Selected macroeconomic determinants and economic growth in Cameroon (1970–2018) "dead or alive" an ARDL approach

Kesuh Jude Thaddeus and Chi Aloysius Ngong
Banking and Finance, Faculty of Business Administration, University of Nigeria, Enugu, Nigeria

Njimukala Moses Nebong
Faculty of Economics and Management Sciences, University of Bamenda, Bambili, Cameroon

Akume Daniel Akume
Higher Technical Teacher Training College BUEA, University of Buea, Buea, Cameroon

Jumbo Urie Eleazar
Faculty of Economics and Management Sciences, University of Bamenda, Bambili, Cameroon, and

Josaphat Uchechukwu Joe Onwumere
Banking and Finance, Faculty of Business Administration, University of Nigeria, Enugu, Nigeria

Abstract

Purpose – The purpose of this paper is to examine key macroeconomic determinants on Cameroon's economic growth from 1970 to 2018.

Design/methodology/approach – Data were obtained from the World Development Indicators and applied on time series data econometric techniques. The auto-regressive distributed lag (ARDL) bounds model analyzed the data since the variables had different order of integration.

Findings – The results showed long and short runs' positive and significant connection between economic growth in Cameroon and government expenditure; trade openness, gross capital formation and exchange rate. Human capital development, foreign aid, money supply, inflation and foreign direct investment negatively and significantly affected economic growth in the short and long-runs. Hence, the macroeconomic indicators are not death.

Research limitations/implications – The present research paper has tried to capture the impact of nine macroeconomic determinants on economic growth such as the government expenditure (LNGOVEXP), human capital development (LNHCD), foreign aids (AID), trade openness (LNTOP), foreign direct investment (LNFDI), gross capital formation (INVEST), broad money (LNM2), official exchange rate (LNEXHRATE) and Inflation (LNINFLA). However, these variables have the tendency to affect each other in a unidirectional or bidirectional manner. Further, the present research paper is unable to capture the impact of other macroeconomic variable due to the unavailability of data.

Practical implications – The study recommends that Cameroon should use proper planning and strategic policy interventions to achieve higher sustainable economic growth with human capital development, foreign aid, money supply, foreign direct investment and moderate inflation.
Social implications – Macroeconomic indicators, if managed well, increase economic growth.
Originality/value – This paper to the best of the researcher's knowledge presents new background information to both policymakers and researchers on the main macroeconomic determinants using econometric analysis.

1. Introduction

Economic development and growth have always been central to human society. The topic continues to dominate public debate at the heart of human concern in today's globalized world. Countries with extraordinary growth and development are celebrated as wonders and nicknamed "growth miracles." A major policy challenge confronting Cameroon and African countries is reducing poverty by generating and maintaining higher economic growth rates while maintaining environmental protection (Acemoglu, 2009; Barro *et al.*, 2004; Heshmati *et al.*, 2015; Kim and Heshmati, 2014). Population growth, rapid urbanization, limited urban infrastructure, insufficient facilities, global economic crisis, corruption and inefficiency, and climate change are the problems faced by the African continent (Belshaw and Livingstone, 2002; Binns *et al.*, 2012; Chitonge, 2014; Johnson, 2016; Robson and Lury, 2011).

Therefore, the researcher wants to know if Cameroon's economic growth determinants are reckonable. Macro-economists have been debating this subject for a long time. Any economic strength is perked to empirical test macroeconomic determinants. Cameroon has gone through a diverse number of macroeconomic changes since independence, Country Assistance Evaluation (CAE) (2001). Cameroon has gone through three critical evolutionary periods. The first from 1960 to 1986 marked by real economic growth and the second from 1986 to 1994 marked by economic crisis. Since 1986, Cameroon's macroeconomic indicators have been declining primarily due to the fall in world commodity prices and internal problems. Cameroon's economy major flaws were revealed as budget deficit grew amid several measures taken to curb government spending in order to raise revenue and lower deficits. Cameroon started recovery from the crises in 1995 till date although the recovery does not reflect the Cameroon's economic resources and potential in this globalization era. This study identifies the most effective macroeconomic variables to boost Cameroon's economic growth and development. A quarter century after independence, Cameroon's economy is rated as a lower-income country. Cameroon was one of Africa's wealthiest nations in natural resources until 1980s, when exports commodity prices for petroleum, cocoa, coffee and cotton declined. This resulted in overvaluation of the currency and economic mismanagement that led to an economic downturn. Between 1986 and 1994, the country's gross domestic product fell by 60%. Its current account deficits, fiscal deficits and foreign debt all increased at a rapid pace. Despite difficult economic situation, Cameroon retains oil reserves and favorable agricultural conditions, making it one of the best in sub-Saharan Africa (SSA).

