cumulative sum (COSUM) of recursive residuals.

Africa. This finding has agreed with extant findings in this area such as the finding of Munyeka (2014) in his study of the impact of inflation on economic growth in South Africa, Tenzin (2019) study of the impact of inflation in Bhutan using ARDL, Muryani and PamungKas (2018) from their study of Indonesia using ECM, among other studies. However, Aubrery has established that inflation has no impact on economic growth in South Africa. The reason inflation negatively impact growth in most studies is that inflation causes uncertainty and reduces investment, employment and consequently output (Tenzin, 2019).

This study has also established that unemployment has not significantly impacted real GDP in South Africa. This finding disagrees with the finding of Maringe and Khobai (2018) who use ARDL regression model to demonstrate that unemployment has reduced economic performance in South Africa. The finding of this study has also contradicted the findings of Babda et al. (2016) who established that unemployment promotes economic growth in South Africa; Saidu and Muhammad (2018) who have also established that unemployment promoted economic performance in Nigeria. The findings of this study are consistent with the finding of Temitope (2013) from his study of South Africa that unemployment has no impact on economic growth; Tenzin (2019) who has studied the impact of unemployment in Bhutan and find no impact of unemployment on real GDP; Saidu and Muhammad (2015) who have also established from their

study that unemployment has no significant impact on economic growth in Nigeria. The possible reasons for unemployment not affecting growth might be attributed to, the use of log of real GDP, the nature of regression model applied and controlling for the possible impact of human capital and physical capital. It is important to note that two of the extant literatures cited above, Temitope (2013) and Saidu and Muhammad (2018) both used causality models, while Tenzin (2019) applies ARDL model with log of real GDP. There is no definitive conclusion predicated on reasons presented above. More investigations need to be done.

The study has established that investment in physical capital and human capital has significantly promoted economic performances in South Africa. The possible reasons are investment in human capital improves productivity of the labour forces and hence increases output; investment in physical capital increases the amount of capital per unit of labour and this has the potency of increasing productivity per worker. The overall effect is the increase in output and therefore economic performance.

The results of the short-run ARDL regression has shown that if output deviates from their long-run pattern, it will take, on average, three years for the economy to return to its long-run path. This is indicated by the ECM value of -0.328, meaning that the output recovers about 33% per year. This figure fall within the ECM estimated by Banda et al. (2016) for South Africa, which fall within

the range of 0.34 to -0.617. It is lower than the estimated recovery of -0.43 from the estimated recovery rate of Iran as reported by Hohseni and Jouzaryan (2016) which is -0.432. The differences from the recovery rate may be explained differences from time period, the type of economy and possibly the variables applied in the regression.

Conclusion

The study presented the descriptive statistics and correlation matrix with the aim of describing the properties of the data. The correlation matrix coefficients showed that unemployment and inflation rates are negatively correlated with real GDP. While the unemployment is significantly correlated, the inflation rates are insignificantly correlated. The ARDL approach to co-integration was used to estimate the short-run and long-run relationships between the variables. The Johansen co-integration test showed the long-run relationship between GDP and the independent variables. The results are in line with *a priori* expectation as an increase in GDP leads to creation of jobs which lowers unemployment. The ARDL regression analysis in this study has demonstrated that both physical and human investments have significantly promoted the log of real GDP in South Africa. Inflation rates have depressing impact on the log of real GDP. Empirical studies are consistent with the results of this study.

The unemployment problem has no direct effect on the real GDP in South Africa. To tame the problem of unemployment in South Africa requires controlling variables that have direct impact on the real GDP. In this study, two of such variables have been identified that stimulate the real GDP which are investment in physical and human capital. Investment in human capital can enable South Africa to overcome the problem of shortage of critical skills alluded to in the literature review as the major cause of unemployment in South Africa. Availability of physical capital is liable to increase productivity of the workforce and is susceptible to increase not only labour productivity but increase employment which might likely reduce unemployment.

The paper has established that inflation rates have depressing impact on the log real GDP in South Africa. The possible reason advanced for this finding is that inflation creates uncertainty, and this reduces economic growth. The implication is that reducing inflation in South Africa can help engender economic growth and reduce unemployment. The reasoning here is that there may be no direct effect of unemployment on real GDP but there is an indirect impact. Any factor that affects GDP is liable to reduce unemployment. Therefore, monetary policies that reduce inflation are liable to affecting real GDP and hence reduce the unemployment rates.

This research is essential for policy making for South Africa. For instance, the Sustainable Development Goal number 8 (SDG8) is designed "to promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all". The results of this paper have shown that to achieve this objective, it is necessary to increase investment into both physical and human capital and to reduce inflationary tendency in the South African economy.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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Impact of globalization on work ethics: A review of existing literature

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Globalization as a concept surpasses a mere openness to symbiotic economic relationship. Globalization refers to the level of openness and positive attitude towards the products, values and ideologies of other people and cultures. The study reviews existing literature on the impact of globalization on work ethics across the globe and tries to observe possible trends of convergence of work ethics among several countries. Most of the reviewed studies revealed a significant impact of globalization on work ethics. The more recent studies also showed trends of convergence among some countries that are geographically far apart and initially had different cultural orientations to work. Since globalization is a continuous process, the degree of this convergence may vary as time goes on.

Key words: Globalization, global openness, capitalist work ethics, Islamic work ethics, socialist work ethics.

INTRODUCTION

The concept of work ethics has been used as a broad term to describe the set of moral principles a person abides by in the course of fulfilling their task (Alam and Talib, 2015). The work ethics in a particular environment is closely linked with the cultural ideology and religion being practiced in such a place (Baguma and Furnham, 1993). For this reason, work ethics can be influenced by the degree of openness to foreign cultures and ideologies that are made possible through globalization. Globalization is a term that is commonly used in recent times to refer to the suppression of barriers to economic trade and openness to foreign economic interest.

However, in this study, we view globalization for the perspective of the general direction in which the world as a whole is moving towards (Velho, 1997). Globalization refers to the influence (whether economic, social or political) that countries and regions have over one another through the inter-transfer of people, products and values. Globalization, in this light, can be seen as providing a medium for exchange of work ethics in terms of attitude to work.

Several studies have investigated the possible impact of globalization on the work ethics of individuals living in a particular community and have offered different

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(sometimes conflicting) results. Thus, there is need to review these studies and bring together the different results. Also, globalization is a two-way street because all the parties involved get to influence and be influenced by others. Thus, if globalization has indeed influenced work ethics, there ought to be some traces of convergence of work ethics among the countries that were studied. This study tries to fill these gaps by reviewing recent empirical works that associate globalization with work ethics. This study tries to bring together most of these previous empirical works and compare their results to identify traces of convergence of work ethics among the different countries that were studied.

The next four sections of this paper present a conceptual review of globalization and work ethics, a review of theories that explain the expected impact of globalization on work ethics and a systematic review of empirical literature on impact of globalization on work ethics. The results were examined and discussed in the discussion session. The remainder of the paper consists of conclusion, limitations, implications and future research directions.

LITERATURE REVIEW

Conceptual review

The concept of globalization is one that has attained common usage in recent times and has been used as a general term to describe global openness to foreign trade relationships. However, some authors have tried to give varying views on the concept of globalization that transcend the solely economic perspective and in accord with existing theories (Robertson, 2007; Robertson and Lechner, 1985; Suh and Kwon, 2002; Schütte and Ciarlante, 1998). Work ethics is a term that has also evolved over time and across several regions. Different perspectives to work ethics have been reviewed in existing literature and will be discussed in later sections.

Globalization

The dynamic theory of globalization recognizes different levels of globalization in the mindset of individuals, businesses and countries (Suh and Smith, 2008). These levels of globalization differ in terms dimensions. For instance, there is a psychological dimension and an economic dimension to globalization and a country can progress in one while remaining the same in the other (Schütte and Ciarlante, 1998; Suh and Kwon, 2002).

Establishment of institutions and increase in global economic activity may increase a country's level of economic globalization but may not have any real effect on their level of cultural or psychological development if there is no openness and positive attitude towards cultural or psychological globalization. There are several other definitions that address globalization in this light.

Robertson and Lechner (1985) define globalization as the processes through which the world is being made into a single place with systemic properties. The popular notion of the world being a 'global village' has its roots in this definition. Meanwhile, Schütte and Ciarlante (1998) define globalization as a psychological and spiritual process of deepening consciousness and increasing sensitivity to the culture and values of other people. Suh and Kwon (2002) tried to define globalization with its constituent effect. They describe it as the long-term effort to integrate the global dimensions of life into each country's economic, political, and cultural systems. The economic globalization is often the first step of globalization, which is then followed by the others (political and cultural). According to Robertson (2007), globalization refers to the transmission of ideas and intermingling of culture across borders.

In this study, we view globalization in aggregate terms as the general direction in which the world as a whole is moving towards (Velho, 1997). Globalization refers to the influence (whether economic, social or political) that countries and regions have over one another through the inter-transfer of people, products and values. This takes the form of a symbiotic or complementary relationship and ought to lead to a convergence of values across the participants. Globalization, in this light, can be seen as providing a medium for exchange of work ethics in terms of attitude to work.

Work ethics

From an individual perspective, work ethics can be described as a set of moral principles a person abides by in the course of fulfilling their task. From an organizational perspective, work ethics refers to the professional or business codes of conduct that sets the standard for judging the values and moral actions of employers and employees that arise in the course of the business (Alam and Talib, 2015). Different approaches to work ethics have eloped over time but these different approaches have been summarized to two broad perspectives; the Capitalist perspective and the anti-capitalist perspective.

Capitalist perspective of work ethics

The capitalist work ethics originated from the protestant work ethics by Max Weber and can be traced back to the seventeenth and eighteenth century (Weber, 1930). The

protestant work ethics summarizes the puritan attitude towards work that characterized the early Protestants (Calvinists) who saw working hard as a sign of predestination. Phrases like 'time is money' and 'he who does not work, let him not eat' were commonly used in this era. Some major defining characteristics of the protestant work ethics are; belief in hard work, leisure avoidance, independence from others, and asceticism (Furnham, 1990). According to Scherer et al. (2009), the protestant work ethics became linked with capitalism in the nineteenth century, which was characterized by a period of brutal capitalism. This era saw many capitalist entrepreneurs (e.g. Cornelius Vanderbilt, Andrew Carnegie, J.D Rockefeller, J.P Morgan) who saw worldly success as a sign of divine grace. Thus, they felt the need to make even more money and give back to society. The common notion of corporate social responsibility (CSR) as 'mere philanthropy' has its root in this era. The capitalist work ethics is more individualistic and values work with respect to productivity and profit. It was hinged on a general belief of egalitarianism (referring more to all men deserving equal opportunity than having equal human dignity), and thus reward systems for work was based on individual merit (Mirels and Garrett, 1971). The work ethics of Western countries have been commonly found to portray the features of capitalist/protestant work ethics. Some of the negative consequences of the extreme version of this work ethics include workaholism, suppression of humor and objectification of labor force (which goes against the fundamental principle of egalitarianism).

Anti-capitalist perspective of work ethics

Some of the foundational principles behind the anti-capitalist perspective to work ethics can be traced to the socialism of Karl Max. However, the anti-capitalist work ethics was majorly championed by André Gorz, a French philosopher. He argued that the need for higher levels of production have already been met (there is enough resource to go round) and that increase in production did not result in increase in quality of life before the era of capitalism and even afterwards (Gorz, 2001). He refuted the capitalist pitch of hard work as an agenda to get the poor to work and increase the wealth of the rich. To protect the interest of the community rather than individual interest, he discourages competition among paid labor workers and suggested that people should work less so as to give others an opportunity to work and earn a living. Unlike the capitalist perspective, this perspective peculiarly supports collectivism (Heins, 1993).

Although the Islamic work ethics, which was first introduce by Ali (1988), shares some characteristics with the protestant work ethics (belief in hard work, careful use of time, asceticism), but it emphasizes more collectivism (collaboration at work and consideration for our fellow men) as opposed to individualism. Elements of collectivism can be observed from the no-interest policy on lending, prohibition of gambling and prohibition of risk sharing (Shirokanova, 2015). The Islamic work ethic hinges more on religion compared to the protestant work ethics as it promotes hard work as long as it does not go against the dictates of the Islam religion (Ahmad and Owoyemi, 2012).

Globalization and work ethics

With the growing levels of migration, foreign economic interest and trade relationships among governments and multinationals, countries are being affected whether voluntarily or involuntarily by the value systems of other countries. Even though the effects of globalization often begin with economic relationships, globalization should not be seen merely as a means to acquire economic prowess but should transcend to openness towards the positive aspects of other cultures (Pope Francis, 2020). No cultural, economic or political system is complete (each society holds a piece of the whole) and only through intermingling of cultures do we benefit from the positive aspects of other cultures.

Globalization has influenced the diffusion of cultural values across countries and continents and these values have a major influence on the work ethics of that environment (Baguma and Furnham, 1993; Ladhari et al., 2015). On this basis, it could be inferred that the current trend of globalization ought to influence the work ethics in different countries through their cultural values as can be seen in the conceptual model (Figure 1). The convergence of cultural values that has been observed in recent years ought to be accompanied by a convergence of work ethics across the globe.

Theoretical review

There are several theories that relate to globalization as well as to work ethics. However, only a few of these theories explain the nature of the relationship between globalization and work ethics. One of these theories is the conventional theory of globalization. The conventional theory suggests that globalization has an impact on the willingness of a particular country to adopt ideas, values and products of other countries.

Conventional theory of globalization

The conventional theory originated as a theory on Country of origin effects (Nagashima, 1970) but has been

Globalization

Work Ethics

| Economic dimension |
| Socio-cultural dimension |
| Political dimension |

Cultural Values

Inter-transfer of products and values among countries

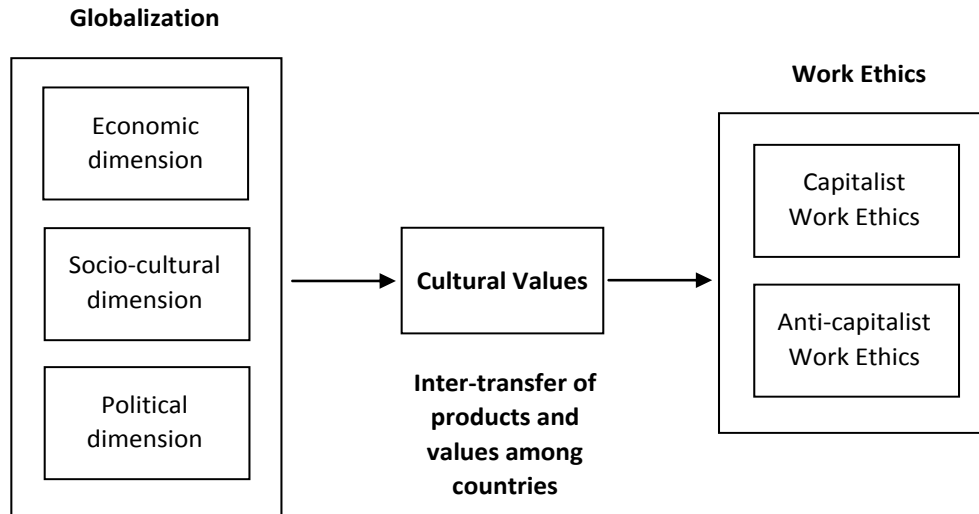| Capitalist Work Ethics |
| Anti-capitalist Work Ethics |

Figure 1. Conceptual framework for globalization and work ethics.

used as a general theory to explain the attitude of individuals and countries towards globalization (Roth and Romeo, 1992; Suh and Smith, 2008). The conventional theory suggests that individuals, businesses and countries are reluctant to change, and thus tend to reject foreign ideas, values and products. This preference for the status quo may be fueled by a lack of trust in foreign ideas and products (country of origin effect) or an irrational preference for products and ideas of local origin (ethnocentrism). Regarding work ethics, the theory suggests an absence of relationship between globalization and work ethics since countries would prefer to stick to their own values and attitude to work than adopt foreign values. Given that the conventional theory of globalization was the most relevant theory for this study, we use it as our main model for contextualizing the results of the reviewed studies.

METHODOLOGY

The research questions of this study were investigated using the systematic review method. This method can be considered appropriate as it involves a review of existing literature on globalization and work ethics with the aim of extracting and mapping the different research findings as well as detection of patterns that could answer some pertinent questions or suggest areas for further research (O'Gorman et al., 2013).

Article search and selection strategy

Studies that have investigated the impact of globalization on work ethics directly are quite scanty. Most of the studies investigate the impact of globalization on work ethics in the light of cultural bias (like ethnocentrisms and country-of-origin bias) and enforcement of

labor laws. Thus, studies that discuss globalization in this light were selected for review. Since the flourishing of globalization in the 1990's, the ethical conduct of multinational companies and other companies whose activities occur across borders have gained special interest (Tian et al., 2015). The reason for this can be traced to the fact that some authors have identified work ethics as one of those resources that can give an organization competitive advantage (Manroop et al., 2014). For this reason, this study targeted empirical studies that have been carried out from 1995 to 2015. Only works that were done within this time frame, addressed the structural research question (what is the nature of the impact of globalization on work ethics?), were empirical in nature (or at least involved some rigorous methodology), and approached the study in the light of cultural bias and enforcement of labor rights were selected. Only eight (8) works met these criteria (Table 1) and thus were reviewed extensively and mapped according to their findings.