Disagreement between economists exists about which policies are best for long-term economic development and growth. De Long and Summers (1992) argued that macroeconomic policies are needed for long-term economic growth, while Anderson and Jodon (1968) suggested that monetary policy greatly and rapidly impacts economic growth. Monetary policy measures should be prioritized over fiscal policy. To Uniamikogbo and Enoma (2001), monetary policy indicators are more powerful than fiscal policy interventions in bringing about economic change. Many academics like Barro (1990) argued that human capital development, specifically educational investment and training, contributes to long-run growth.

Molua (2010) claimed that most SSA economies including Cameroon have inefficient domestic output and trading structures. These inefficiencies result from ineffective government policies that stifle competition and limit economies of scales. To Tambi (1984), Cameroon practiced developmental interventionist approach where exchange rate and interest rate were regulated between 1960 and 1961. The government quantitatively restricted trade and controlled private sector and every economic activity wholly. To combat market uncertainty and price instability, the marketing board was created where farmers register to guarantee their crops and participate in the cash economy by paying the same price for the same product to everybody, regardless of position.

To Molua (2010), macroeconomic imbalances in 1980s negatively affected demand, exchange rate, foreign funding and aggregate production. The country started structural adjustments in 1990s to boost economic growth through macroeconomic stability and budget deficits decrease. Cameroon GDP was growing averagely at 4% due to improvement on public finances. Despite the hope of emerging from a long economic hardship, Cameroon still has a negative trade balance with trading partners like Spain, Italy, France, the United Kingdom, the United States and the Netherlands. Agriculture, with a 25% share of GDP is still the economy's backbone. Walters (1966) examined the effect of money supply shifts on UK's gross national product value for 80-year time series data. The findings showed that with money supply as the primary monetary policy weapon, a 1% increase in autonomous money supply results to a less than 1% GDP increase, everything being equal. Aku (2002) tested the Keynesian hypothesis in Nigeria from 1970 to 2000. The findings revealed that money supply has no bearing on the Nigerian situation. The findings revealed that rather than dropping interest rates, increases in money supply increases the overall price levels. Economic researcher like Baye *et al.* (2002), Tambi *et al.* (2012), Fambon *et al.* (2004) and Njinkeu *et al.* (1997) analyzed Cameroon's microeconomics indicators using poverty, inequality and living standards.

Despite macroeconomic policy interventions in Cameroon, the economy has not performed well relative to growth since 1994 growing at a slow rate. Information in Figure 1 reveals that the Cameroon's annual GDP growth in 1986 was 6% and decrease to −2.14%, −7.82%, −1.82%, −6.10%, −3.80%, −3.1% and −7.93% in 1987, 1988, 1989, 1990, 1991, 1992 and 1993, respectively. Then GDP increased from 2.12% in 1994 to 4.29% in 1999. It decreased to 4.23% in 2002 then increased to 6.7% in 2006 and decreased to 2.19% in 2009 before rising to 5.65% in 2015. The volatility makes it difficult to ask what macroeconomic factors and policy implications are driving Cameroon's economic growth in the 21st century.

Most studies in Cameroon focus on poverty and growth channels. Limited studies reviewed the macroeconomic indicators affecting Cameroon despite the crucial nature of the information for public policy on poverty eradication. This paper targets the following goals: (1) Examine the main drivers of real economic growth; (2) Establish short and long-term causality between macroeconomic variables and GDP growth; (3) Examine the most important determinants of economic recovery in the globalization era and recommend effective macroeconomic metrics for improving Cameroon's economic development. Since every nation's goal is to improve the living standard of the population through economic growth and development, time series data provides a good analytical context for identifying the main macroeconomic drivers of economic growth. Many governments are still unaware of the core macroeconomic growth metrics and policies that apply to the economies.