Impact of globalization on work ethics

Several works have attempted to evaluate the effect of globalization on the adoption of different approaches to work ethics in different countries. The elements that make up the different work ethics in a particular country can be partly traced to some cultural ideas which may be of domestic or foreign origin. Few authors are of the opinion that globalization has not really changed the approach to culture and work ethics in some countries. For instance, Suh and Smith (2008), in their study, tried to test the impact of globalization on the decision to accept or reject certain ideas or products of foreign origin. They carried out a study on the attitude of individuals towards globalization (global openness) and Country-of-Origin effect. Country of origin effect was measured from a positive perspective (i.e. the tendency to accept a product or idea due to its country of origin). They tested data from a sample of 133 residents in Korea. They discovered that there is a negative relationship between individual ethnocentrism and country of origin effect while there was no relationship between globalization and country of origin effect. Thus, globalization has not had any significant effect on the reduction of country of origin bias.

Table 1. Selected articles for review.

Author	Full citation
Suh and Smith (2008)	Suh T, Smith KH (2008). Attitude toward globalization and country-of-origin evaluations: Toward a dynamic theory. Journal of Global Marketing 21(2):127-139. https://doi.org/10.1080/08911760802135202
Suh and Kwon (2002)	Suh T, Kwon IG (2002). Globalization and reluctant buyers. International Marketing Review 19(6):663–680. https://doi.org/10.1108/02651330210451962
Tilly (1995)	Tilly C (1995). Globalization threatens labor's rights. International labor and working-class history 47: 1-23.
McCorquodale and Fairbrother (1999)	McCorquodale R, Fairbrother R. (1999). Globalization and human rights. Human Rights Quarterly 21(3):735-766.
Niles (1999)	Niles FS (1999). Toward a cross-cultural understanding of work-related beliefs. Human Relations 52(7):855-867. https://doi.org/10.1023/A:1016902821120
Alam and Talib (2015)	Alam MA, Talib N (2016). Islamic work ethics and individualism in managing a globalized workplace: Does religiosity and nationality matter? Journal of Management & Organization 22(4):566-582. https://doi.org/10.1017/jmo.2015.54
Ladhari, Souiden and Choi (2015)	Ladhari R., Souiden N, Choi YH (2015). Culture change and globalization: The unresolved debate between cross-national and cross-cultural classifications. Australasian Marketing Journal 23(3):235-245. https://doi.org/10.1016/j.ausmj.2015.06.003
Shirokanova (2015)	Shirokanova A (2015). A comparative study of work ethic among Muslims and Protestants: Multilevel evidence. Social Compass 62(4):615-631.

These results are similar to those of Suh and Kwon (2002). Suh and Kwon (2002) did a study on 'globalization and reluctant buyers' in which they tried to test the hypothesis that globalization has led to homogeneity in consumers' buying behavior (in terms of reluctance to purchase foreign-made goods). Using samples of US and Korea, they found that customers are more reluctant to purchase foreign-made goods, in spite of the increasing level of global openness. The reason was attributed to consumer ethnocentrism (in both countries) and product judgment (in US only). They also discovered that, despite the growing trend of globalization, countries with different buying culture have remained different, thus emphasizing a lack of impact on the part of globalization and confirming the conventional theory of globalization. These studies may have only addressed buying behavior for products but the reasons for the lack of influence of globalization can be attributed to cultural ideas and work ethics as well.

Some other authors like Tilly (1995) have even advocated that globalization has a negative effect on work ethics. The author argues that the ability of the state to protect the rights of workers (and indeed, enforce other social policies) is highly dependent on their ability to control the stocks and flows of migration, drugs, capital, technology, political practices and other culture carriers. Given the fact that globalization has reduced the control of the state over these factors, the power and ability of the state to enforce and protect worker's rights is reduced.

On the other hand, several authors have found globalization to have a positive influence on the diffusion of certain aspects of culture and work ethics across the globe. McCorquodale and Fairbrother (1999) tried to examine the impact of globalization on human rights, which ultimately influences work place relationship. In terms of international Human Rights Law, at one time, governments dealt with those within their jurisdiction as they wished and resisted all criticisms of their actions by claiming that human rights were matters of "domestic jurisdiction". But with globalization, human rights are an established part of international law with an institutional structure to enforce them. In the study by Niles (1999) on a cross-cultural understanding of work-related beliefs, the author was able to identify certain work-related traits in Australia (a Western Christian country) and Sri Lanka (a non-Western and Buddhist country) using the protestant work ethics as a reference point. Data was collected using a questionnaire and the data from the test items were analyzed using factor analysis. Although, both cultures had the same idea of the concept of work, the Sri Lankans seemed to be more committed to hard work but had less belief that hard work leads to success compared to the Australians. However, over time, the author was able to uncover several proofs of a diffusion of certain aspects of the protestant work ethics across Sri Lanka (a non-Protestant and even non-Western country). This primary cause was ultimately traced to globalization. Similarly, Alam and Talib (2015) did a study on Islamic work ethics and individualism in a globalized workplace. The western capitalist approach to work ethics has been known to be more individual-centered (Individual incentives and rewards are given priority over group incentives and rewards). The basis for this is the notion that one should be proud of his own achievements and accomplishments and not just ride on the achievement of a group. On the other hand, the Islamic approach towards work ethics has been known to be more group-centered (employees are often rewarded as a group). One of the bases for this approach is the desire to promote team work and to promote common goals as superior to individual goals. The authors were able to prove that globalization has made Islamic work ethics to move away from collectivism and more towards individualism. Ladhari et al. (2015), in their study, were able to show some level of convergence of work ethics caused by globalization using a sample of three countries in different continents (Canada, Japan and Morocco). They tested for the existence of certain cultural values that extend beyond national borders among the three countries in the sample. The data on the cultural values were measured using the Horizontal-Vertical Individualism-Collectivism scale (a bit similar with Alam and Talib).

They found that although these countries had some aspects of culture that were specific to them, horizontal collectivism (tendency to cooperate and be rewarded collectively among peers) was consistent among all three countries.

Studies like that of Shirokanova (2015) give mixed results. Shirokanova (2015) did a comparative study on work ethics among Muslims and Protestants. The author tried to test Inglehart's theory of post-materialist shift. This theory explains the societies' change in values that occur as such societies develop. Since many societies experience similar socio-economic conditions (although at different times) they experience similar cultural, political and economic changes as they develop (Inglehart, 1997). During the modernization phase (i.e. the stage of revolutionary development), there is a highly committed attitude to hard work. However, during the post-modernization era of societal development (the period of diminishing marginal gain in material and subjective well-being), there is a shift from survival values (commitment to intense work and individualism) to well-being values (leisure and participatory management). The author also investigated whether the practice of protestant work ethics was limited to countries with a protestant religion. They conducted a survey on about 25,437 respondents in 55 different countries and discovered that living in a society that is predominantly protestant does not significantly increase commitment to hard work but belonging to a protestant religion does. This suggests that the adoption of the protestant work ethics depends more on religious identification than on mere migration policy. Also, they found that as countries develop, there is less commitment to hard work. The study admits to globalization having an effect on work ethics but from a religious perspective (i.e. a certain level of convergence of attitude towards work between protestant and Islam religion).

Convergence of work ethics across countries

Some of the studies that were reviewed were able to provide evidence of a convergence in work ethics among countries that originally had dissimilar attitude to work prior to globalization.

In the study by Niles (1999), Australia and Sri-Lanka were found to share similar idea of work. The author also discovered evidence of diffusion of some protestant work ethics traits to Sri Lanka over time and attributed it ultimately to globalization. Alam and Talib (2015) also proved that the influence of western culture and work ethics has introduced a more individualistic dimension to Islamic work ethics. They showed that globalization has caused a significant shift in Islamic work ethics to move away from collectivism and tend more towards individualism. In the study by Ladhari et al. (2015), the different countries (Canada, Japan and Morocco) were selected on the basis of continent dispersion and difference in cultural orientation. Over time, the work ethics in the three countries were found to share a culture of high horizontal collectivism which is characterized by high level of cooperation among colleagues. Shirokanova (2015), in her study, discovered that there was no significant difference between the work ethics of people of Protestant religion and those of Islam religion. The work ethics in about 55 countries of study were found to be similar regardless of the religion that the people practiced. This suggests some level of intermingling of work values and ethics. A summary of the results of the reviewed studies can be found in Table 2.