2. Literature review
2.1 Theoretical review
Studying factors that influence economic growth is the central tenets among theoretical and empirical growth researchers with little consensus. Economic growth theory has largely been discussed in academic circles between two major theorists: neoclassical and endogenous
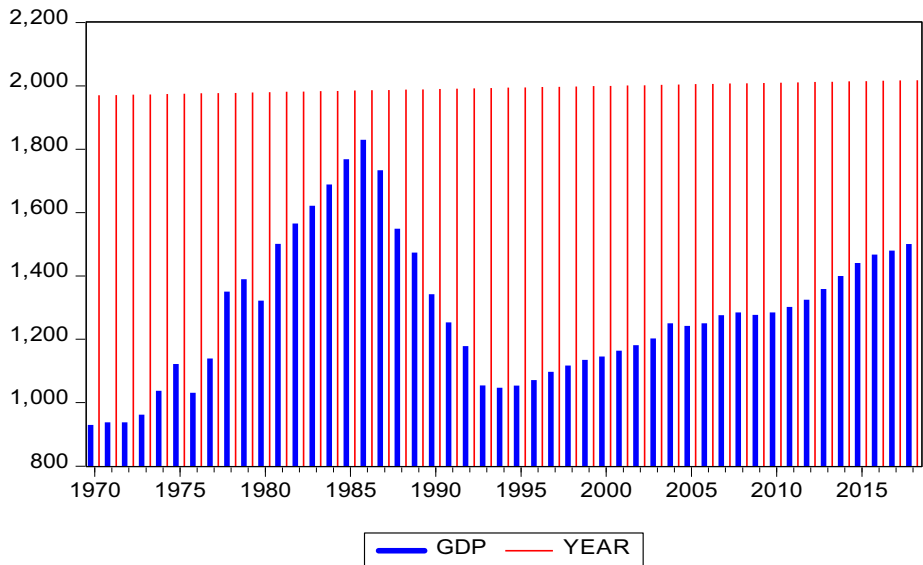
Figure 1.
GDP from 1970–2018

Source(s): World Bank, 2020

growth theories. Emphasis is on the significance of factors like physical capital accumulation and human capital growth (Solow, 1956; Lucas, 1988). Other economic growth contributors like Easterly *et al.* (1989) and the World Bank (1990) significantly contributed to growth literature.

Solow-Swan (1956) developed the neoclassical growth theory which is equally called the endogenous growth model. The theory states that physical capital accumulation is a key short-run economic growth driver while technology is the primary determinant of long-run economic growth. The neoclassical theory was expanded to include human capital stock as main driving factors of economic development (Mankiw *et al.*, 1992; Islam, 1995). The endogenous growth theorists contributed mainly with the inclusion of efficiency like learning-by-doing and useful technical skills as critical growth drivers (Lucas, 1988; Grossman and Helpman, 1991; Aghion and Howitt, 1992).

In every country, accumulation of physical capital, human capital stock and productivity factors are important macroeconomic determinants of economic growth (Solow, 1956; Frankel, 1962; Lucas, 1988; Mankiw *et al.*, 1992; Aghion and Howitt, 1991; Grossman and Helpman, 1992). Easterly and Wetzel (1989), World Bank (1990) and Fischer (1992) believed that savings and investment are essential economic growth factors. These factors became popular in 1990s and focus on three main outcomes: macroeconomic stability, efficacy of an economy's institutional system like political and governance, incentive systems, social infrastructure, adequate price mechanism development and regulatory environment to clear markets.

For Fischer (1992), macroeconomic stability is important for economic growth due to the uncertainty in predicting the future economic variables' value. Uncertainty caused by policies is one source of uncertainty because it reduces the market mechanism's ability to react to demand and supply. If inflation, government spending, real exchange rates, real interest rates and population growth rise, this impacts negatively on potential economic growth rates. The second type of uncertainty is temporal uncertainty, which arises when investors hold on to

their assets until the macroeconomic environment stabilizes. This kind of unpredictability might result in capital flight if not controlled (Pindyck and Somalino, 1993; World Bank, 1990).

Barro and Sala-i-Martin (1992), Mundell (1963), Fischer (1983), Bruno and Easterly (1998), Burnside and Dollar (2000), McKinnon (1973), Shaw (1973), Knight *et al.* (1993) and Solow (1956), Boserup (1996) modeled government expenditure, inflation, real exchange rate stability, foreign aid, financial development, international trade and population with little consensus on their effect on economic growth.

Many growth economists choose many macroeconomic determinants as possible provided there are enough time series data and degrees of freedom to manage the study (Sala-i-Martin *et al.*, 2004; Ciccone *et al.*, 2010). Many studies support choosing a large number of determinants, arguing that the robustness of determinants is ensured by including more economic growth determinants (Doppelhofer *et al.*, 2004; Bayraktar and Wang, 2006). Contrarily, the approach shows that the variables behave differently when pooled together which may confuse policymakers on country-specific economic policies.