FINDINGS AND DISCUSSION

Work ethics is an element of a society's culture and has been affected by globalization over the years. From the review of empirical literature, there are evidence of mixed results about the nature of this effect (Table 2). Some of the reviewed studies show that globalization has led several countries to adopt certain approaches to work ethics (both protestant and Islamic work ethics) thus creating overlaps of each approach across countries where they were previously foreign (Alam and Talib, 2015; Ladhari et al., 2015). Also, less developed countries tend to be more committed to hard work (Niles, 1999; Shirokanova, 2015). Globalization has also spread the awareness and enforcement of basic principles like fundamental human rights and other work place ethics (McCorquodale and Fairbrother, 1999), this spread is often restrained by existing barriers like country-of-origin bias, individual ethnocentrism and religious bias. This aligns with the suggestion of the dynamic theory of globalization. Religion was identified as a major mediating variable that determines the effect of globalization on work ethics (Shirokanova, 2015). On the other hand, few studies also confirmed the conventional theory that suggests globalization as an irrelevant (Suh and Smith, 2008; Suh and Kwon, 2002) or even negative factor in improving work ethics across borders, in so far as it limits the power of the state to properly enforce social policies (Tilly, 1995). Over all, out of the eight studies that were reviewed, three (3) confirmed the conventional theory (suggested a lack of positive influence of globalization on work ethics) while the other five (5) opposed the suggestions of the conventional theory.

Some of the recent studies that were reviewed were able to provide evidence of a convergence in work ethics among countries that originally had dissimilar attitude to work prior to globalization. Australia and Sri-Lanka tend to share similar idea of work (Niles, 1999). The work ethics in about 55 countries were found to be similar regardless of the religion that the people practiced (Shirokanova, 2015). The work ethics in Canada, Japan and Morocco were found to share a culture of high horizontal collectivism which is characterized by high level of cooperation among colleagues (Ladhari et al., 2015). Most of the sample countries in the reviewed studies are geographically far from one another and originally had different cultural orientations.

SUMMARY AND CONCLUSION

In this study, the concepts of globalization and work ethics were reviewed. The different perspectives of work ethics that have originated from different cultures and religions may have some flawed element, but also contain lots of virtues to be imitated in terms of attitude to work. The benefits of foreign cultural values and orientations will be realized only if countries, businesses and individual are more open to globalization. Although, barriers to globalization like ethnocentrism and country-

Table 2. Summary and map of results of the reviewed works.

Author	Argument/findings	Impact (Theory)	Evidence of convergence
Suh and Smith (2008)	There was no relationship between globalization and country of origin effect. Thus, globalization has not had any significant effect on the reduction of country of origin bias.	No (supports the Conventional theory)	
Suh and Kwon (2002)	Customers are more reluctant to purchase foreign-made goods, in spite of the increasing level of global openness	No (supports the Conventional theory)	
Tilly (1995)	Given the fact that globalization has reduced the control of the state over these factors, the power and ability of the state to enforce and protect worker's rights has reduced.	Negative	No
McCorquodale and Fairbrother (1999)	With globalization, human rights have become an established part of international law with an institutional structure to enforce them.	Positive	No
Niles (1999)	Although both cultures had the same idea of the concept of work, the Sri Lankans seemed to be more committed to hard work but had less belief that hard work leads to success compared to the Australians. Evidence of diffusion of PWE to Sri Lanka (a non-Protestant and even non-Western countries)	Yes	Yes
Alam and Talib (2015)	The influence of western culture and work ethics has introduced a more individualistic dimension to Islamic work ethics.	Yes	Yes
Ladhari, Souiden and Choi (2015)	Although Canada, Japan and Morocco (3 far apart countries) had some aspects of culture that were specific to them, horizontal collectivism (tendency to cooperate and be rewarded collectively among peers) was consistent among all three countries	Yes	Yes
Shirokanova (2015)	Adoption of the PWE depends more on religious identification than on mere migration policy. However, there was no significant difference between the work ethics of people of Protestant religion and those of Islam religion.	Yes/No	Yes

exist, many of the reviewed empirical studies have revealed some impact of globalization on the work ethics of different countries. The more recent studies tend to suggest a significant impact of globalization on work ethics. This could suggest that such psychological biases may be strong but only effective in the short term. In the long run, globalization tends to overcome these barriers. Also the works that suggest significant impact of globalization on work ethics tested their hypotheses using larger respondents (larger sample size). This could suggest that those who hold these biases constitute the minority of individuals.

Some of the reviewed studies also showed evidence of convergence of attitudes to work and work place relationships. It is also important to mention that these results are not fixed. Since globalization is a continuous process, the findings of this study may be true as at the time of study but may change afterwards.

IMPLICATIONS

The results of the reviewed studies have some implications for countries, business organizations and individual workers. Contrary to the proponents of the conventionalist, globalization does affect the attitude to work at different levels and in different countries. In response, countries often establish policies to regulate the exchange of economic value across their borders. However, little effort is made in ensuring a moderate regulation of the transfer of socio-cultural and political values. These values should not be viewed with unnecessary skepticism since each culture has its good and bad sides. Instead of going to either extremes (allowing everything and allowing nothing), efforts should be put towards regulating what comes in. This will help in maximizing the good and minimizing the bad. Governments cannot afford to simply 'fold their hands and hope for the best'. Development occurs through individuals, and so governments can establish immigration policies that attract individuals with certain dispositions to work that will promote both economic and cultural development. In the past few years, countries like Canada and Australia have begun to gear their immigration policies towards attracting certain quality of individuals and this has improved their economic performance in recent times. For this reason, it is no surprise that they are one of the countries that studies

have found to exhibit some level of harmonization of work ethics. This increase in dynamics of work ethics can help in the character development of individual workers and this will only be realized if countries, businesses and individual are open to globalization.

Also, where there is convergence of work ethics, businesses will experience more dynamics in workers' attitude. Such dynamics could be advantages as it could expose new ways of doing things that could improve on previous ways. Although, this new way of doing things may be obtained through technology transfer and other economic-oriented means. Work ethics still constitutes a major value creation element that can give a business competitive advantage across borders. For instance, many construction companies like to hire Germans because of their perceived orientation towards efficiency and toughness. And indeed, many of the top construction companies all over the world (both German and non-German) often have a number of German employees. Each category of attitude to work has its benefits and preferred context and thus convergence can bring about a more complete work environment compared to a work environment that possesses only one or the other.

LIMITATIONS AND FUTURE DIRECTION

Despite the mostly positive intentions of its proponents, globalization is often hindered by some barriers. At the national level, Zinn and Grosse (1990) identified government policies and regulations (e.g. embargoes and legal restrictions placed on foreign products, ideas and values) as barriers to globalization. At the business perspective, Carrieri et al. (2013) identified poor functioning institutions, poor corporate governance and lack of transparent markets as significant barriers to globalization. All these factors limit effect of globalization on cultural development (particularly in the area of work ethics) and more studies could be carried out to investigate the effect of these factors on globalization and recommend possible solutions.

Also, a major limitation in the reviewed works is the measurability of the focal concepts. Globalization as a concept may be measured quantitatively using measures like the Globalization Index that measures the economic, social and political dimensions of globalization (KOF index), but work ethics is one that is difficult to capture from a quantitative perspective. Few of the reviewed studies measured work ethics partially, in terms of attitude towards foreign culture and values (e.g. individual ethnocentrism and country-of-origin effect).

Also, the more recent studies showed trend of convergence among some countries that are geographically far apart. Since globalization is a continuous process, the degree of this convergence may vary over time. Studies can be done to capture the degree of convergence work ethics across different countries over time.

CONFLICT OF INTERESTS

The author has not declared any conflict of interests.

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An econometric analysis: Is there an optimal external debt threshold for Guinea?

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This study aimed to determine the threshold level of public external debt-to-GDP ratio for Guinea and compared it with the current evolution of public debt. The authors used an autoregressive distributed lag (ARDL) approach to test the hypothesis of long-term relationship among the variables of interest and the data used ranged from 1990 to 2018. The results revealed that External debt-to-GDP ratio and per capita GDP are positively related. Moreover, the null hypothesis of no co-integration was rejected. Thus, external debt-to-GDP ratio and economic growth as well as other variables are co-integrated. Moreover, the debt variable had significant non-linear effects on economic growth and indicated that there exists an optimal level of external debt-to-GDP ratio that stood at 25.2%. Compared to its current level which stood at 21.7%, the country still has some borrowing margin. In the short run external debt-to-GDP ratio has no significant effect on the country's economic performance.