Macroeconomic theory identified various factors that influence a country's growth from the classical, neoclassical and new growth theories. Antwi *et al.* (2013) asserted that these factors include natural resources, investment, human capital, innovation, technology, economic policies, governmental factors, foreign aid, trade openness, institutional framework, foreign direct investment, political factors, socio-cultural factors, geography, demography and many others. This study considers most of these factors to examine the evidence of the macroeconomic factors on Cameroon's economic growth.

2.2 Empirical reviews of key macroeconomic determinants and economic growth
Fischer (1992) compares macroeconomic stability and economic development in SSA and LAC countries from 1970 to 1985. Human capital, investment and budget surplus were found to be positively and substantially associated with economic growth using a cross-section regression, while initial real GDP, inflation and dummy variables for SSA and LAC were found to be negatively associated with economic growth. This implied that any country's economic growth is supported by a sustainable degree of macroeconomic stability.

Chen and Feng (2000) used panel data to investigate the impact of trade openness, state-owned enterprises, inflation, investment and enrollment in higher education on China's economic development. The findings show that trade openness and university enrollment positively and significantly associated with GDP, whereas inflation and state-owned enterprises negatively and significantly associated with economic growth. Private businesses, foreign trade and education were the key determinants of long-term economic growth.

Knight *et al.* (1993) used panel regression method to examine macroeconomic variables like human capital, investment, public investment and trade openness on a sample of 81 countries on economic growth. The findings showed a significantly positive relationship between physical capital, human capital development and economic growth while trade openness and population growth negatively and significantly associated with economic growth. Physical capital, human capital development, public investment, trade openness and population growth were key determinants of economic growth. Chang and Mendy (2012) used panel data with fixed effects to examine the relationship between trade openness and economic growth in 36 African countries from 1980 to 2009. The results indicated that foreign assistance, exports, imports, labor employed and trade openness were positively associated with economic growth, while foreign direct investment, domestic investment and gross national savings were negatively associated with economic growth. Foreign aid yielded mixed results by region, foreign assistance had a positive and significant effect on economic

growth in the Middle and North African regions, with a negative and significant impact on economic growth in the West and East African regions.

Ismaila and Imoughele (2015) investigate the macroeconomic determinants of economic growth in Nigeria using a co-integration approach. The study reveals that Nigeria's economic growth is positively influenced by gross fixed capital formation, total government expenditure and foreign direct investment. Inflation negatively related to economic growth. Hence, macroeconomic stability is enhanced through sound monetary and fiscal policies. Phiri (2013) investigates the relationship between economic growth, foreign direct investment and inflation in Zambia using a threshold auto-regressive (TAR) technique. Inflation is associated with improved economic growth if inflation stays below 22.5%; if inflation rises above this level, inflation negatively impacts on economic growth, whereas foreign direct investment has a positive impact on growth.

Anyanwu (2014) examines the main microeconomic factors affecting economic growth in Africa (1996–2010) and China (1984–2010) using cross-country panel data. Domestic investment, foreign aid, human capital development, metal price index, government effectiveness and urban population positively and significantly impacted economic growth in Africa, while domestic investment and trade openness positively impacted economic growth in China. Credit to the private sector, agricultural rate and urban population negatively impacted economic growth in China. Checherita-Westphal and Rother (2012) explore the relationship between government debt and economic growth in 12 European countries between 1970 and 2008. The findings revealed that government balance, private investment and trade openness had a positive impact on economic growth, while population growth and real interest rates had no effect. Government debt strongly and substantially impacted economic growth. Barro (2003) examined the factors that influenced economic growth in a panel of 87 countries from 1965 to 1995. Human capital production, investment, rule of law, democracy and trade openness positively associated with economic growth, while GDP, life expectancy, fertility rate, government consumption, inflation rate and landlocked negatively associated with economic growth.

Antwi et al. (2013) examined the relationship between macroeconomic determinants and economic growth in Ghana from 1980 to 2010, using co-integration and error correction models. The results revealed that physical infrastructure, foreign direct investment, foreign assistance, inflation and government spending on economic growth have a long-run relationship. Short-term shifts in labor force affect economic development. The ECM coefficient indicates a slow equilibrium change rate. Ullah and Fand Rauf (2013) found a connection between key macroeconomic indicators and economic growth in Asian countries using panel data from 1990 to 2010. The findings show that foreign direct investment and savings rate positively affect economic growth, while exports negatively impact. Economic growth was unaffected by the labor force and tax levels.