Key words: External debt, Economic growth, autoregressive distributed lag (ARDL), Guinea.

INTRODUCTION

The problem of external public debt emerged in most developing countries during the 1970s and in the early 1980s for Africa. With an external debt of $337.2 billion (1999), Africa is the most indebted continent in relation to its gross national product (GNP). This situation can be explained by the ease with which African countries were able to borrow money in the late 1970s and early 1980s, but also by the duration of the global economic crisis and the fall in the prices of raw materials and agricultural products. In addition, external debt has often impacted

the economy of over-indebted countries by taking away from the state budget resources necessary for the proper functioning of public administrations and services thereby reducing the country's capacity for investment, etc. It can also lead to an increased need for additional resources and hence a need for more borrowing. Faced with macroeconomic and financial imbalances in their economies, governments have often resorted to external borrowing to rebalance their external and internal deficits. The idea that debt servicing negatively affects the
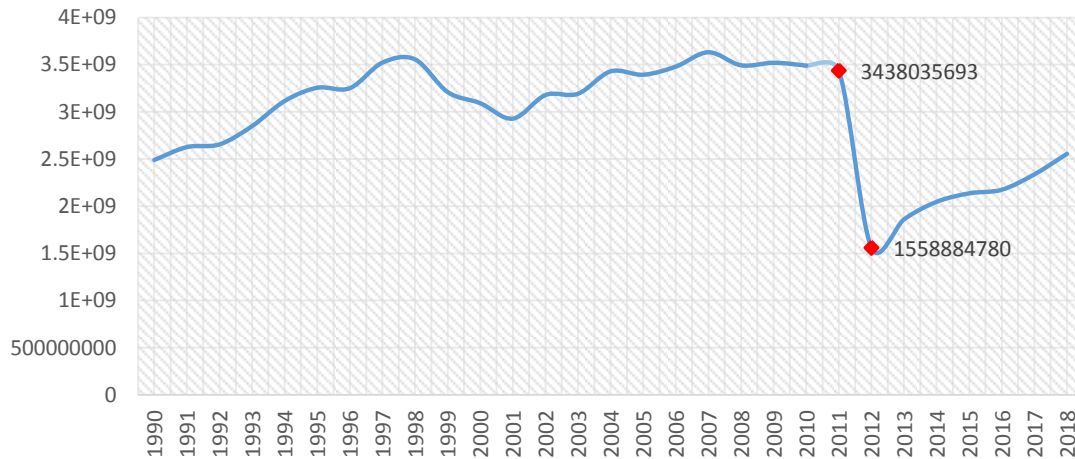
Figure 1. Evolution of the external debt stock (in current $).
Source: World Bank (2020).

economy of poor countries has been the subject of sustained discussions within international institutions. This could explain why numerous programs aimed at relieving debt were put in place that is, the HIPC (Highly Indebted Poor Country) initiative. Indeed, many countries, including Guinea, were facing economic difficulties due to the large share of their GDP that they were allocating to debt service. Thus, the country embarked on a borrowing spray both internally and externally (International Monetary Fund, 2017). These borrowings undoubtedly affected the country's public finances.

Indeed, between the year 2000 and 2005, Guinea's external debt stock rose from US$ 3 billion to US$ 3.4 billion (World Bank, 2020). In 2011, the country's external debt stood at US$ 3.4 billion. It dropped to US$ 1.56 billion in 2012 in line with the HIPC initiative, representing a 54.66% reduction of the country's external debt. Notwithstanding this, the country's external debt kept rising steadily. By 2018, the country's external debt has reached another peak. Indeed, it stood at US 2.55 billion (World Bank, 2020). This represented a 63.88% increase in a six years period. The current observation is that Guinea's external debt is still on an upward sloping trend. Thus, in order to avoid falling back into the cycle of debt overhang with its adverse effects on both economic growth and fiscal sustainability, the mobilization of foreign resources should be carried out in a prudent manner, taking into account the costs and risks associated with these resources. It is in line with the above that, this study seeks to provide a better understanding of the following issues:

1. How did the country's public debt and its components evolved from 1990 to 2018?
2. What could be the short- and long-term impact of the country's rising external debt on economic growth?
3. Whether there is a critical threshold for Guinea's external debt?

The overall objective of this study is therefore to provide a better understanding of the impact of external debt on Guinea's economy. More specifically, the study seeks to: determine the short and long term impact of the country's external debt on its economic growth; determine the optimal threshold for Guinea's external debt. In addition to the above objectives, the following hypotheses will be tested: external debt has a positive impact on Guinea's economic growth in both the short and long run; and Guinea's optimal external debt-to-GDP ratio is below the current level of external debt which stood at 21.7%.

Stylized facts

As countries seek ways to ensure macroeconomic stability and mobilize resources for the financing of major development projects they resort to debt. However, in many instances, public debt has a number of limitations that should not be overlooked. Indeed, poor management of public debt can lead to a number of difficulties that can be very unfavorable to the proper functioning of the economy. In Guinea, the increase in external debt in recent years could be explained by the implementation of several major economic and social development projects. Thus, a descriptive analysis of external debt, as well as its relationship with certain key macroeconomic variables, should provide a better understanding. From Figure 1, Guinea's external debt increased from US$ 2.489 billion to US$ 3.555 billion between 1990 and 1998, an increase of 42.82%. However, over the period of 1998 to 2008, Guinea's external debt showed a moderate evolution, with light fluctuations.

The year 2012 was marked by a sharp drop of the country's external debt, this was mainly attributable to the cancellation of debt resulting from the implementation of the Heavily Indebted Poor Countries Initiative (HIPC), that is, a cancellation of more than US$ 2 billion. From 2012
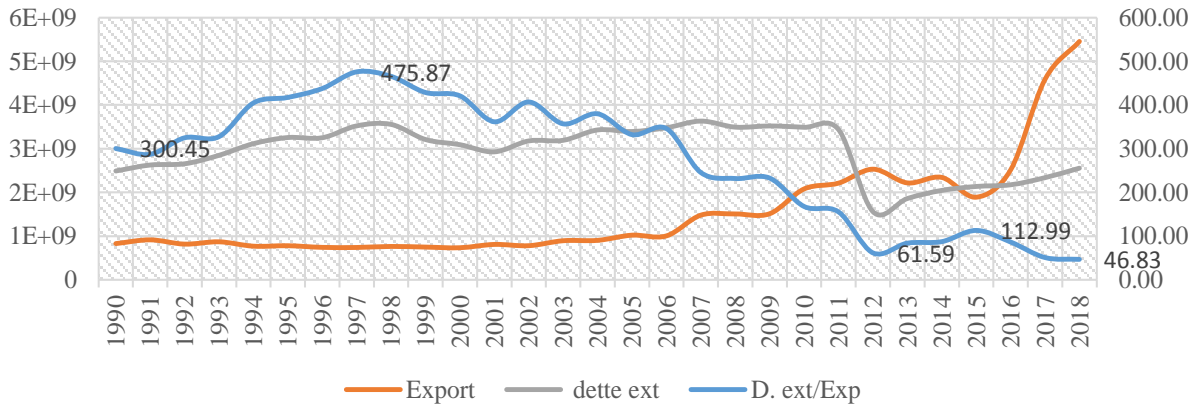
Figure 2. Evolution of the external debt to exports of goods and services ratio.
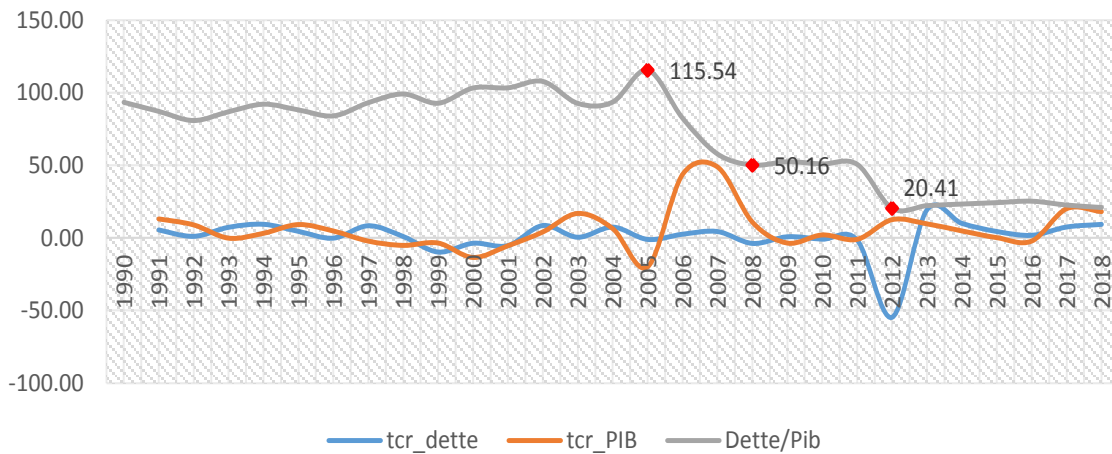Source: World Bank, (2020).

Figure 3. Trend of the growth rate of debt, GDP and debt-to-GDP ratio from 1990 to 2018.
Source: World Bank (2020).

to 2018, the stock of external debt rose from USD 1.558 billion to USD 2.554 billion, an increase of 63.88%. This increase can be explained by the State's investments in the mining and infrastructure sectors[1]. When considering the external debt-to – export ratio, it is observed that the trend was upward sloping in the early 90s (Figure 2). Indeed, it rose from 300.45% in 1990 to 475.87% in 1997 representing a 58.36% rise. From 1997, the trend has been downward sloping till 2012 although not steadily. In 2012 the external debt-to- exports ratio stood at 61.59%. Unfortunately this downward trend was halted in the period ranging from 2013 to 2015 where it reached 112.99%. Thereafter, it dropped to reach its lowest level in 2018 where it stood at 46.83% representing a 58.55% decrease in less than five years (World Bank, 2020).

In Figure 3, it is observed that the growth rate of the economy and that of the external debt evolved together but with different amplitudes. Indeed, between 1990 and 2018, the outstanding external debt has grown by an average of 1.17%. As for the economic growth rate, it has evolved on average by 6.45% over the same period. Over the period 1990 to 2004, the external debt/GDP ratio was almost stable with an average growth rate of 2.61%. From 2005 to 2012, there was a clear decline in the external debt to GDP ratio. Indeed, it fell from 115.54% in 2005 to 50.16 in 2008 and then to its lowest level in 2012 at 20.41%. This later one has to do with the HIPC initiative. From 2012, the external debt to GDP ratio evolved around 21% (World Bank, 2020).

The trend of the country's debt service is presented in Figure 4. It is observed that it declined until 1992. Then it rose from 1993 to 1995 before another decline in 1996. Broadly speaking was neither steady nor stable

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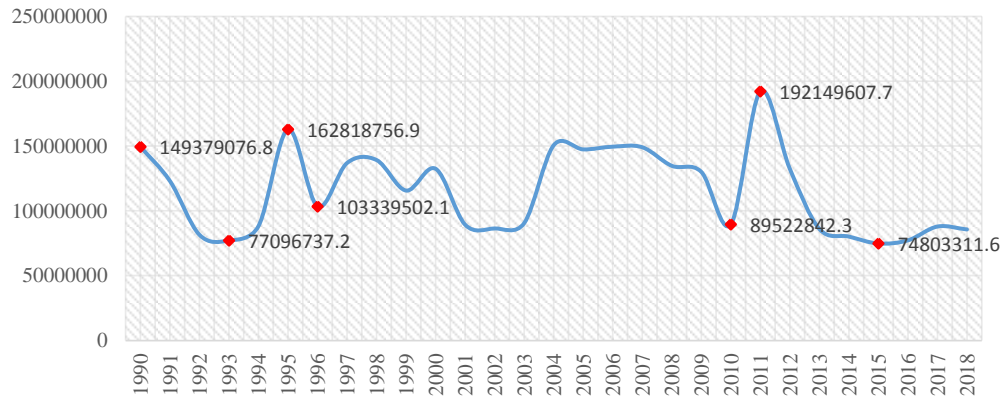[1] Le Programme d'Investissement Publique / Guinée 2019 (PIP)

Figure 4. Evolution of debt service.
Source: World Bank, (2020).

throughout the period of analysis. However, from 2011, a downward trend is observed. This last situation is attributable to the cancellation of a large part of the external debt through the Heavily Indebted Poor Countries Initiative (HIPC).

REVIEW OF LITERATURE

A review of selected literature is undertaken in this study. It starts with a brief theoretical review followed by a selected empirical studies review on the link between public debt and economic growth.

Theoretical review

The debate between economic growth and debt is relatively old, one of the pioneers being Cairnes (1874), and owes its revival to endogenous growth theories. Since the 1980s, two schools of thoughts have been clashing over the theory of growth and public debt, namely the Keynesians and the neoclassicals. For the Keynesians, the main idea is that debt does not cause burdens for current and future generations, because of the investments it generates. From this approach, debt stimulates demand, and the accelerating effect of an increase in investment leads to an increase in production. According to Clements et al. (2004), external debt has the potential to stimulate economic growth, provided that it is used to finance investment. For these authors, it is necessary to have a measure of debt, because there is a certain threshold beyond which debt negatively influences economic growth. Indeed, when the return on capital is declining, the benefits of any new investment on economic growth could diminish as the debt increases. This theory gives rise to a "Laffer Curve" relationship between external debt on the one hand and per capita income growth on the other. For the neoclassicals, debt is considered as a future tax and attributes it to the state. According to this school of thought, public debt has a negative effect on the accumulation of capital and the consumption of future and present generations. According to Sargent (1981), a sustainable debt leads to a growth rate higher than the real interest rate on bonds. Thus, government revenues grow faster than interest on the debt, based on the assumption of a unitary elasticity between the budget balance and economic activity. Krugman (1988) and Sachs (1989) predict that a high debt is harmful to economic growth, since it discourages investment. For these authors, when debt exceeds a country's internal resources, the country may no longer be able to repay past loans, which will have a dissuasive effect on potential creditors and investors thus, it hinders economic growth. Moreover, Barro's (1990) model attributed a very important role to productive public spending (for instance public spending on infrastructure) in the process of long-run economic growth. According to the author, debt is neither a wealth for the current generation or a bridge between generations because of the agents' anticipation of future taxes. Thus, part of the debt will be transferred to the future generation (tax debt) and the other part will be compensated by public securities. This is why substituting borrowing for taxation does not necessarily lead to growth. In matters of fiscal policy, public debt is a key factor in analyzing government's room for maneuver in its spending.

Empirical review

Several studies have tackled the issue of the optimal level of external debt to GDP ratio. However, there is no consensus on the threshold to be considered. This could be explained by the peculiarities of countries and their specific needs. This study therefore reviews couple of selected empirical studies including Greenidge et al.

(2012), Mencinger et al. (2014), Faye and Thiam (2015), Wade (2015), Omotosho et al. (2016), Adeniyi et al. (2018), N'Zué (2018), Mary et al. (2019), Ehikioya et al. (2020), and Aziz and N'Zué (2020) just to cite a few. Greenidge et al. (2012) studied the threshold effects between public debt and economic growth in the Caribbean. Their study confirmed the existence of a debt to gross domestic product (GDP) threshold of 55-56%. They also found that debt dynamics began to change well before this threshold was reached. Specifically, at debt levels below 30% of GDP, increases in the debt-to-GDP ratio are associated with faster economic growth. However, as debt rises above 30%, the effects on economic growth decline rapidly and at debt levels reaching 55-56% of GDP, the impacts on growth shift from positive to negative. Thus, beyond this threshold, debt becomes a drag on growth. Mencinger et al. (2014) studied the direct effect of higher debt on economic growth for 25 EU countries. Their sample of EU countries was divided into subgroups to distinguish between "old" member states, over the period 1980-2010, and "new" member states, covering the period from 1995 to 2010. Using a panel estimation method, they confirmed the existence of a non-linear relationship between the ratios of government debt to GDP per capita. They also found that the threshold for the debt-to-GDP ratio should be approximately between 80 and 90% for the "old" member states. Yet, for the "new" member states, the threshold for the debt-to-GDP ratio is lower and was between 53 and 54%.

Faye and Thiam (2015) use a nested generation's model to study the effect of public debt on consumption, GDP, savings, budgetary revenues, investment, and capital dynamics in Senegal. The results show that a 10% increase in public debt positively affects macroeconomic variables but worsens the current account deficit. To be effective, a public debt of at least 65% of GDP should be integrated into the capital accumulation process. A 10% increase in external debt has a positive impact on macroeconomic variables, but worsens the current account deficit. A 10% increase in domestic debt leads to a recession. An increase in debt-financed public spending leads to an increase in the public debt bequeathed to future generations by 15% and an increase in future consumption by about 2%. As for Wade (2015), the author estimated the impact of total public debt-to- GDP ratio on the growth rate of GDP per capita with a PSTR (Panel Smooth Transition Regression Model) and the Generalized Method of Moments (GMM) method. The study covered the eight (8) WAEMU countries over a period ranging from 1980 to 2011. The results obtained with the GMM method indicated that the optimal public debt threshold stood at 48.8% of GDP, while for the PSTR the threshold stood at 49.8% of GDP. Omotosho et al. (2016) investigated the existence of threshold effects in the relationship between public debt and economic growth in Nigeria using quarterly data.