Zafar and Zahid (2013) examined key macroeconomic variables effect on economic growth using multiple regression from 1959–1960 to 1996–1997. Primary education is a critical precursor for rapid growth. Increasing the physical capital stock and economy's openness contribute to growth. The findings showed that budget deficit and external debt negatively related to economic growth. This implies that relying on domestic resources is the best option to finance growth and highlight the importance of long-run growth-oriented policies to achieve sustainable growth. Ndambiri et al. (2012) used the generalized system of moments (GMM) method to investigate the determinants of economic growth in 19 SSA countries from 1982 to 2000. Physical capital development, the export market and human capital formation substantially affect economic growth. Government spending, nominal discount rate and foreign aid negatively affect economic growth. Biswas and Saha (2014) investigate the determinants of economic growth in India using time series analysis from 1980 to 2011. The findings revealed that gross domestic capital formation has a positive impact on GDP in

the short run. Exports, money supply and foreign direct investment boost growth while inflation and fiscal deficits negatively impact. India experienced stable economic growth during the study period as a result of careful and purposeful management of macroeconomic growth determinants.

3. Data and methodology
This study used time series data from World Development Indicators database for Cameroon. This paper examines the key macroeconomic indicators on Cameroon's economic growth and establishes the short- and long-run causal effect. The auto-regressive distributed lag (ARDL) is used to examine the key macroeconomic indicators affecting economic growth in Cameroon. In comparison to traditional co-integration approaches of full maximum likelihood (Johansen and Juselius, 1990) and the residual-based method (Engle and Granger, 1987), the ARDL bounds test approach has some key distinctive features; (1) the ARDL approach used ordinary least square (OLS) for estimating co-integration relationship which is done by selecting respective lag order from the model considered, (2) this technique is found to be statistically significant for all types of variables with I(1), I(0) or jointly integrated (3) the ARDL model tracks the long-run relationship with dependent variables (Shrestha and Chowdhury, 2007). The error correction model (ECM) without dropping the long-run evidence assimilates the short run with long run (Collier and Goderis, 2012). The variables for macroeconomic indicators and economic growth were chosen based on data availability for the period 1970–2018 using annual data.

4. Model specification
The classical, neoclassical and modern growth theories established the factors that influence economic growth like natural resources, institutional structure, foreign direct investment, investment, human capital, innovation, technology, economic policies, governmental factors, foreign aid, trade openness, political factors, socio-cultural factors, geography, demography to be some of the important macroeconomic determinants (Antwi *et al.*, 2013). The model specification for economic growth and macroeconomic indicators is given as follows:

GDP = MEI(GOVEXP, HCD, AIDS, TOP, FDI, INVEST, M2, EXCHRATE, INFLA).

Hence, the econometric model is specified as:

$$LNGDP = \beta_0 + \beta_1 LNGOVEXP_{it} + \beta_2 LNHCD_{it} + \beta_3 LNAIDS_{it} + \beta_4 LNTOP_{it} + \beta_5 LNFDI_{it}$$
$$+ \beta_6 LNINVEST_{it} + \beta_7 LNM2_{it} + \beta_8 LNEXCHRATE_{it} + \beta_9 LNINFLA_{it} + \varepsilon t_{it}.$$

(1)

where,
   Dependent Variables

   $GDP_{it} = GDP_{it}$ per capita (current us\$) . . . for Eqn (1).

Explanatory Variables

   $GOVEXP_{it}$ = General government expenditure (% of GDP) of country i at time t.

   HCD_{it} = Human capital development measured by school enrollment in secondary school (% of gross) of country i at time t.

   $AIDS_{it}$ = Net official development assistance and official aid received (constant 2015 US\$) of country i at time t.

TOP_{it} = Trade Openness (ratio of import plus exports to % of GDP) of country i at time t.

FDI_{it} = Foreign direct investment (% of GDP) of country i at time t.

$INVEST_{it}$ = Gross capital formation (% of GDP) of country i at time t.

$M2_{it}$ = Broad money (% of GDP) of country i at time t.

$EXCHRATE_{it}$ = Exchange rate (period average) of country i at time t.

$INFLA_{it}$ = Inflation, consumer prices (annual %) of country i at time t.