They found empirical support for an inverted U-shape relationship between public debt types and economic growth. For total public debt as percentage of GDP, the threshold level stood at 73.70%. Adeniyi et al. (2018) investigated the possible role of domestic investment in the non-linear relation between external debt and economic growth in Nigeria over the period from 1981 to 2015 using threshold regression analysis. They found that the impact of external debt on economic growth is sensitive to the measures of external debt used, and whether or not the role of domestic investment is accounted for. Accounting for the role of domestic investment in the non-linear relation between external debt and economic growth reduces the optimal debt carrying capacity of the country. Moreover, the study provided support to the crowding-out effect of excessive external debt servicing. They therefore suggested that the Nigerian government internalizes a maximum ceiling of 6.81% as the share of external debt stock in gross national income (GNI) so as to enjoy the resulting growth benefits.

N'Zué (2018), using the model of Patillo et al. (2002) with data ranging from 1970 to 2015, studied the link between external debt and growth in Côte d'Ivoire. He estimated a critical threshold of 42.9% beyond which external debt accumulation will have a negative impact on growth. Mary et al. (2019) examined the optimal point beyond which government debt impairs economic performance in Nigeria. Data from the Central Bank of Nigeria Statistical Bulletin from 1986 to 2017 were used. Dynamic Ordinary Least Square estimation method was applied. They found a significant relationship between government debt and Nigeria's economic performance. Government debt is growth-enhancing at low levels but growth-retarding at a high level with the optimal government debt estimated as 9.98% of the gross domestic product implying that borrowing beyond such a limit becomes growth retarding in the economy. Thus, government should focus on other sources of revenue to fund its budget deficits to decrease the debt burden. Aziz and N'Zué (2020), revisited the above study by using an ARDL method with data covering the period ranging from 1980 to 2018, they estimated the external debt to GDP ratio threshold to be at 59.53%. The rate beyond which debt accumulation will have a negative impact on growth.

MATERIALS AND METHODS

Following previous studies that is, Patillo et al. (2002) and N'Zué (2018), we use a Solow (1956) type production function. The theoretical framework is the neoclassical growth theory where output (Y) is a function of labor (L) and capital (K). The production function is represented below:

$$Y_t = Af(L_t, K_t) \tag{1}$$

Where, L and K are as defined above and A is a parameter that captures the effect of other factors on output. By definition, A

measures total factor productivity (*TFP*). It is through *A* that the effect of government debt on economic growth is captured.

Using the above formulation and referring to recent work, additional variables (control variables) are included in the model to help explain the output. The variable of interest "government external debt" as a percentage of GDP enters the model in both linear and quadratic terms. The quadratic term allows us to determine the threshold if it exists. The other control variables are inflation, gross fixed capital formation, working age population (used as a proxy for labor). It is important to remember that the control variables are included in the initial model (equation 1) to improve the specification of the model and to determine the effects of these other variables on the dependent variable. Equation 1 is rewritten as follows:

$$Y_t = \alpha_t + \beta X_t + \gamma Det_t + \varepsilon_t \qquad (2)$$

Where, Y_t is the dependent variable; X_t is a set of control variables, (Det_t) is our variable of interest, α_t, β , γ are parameters to be estimated. *t* is the time period and ranges from 1980 to 2018. ε_t is the error term. As mentioned earlier, the control variables of the model include the capital variable which is represented by gross fixed capital formation ($Fcbf_t$). It measures the impact of physical capital in the production process; it is expected to positive; the budget deficit ($Solde_t$) is included to capture the impact of fiscal policies on growth and its coefficient expected also to be positive; the trade openness indicator ($open_t$) is defined as the sum of exports-to-GDP ratio and imports-to-GDP ratio. It is introduced to capture the extent to which knowledge/technology transfer through trade impacts influences GDP. The coefficient associated with this variable is also expected to be positive. The other variables are the ratio of external debt-to-GDP ratio ($Debt_t$), terms of trade ($Term_t$), and working age population as a percentage of total population (pop_t). The linear term of external debt-to-GDP ratio is expected to have a positive coefficient while that of its quadratic term is expected to be negative.

The terms of trade variable was obtained by taking the ratio of the unit value index of exports to the unit value index of imports. It is expected to be associated with an ambiguous sign. The positive coefficient will be an indication that the terms of trade have been beneficial to the country's economy while a negative sign will indicate the extent to which the terms of trade have been detrimental to the country's economy. The working-age population is the population aged 15-64, as a percentage of the total population. It should be noted that the variables are transformed using their logarithm (ln). The data used range from 1990 to 2018 and are mainly obtained from the World Bank's World Development Indicators (WDI)[2], the National Directorate of Planning and Prospecting (Revised Macroeconomic Framework). Given the time-series nature of the available data, it is important to assess their time series characteristics. This includes testing for stationarity, as regressing a non-stationary variable on other non-stationary variables can lead to spurious regression. Once the assessment of the time series characteristics of the variables is completed, the next step will be to investigate the long-term dynamics of the model, which will be done by conducting co-integration tests to assess the extent to which the variables in the model move together or not in the long run. This will be done by using an *ARDL* approach and the bounds test proposed by Pesaran et al. (2001). To undertake the bounds test, it is important to reformulate the initial model to take into account both short and long term dynamics). The generalized *ARDL (p, q)* model is as follows:

$$Y_t = \alpha_t + \sum_{i=0}^{p} \delta_i Y_{t-i} + \sum_{i=0}^{q} \beta_i X_{t-i} + \varepsilon_t \qquad (3)$$

Where, Y_t = Endogenous variable; X_t = Explanatory variables; α=

[2] World Bank (2020)

Constant; δ and β=parameters to be estimated; p and q = Optimal lag orders (The lags p and q are determined by minimizing the Akaike criterion (AIC) ; ε_t = Error term.

$$\Delta lnPibh_t = \alpha_t + \delta_1 lnpibh_{t-1} + \delta_2 lnTerm_{t-1} + \delta_3 lninFcbf_{t-1} + \delta_4 lnOuv_{t-1} + \delta_5 Solde_{t-1} + \delta_6 lnDebt_{t-1} + \delta_7 lnDebtsq_{t-1} + \delta_8 lnInflat_{t-1} + \delta_9 lnpop_{t-1} + \sum_{i=0}^{q} \beta_{1i} \Delta lnpibh_{t-i} + \sum_{i=0}^{q} \beta_{2i} \Delta lnTerm_{t-i} + \sum_{i=0}^{q} \beta_{3i} \Delta ln Fcbf_{t-i} + \sum_{i=0}^{q} \beta_{4i} \Delta lnouv_{t-i} + \sum_{i=0}^{q} \beta_{5i} \Delta Solde_{t-i} + \sum_{i=0}^{q} \beta_{6i} \Delta lnDebt_{t-i} + \sum_{i=0}^{q} \beta_{7i} \Delta lnDebtsq_{t-i} + \sum_{i=0}^{q} \beta_{8i} \Delta lninflat_{t-i} + \sum_{i=0}^{q} \beta_{9i} \Delta lnpop_{t-i} + \varepsilon_t \qquad (4)$$

The coefficients β_1 to β_9 represent the short-run dynamics while the coefficients δ_1 to δ_9 represent the long-run dynamics of the model. The bounds test for co-integration is equivalent to testing the following hypotheses for the above equation:

$$H_0: \delta_1 = \delta_2 = \delta_3 = \delta_4 = \delta_4 = \delta_5 = \delta_6 = \delta_7 = \delta_8 = \delta_9 = 0$$
$$H_1: \delta_1 \neq \delta_2 \neq \delta_3 \neq \delta_4 \neq \delta_5 \neq \delta_6 \neq \delta_7 \neq \delta_8 \neq \delta_9 = 0 \qquad (5)$$

This test is currently a test of the hypothesis of no co-integration among the variables (H_0) against the alternative that the variables are co-integrated (H_1) as shown above. The statistic underlying this test is the F-statistic (Pesaran et al., 1999). The calculated value of the Fisher statistic is used to decide whether or not the series are co-integrated. The asymptotic distribution of this test is non-standardized under the null hypothesis of non-co-integration between the variables. However, Pesaran et al. (2001) have provided asymptotic critical value bounds for all classifications of the regressors in *I(1)* and or *I(0)*. Thus, if the calculated F-statistic is above the upper bound, the null hypothesis is rejected and it is concluded that there is co-integration between the variables. If it is lower than the lower limit, then the null hypothesis cannot be rejected. The conclusion is that there is no co-integration relationship between the variables. If the F-statistics are between the two limits, the test is not conclusive. When co-integration exists, the model can be rewritten to show the speed of adjustment after an exogenous shock.