5. Discussion of results

5.1 Descriptive statistics of selected variables

Table 1 shows that gross domestic product per capita has an average value of 1296.711 with a standard deviation of 224.2547 and having a maximum value of 1829.195 and a minimum value of 938.0023. The gross domestic product per capita shows that the GDP fluctuated over the years of study. Government expenditure has an average value of 11.07488% and a standard error of 1.124151% ranging from 13.27465 maximum to 8.837744 minimum values. Human capital development has an average value of 27.20552% and a standard error of 13.42664% ranging from 60.05816 maximum to 8.170410 minimum values. Official development assistance and official aid received has an average value of 6.33E+08 and a standard error of 3.22E+08 ranging from 1.82E+09 maximum and 2.50E+08 minimum values. Trade openness has a mean of 49.19386 and a standard error of 8.012908 with a maximum value of 65.02459 and a minimum value of 31.99461. Foreign direct investment has an average value of 2.457352 and a standard error of 3.935537 ranging from 19.03948 maximum to 0.001202 minimum values. Gross capital formation has an average value of 22.05241 and a standard error of 3.551837 ranging from 31.24881 maximum to 14.30539 minimum values. Broad money has an average value of 18.16671 and a standard error of 3.394053 ranging from 23.66621 maximum and 11.66045 minimum values. Official exchange rate has an average value of 418.0199 and a standard error of 155.3980 ranging from 732.3977 maximum to 211.2796 minimum values. Inflation has an average value of 87.53682 and a standard error of 195.3013 ranging from 1231.621 maximum and 0.000258 minimum values.

Furthermore the descriptive statistics revealed that, GDP, HCD, AIDS, FDI, INVEST, EXCHRATE and INFLA were positively skewed meaning that, their mean are peaked to the right of the distribution while GOVEXP, TOP and M2 were negatively skewed meaning that their mean were peaked to the left.

The kurtosis coefficients of GDP, GOVEXP, TOP, M2 and EXCHRATE were below 3.000, showing that they are platokurtic which means they have less extreme outliers than the normal distribution. The kurtosis coefficient of HCD, AIDS, FDI, INVEST and INFLA are above 3.000, meaning that they are leptokurtic relative to the normal, meaning that their distribution produces more extreme outliers than the mesokurtic distribution.

The Jarque-Bera probability statistics for GDP, GOVEXP, TOP, INVEST; M2 and EXCHRATE are normally distributed because their probability values is above 5% while HCD, AID, FDI and INFLA are not normally distributed since the probability value is less than 5%. The descriptive statistics above was done with the raw data.

Human capital development, foreign aids, trade openness, foreign direct investment, gross capital formation, broad money, official exchange rate and inflation are positively correlated to economic growth while government expenditure presents negatively correlate to GDP. According to Gujarati (2004) when the coefficients between the variables exist within certain thresholds, it signals weak, moderate and strong correlation in positive or negative directions.

	GDP	GOVEXP	HCD	AIDS	TOP	FD1	INVEST	M2	EXCHRATE	INFLA
Mean	1296.711	11.07488	27.20552	6.33E+08	49.19386	2.457352	22.05241	18.16671	418.0199	87.53682
Median	1276.060	11.10516	25.81295	5.61E+08	49.86921	0.887926	22.35885	18.46468	446.0000	19.53439
Maximum	1829.195	13.27465	60.05816	1.82E+09	65.02459	19.03948	31.24881	23.66621	732.3977	1231.621
Minimum	938.0023	8.837744	8.170410	2.50E+08	31.99461	0.001202	14.30539	11.66045	211.2796	0.000258
Std. Dev	224.2547	1.124151	13.42664	3.22E+08	8.012908	3.935537	3.551837	3.394053	155.3980	195.3013
Skewness	0.558041	−0.312829	1.042532	2.18793	−0.071192	2.676501	0.216281	−0.188685	0.230798	4.866898
Kurtosis	2.730180	2.372129	3.496376	8.712993	2.531605	10.56360	3.019569	1.966009	1.842380	28.78676
Jarque-Bera	2.362207	1.407659	8.230708	92.62313	0.429404	153.8372	0.335925	2.170684	2.782736	1361.136
Probability	0.306940	0.494687	0.016320	0.000000	0.806782	0.000000	0.845386	0.337786	0.248735	0.000000
Sum	55758.56	476.2199	1169.837	2.72E+10	2115.336	105.6661	948.2537	781.1686	17974.86	3764.083
Sum sq. Dev	21121187.0	53.07601	7571.532	4.37E+18	2696.681	650.5151	529.8530	483.8231	1014238	1601990
Observations	43	43	43	43	43	43	43	43	43	43
Correlation										
LNGDP	1.000000									
LNGOVEXP	−0.330257	1.000000								
LNHCD	0.375117	0.362617	1.000000							
LNAIDS	0.024875	0.108913	0.544243	1.000000						
LNTOP	0.173557	−0.478312	0.039109	−0.036894	1.000000					
LNFD1	0.467747	−0.220173	0.301802	−0.012284	0.299919	1.000000				
LNINVEST	0.545394	−0.538053	0.180158	−0.045875	0.507913	0.355373	1.000000			
LNM2	0.624502	−0.294202	−0.012430	−0.203315	0.218612	0.316742	0.293237	1.000000		
LNEXCHRATE	0.031239	0.193039	0.689324	0.480372	0.179413	0.117273	0.120696	−0.531709	1.000000	
LNINFLA	0.032202	−0.511815	−0.419337	−0.482775	0.363587	0.003283	0.452762	0.097727	−0.194980	1.000000