After estimating equation 4, the threshold for the government external debt-to-GDP ratio is obtained by taking the first derivative of the dependent variable with respect to the debt variable and setting it to zero (equation 7).

$$\frac{\partial lnpibh_t}{\partial lnDebt_{t-1}} = \beta_6 + 2\beta_7 lnDebtsq_{t-1} \qquad (6)$$

$$\rightarrow \frac{\partial lnpibh_t}{\partial lnDebt_{t-1}} = 0 \qquad (7)$$

$$\rightarrow \beta_6 + 2\beta_7 lnDebtsq_{t-1} = 0 \qquad (8)$$

$$\rightarrow ln\widehat{Debtsq}_{t-1} = \frac{-\beta_6}{2\beta_7} \; avec \; \beta_7 < 0 \qquad (9)$$

$$\rightarrow \widehat{Debtsq}_{t-1} = e^{\left(-\beta_6 / 2\beta_7\right)} \qquad (10)$$

Equation 10 is used to calculate the estimated threshold level of the external debt-to -GDP ratio.

RESULTS AND DISCUSSION

This section presents and discusses the empirical results. It begins with the descriptive statistics presented in Table 1. It can be observed that, on average, gross fixed capital

Table 1. Results of descriptive statistics for the variables of interest.

Variable	Obs	Mean	Std. Dev.	Min	Max
$pibh_t$	29	563.51	175.90	322.41	983.30
$dette_t$	29	69.54	31.81	20.40	115.53
$fbcf_t$	29	22.55	7.49	14.29	54.30
pop_t	29	63.44	0.85	61.48	64.31

Author's calculation.

Table 2. Results of the unit root tests using the "Augmented Dickey Fuller" and "Philip Perron" tests.

	ADF		PP		Decision
Variable	Level	1st différence	Level	1st difference	
$\ln pibh_t$	-0.987(-3.588)		0.367(-2.992)	-3.854(-3.592)	I(1)
$\ln dette_t$	-1.793(-3.588)	-4.753(-3.592)	-0.310(-2.992)	-5.399(-3.592)	I(1)
$\ln fbcf_t$	-4.286(-3.588)		-3.150(-2.992)		I(0)
$\ln detteq_t$	-1.732(-3.588)	-4.440(-3.596)	0.018(-2.992)	-5.253(-3.592)	I(1)
$\ln pop_t$	-0.879(-3.588)		5.613(-2.992)	-4.620(-3.592)	I(1)

Author's calculation.

Table 3. Test of co-integration between the variables of interest for *ARDL (1,5)*.

H0: No long run relationship		
F-stat		*F*=10.42
K=4	I (0)	I (1)
Critical value at 10%	2.45	3.52
Critical value at 5%	2.86	4.01
Critical value at 1%	**3.74**	**5.06**

Accept H_0 if F_{stat} < Critical value for I (0); Reject H0 if Fstat > Critical value for I (1)
Source: Author's calculation.

formation is very high in Guinea. Indeed, it was 22.55% and above the ECOWAS regional threshold of 20% On average, the minimum debt-to-GDP ratio was 20.41% and was recorded in 2012 after the country benefited from the Heavily Indebted Poor Countries (HIPC) initiative. The highest debt-to-GDP ratio (115.54%) was recorded in 2005. The time series characteristics of the variables were analyzed (Table 2). The results show that with the exception of the variable gross fixed capital formation which is integrated of order 0, that is *I (0),* all other variables are integrated of order 1, that is *I(1).* The above results, show a mixture of *I(0)* and *I(1)* variables confirming the use of the *ARDL (p, q)* approach. The results of the bounds tests are presented in Table 3. The F-statistic is compared to the critical bound test values

tabulated by Pesaran et al. (2001) without restriction on the constant and trend. The null hypothesis of the test is that there is no co-integrating relationship versus the alternative hypothesis of a co-integrating relationship. The value of the F-statistic calculated is 10.42. It is greater than all of the critical values considered, namely 1%, 5% and 10%. The null hypothesis of no co-integration cannot be accepted. It is therefore concluded that there is a co-integration relationship between the variables, which means that they move together in the long run.

With the above result, we proceed to estimate the short and long term dynamics. The results are presented in Table 4. From Table 4, we found that in the long run, debt is positively related to growth and the coefficient

Table 4. Results of the estimated *ARDL(1,5)* model (1).

Variable	Dependent variable : Per capita gross domestic product	
	Coefficients	Probability Value
Long run dynamics		
$\ln^{pibh_t}$ (ADJ)	-0.976*	0.000
$\ln^{dette_t}$	2.907*	0.000
$\ln^{fbcf_t}$	0.503*	0.002
$\ln^{detteq_t}$	-0.450*	0.000
$\ln^{pop_t}$	16.195**	0.026
Short run dynamics		
$\ln^{pibh_t}$	0.243	0.105
$\ln^{dette_t}$	0.121	0.907
$\ln^{fbcf_t}$	0.482*	0.002
$lnpop_t$	-39.618	0.183
C		

R-square→ 0.881   Adjusted R-square→ 0.780
Autocorrelation test (Breusch-Godfrey)
F-stat= 16.02   P-Value F= 0.034
Heteroskedascticity test (White)
F-stat= 25.80   P-Value F= 0.081

Normality test (Jarque Bera)→ 0.442
Ramsey test
F-stat= 2.85   P-Value F= 0.061

Asterisks, *, **, *** indicate significance at 1, 5 and 10%, respectively.
Source: Author, based on data from the Revised Macroeconomic Framework of Guinea and WDI (2018).

associated with the squared variable is negative. This indicates that in the long run there is an optimal level of debt beyond which it will have a negative effect on growth. The error correction term is negative and significant, confirming the co-integration relationship between the variables. Furthermore, in the long term dynamics, we observe that all the variables are significant at 5%. With the above results (long-term dynamics) and using equation 10, it is possible to estimate the optimal level of indebtedness beyond which an increase in the external debt-to-GDP ratio will have a negative effect on the country's economy. Indeed, replacing the estimated parameters in equation 10 enables us to obtain the estimated optimal level of external debt-to-GDP ratio. It stood at 25.7%. Thus, beyond this point, an increase of the external debt-to-GDP ratio resulting from an increase in external debt will have a negative impact on the country's economic performance. It was also found that in the case of Guinea, the external debt-to-GDP ratio has no effect on the country's economic performance.

Conclusion

The objective of this study was to determine the threshold of Guinea's external public debt-to-GDP ratio and compare it to the current evolution of public debt. Specifically, the study sought to determine the impact of the external public debt-to-GDP ratio on the country's economic performance; and to determine the threshold level of the external public debt-to-GDP ratio beyond which economic performance would be affected. We used an *ARDL* approach. We found that the variables considered in this study are co-integrated. That is, they move together in the long run. The *ARDL(1,5)* model estimated enabled us to have the following results: In the long run, external debt-to-GDP ratio has a positive impact on the country's economic performance; there is a threshold level of external debt-to-GDP ratio beyond which its impact on economic performance is negative. That threshold level stood at 25.27%. Considering the current level of the external debt-to-GDP ratio, which

stood at 21.7%, it is clear that the country still has room to more borrowing, however we should call for caution as this level is not too far from the threshold.

This result is in line with previous studies (Omotosho et al. (2016), Adeniyi et al. (2018), N'Zué (2018), Mary et al. (2019)) that found a threshold level for external debt: in the long run, a 1% increase in the stock of external public debt-to-GDP ratio could lead to a 2.9% increase in per capita GDP; a 1% increase in investment as a percentage of GDP will lead to a 0.5% increase in per capita GDP; and a 1% increase in the working age population as a percentage of total population will lead to a 16.1% increase of per capita GDP. The results are also in line with Ehikioya et al. (2020) who found long run equilibrium between external debt and economic growth. In the short run, we obtained the following results: external debt-to-GDP ratio is positively related to economic growth but it is not significant. Investment as a percentage of GDP has a positive and significant impact on GDP per capita thus a 1% increase in the investment variable leads to a 0.48% increase in GDP per capita and the working age population has a negative impact on GDP per capita.

Recommendations

Given that investment has a positive impact on economic growth, it is necessary for the country's authorities to encourage the development of public investment policies that promote the private sector. Additional research is needed to undertake a thorough assessment of the utilization of the resources borrowed. Also, they should develop the skills of the working age population to boost further its impact on the country's economic performance.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interest.

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