Source(s): Eview 10 computation 2020

Table 1.
Descriptive statistics

If the coefficients lie below 0.5(−0.5), it is weak correlation like human capital development, foreign aids trade openness, foreign direct investment, official exchange rate and inflation, when it is between 0.5 (−0.5) and 0.8 (−0.8), it is moderate correlation like gross capital formation, broad money and if it is above 0.8 (−0.8), indicates strong multicollinearity. From the correlation section, the presence of multicollinearity can be inferred. Since the correlation coefficients presented only scenario of weak and moderate across all the variables.

5.2 Stationarity test and bound test results

Table 2 shows the stationarity properties of variables using the Augmented Dickey–Fuller (1979) and Phillips–Perron (1988). Some variables were stationary at level I(0), while others difference I(1). Gujarati (2003) proposed the ARDL approach to co-integration to determine how dependent variables react to changes in independent variables in the long and short runs. This approach by Pesaran and Shin (1999) has many advantages over the Johansen co-integration approach. It is used whether the data are strictly I(0), purely I(1) or mixed integrated. The official exchange rate, broad money, trade openness, government expenditure are stationary at first difference while gross domestic product, human capital development, inflation, foreign aid and gross capital formation are stationary at level, thus bounds checks is used to investigate a co-integration relationship (Pesaran *et al.*, 2001).

The bound test shows that at 1% and 5% significance levels, the *F*-statistics is 10.22115, higher than the lower bound of 2.5 at 1% and 2.04 at 5% significance level as well as the upper bound of 3.68 at 1% and 2.08 at 5% significance level. The results reject the null hypothesis of no co-integration. A long-run co-integration exists between macroeconomic indicators and economic growth. The effect of key macroeconomic indicators on Cameroon's economic growth is investigated using a long-run estimation test as shown in Table 3.

5.3 ARDL long-run coefficients

In Table 3 above, the R^2 value is 0.997539 with the modified R^2 value being 0.98 8,045, implying that the independent variables account for 99.7% of variations in Cameroon's economic development. This demonstrates that the model substantially explains the variation in Cameroon's economic growth with a good match. The null hypothesis is rejected because the *F*-statistics (105.0748) indicates the model's overall importance at 1% level because the likelihood value (0.000001) is below 0.05 critical values. The Dublin Watson statistic (2.576619) is within the appropriate bound, indicating no serial autocorrelation.

The lag value of per capita GDP growth is integrated into the model to capture previous years' effects. At the 1% significance level, a 1% rise in the previous year's GDP growth rate results in a 71% increase in the current year's GDP growth rate. Government expenditure, trade openness, exchange rate and gross capital formation showed a long-run positive significant effect on the GDP at a 1% level and 10% but exhibit a negative effect on the first lag and a positive effect on the second lag. This implies the effect of government expenditure, trade openness exchange rate and gross capital formation are positively on Cameroon's economy only after the second lag at a significant level of 1% hence a 1% increase in government expenditure, trade openness, exchange rate and investment lead to an increase of 46%, 43%, 46% and 44% in GDP, respectively. The results are in line with the work of Checherita-Westphal and Rother (2012) and Barro (2003). The positive relationship between government spending and economic growth suggests that government spending will help mobilize idle capital, resulting in increased long-term economic growth. The positive relationship between trade openness and economic growth indicates that Cameroon's government supports more exports than imports, resulting in long-term economic growth. A positive relationship exists between exchange rate and economic development. This implies that Cameroon enjoyed a stable rate of currency exchange with other currencies which

| Variables | Stationarity check at level | | | | Stationarity check at 1st difference | | | |
| | ADF (p-values) | | Phillip–Perron (p-values) | | ADF (p-values) | | Phillip–Perron (p-values) | |
	Intercept	Trend and intercept	Intercept	Trend and intercept	Intercept	Trend and intercept	Intercept	Trend and intercept
LNGDP	0.0213**	0.0903*	0.2958	0.6363	0.0007***	0.0043***	0.0004***	0.0026***
LNGOVEXP	0.1047	0.1968	0.0858*	0.2088	0.0000***	0.0000***	0.0000***	0.0000***
LNHCD	0.0020***	0.1739	0.4067	0.5745	0.0070***	0.5883	0.0000***	0.0000***
LNAIDS	0.0230**	0.0025***	0.0384**	0.0028***	0.0000***	0.0000***	0.0000***	0.0000***
LNTOP	0.0639*	0.2108	0.0639*	0.02108	0.0000***	0.0000***	0.0000***	0.0000***
LNFDI	0.0644*	0.1545	0.0001***	0.0003***	0.0000***	0.0000***	0.0000***	0.0000***
LNINVEST	0.0324**	0.1355	0.0333**	0.1386	0.0000***	0.0000***	0.0000***	0.0000***
LNM2	0.5364	0.8292	0.4272	0.7418	0.0000***	0.0000***	0.0000***	0.0000***
LNEXCHRATE	0.6303	0.4897	0.5877	0.3444	0.0000***	0.0000***	0.0000***	0.0000***
LNINFLA	0.0056***	0.0019***	0.0275**	0.0401**	0.0000***	0.0000***	0.0000***	0.0000***

Bound test result
F-statistic 10.22115**

Critical value	Lower bound 1(0)	Upper bound 1(1)
1% significant level	2.5	3.68
2.5% significant level	2.24	3.35
5% significant level	2.04	2.08
10% significant level	1.8	2.8

Source(s): Author Construction (2020) (***), (**) and (*) denote 1%, 5% and 10% significance level

Table 2.
Stationarity test and bound test results

Dependent variable: LNGDP
Dynamic regressors (2 lags, automatic): LNGOVEXP LNHCD LNAIDS
LNTOP LNFD1 LNINVEST LNM2 LNEXCHRATE LNINFLA
Selected model: ARDL(1, 2, 2, 1, 2, 2, 2, 2, 2, 2)

Variable	Coefficient	Std. Error	t-statistic	Prob*
LNGDP(−1)	0.710297	0.169731	4.184828	0.0041
LNGOVEXP	0.460555	0.214978	2.142340	0.0694
LNGOVEXP(−1)	−0.922897	0.181782	−5.076953	0.0014
LNGOVEXP(−2)	0.772735	0.138817	5.566589	0.0008
LNHCD	−0.609411	0.167837	−3.630970	0.0084
LNHCD(−1)	0.382466	0.084881	4.505884	0.0028
LNHCD(−2)	0.283407	0.156721	1.808360	0.1135
LNAID	−0.075715	0.020575	−3.680047	0.0079
LNAIDS(−1)	0.064842	0.026425	2.453789	0.0439
LNTOP	0.430851	0.103707	4.154510	0.0043
LNTOP(−1)	−0.464493	0.119358	−3.891597	0.0060
LNTOP(−2)	0.133029	0.052513	2.533230	0.0390
LNFD1	−0.011809	0.004650	−2.539374	0.0387
LNFD1(−1)	−0.025796	0.005847	−4.411883	0.0031
LNFD1(−2)	−0.014175	0.005126	−2.765476	0.0279
LNINVEST	0.463569	0.087875	5.275304	0.0012
LNINVEST(−1)	−0.474255	0.084031	−5.643836	0.0008
LNINVEST(−2)	0.275403	0.059448	4.632657	0.0024
LNM2	−0.672165	0.132760	−5.063024	0.0015
LNM2(−1)	0.609784	0.090353	6.748912	0.0003
LNM2(−2)	0.332649	0.166856	1.993628	0.0864
LNEXCHRATE	0.440642	0.105665	4.170159	0.0042
LNEXCHRATE(−1)	−0.686060	0.141908	−4.834537	0.0019
LNEXCHRATE(−2)	0.346896	0.104469	3.320548	0.0128
LNINFLA	−0.014703	0.004680	−3.141429	0.0163
LNINFLA(−1)	0.046808	0.008020	5.836762	0.0006
LNINFLA(−2)	−0.006354	0.005203	−1.221151	0.2616
C	−1.220519	2.236854	−0.545641	0.6023
R^2	0.997539	Adjusted R^2		0.988045
F-statistic	105.0748	Prob(F-statistic)		0.000001
Durbin–Watson stat	2.576619	Akaike info criterion		−5.283161
Schwarz criterion	−4.038882	Hannan-Quinn criterion		−4.853636

Source(s): Author Construction (2020)

Table 3.
Long-run ARDL test

increase economic growth. Investment and economic growth have a positive relationship implying Cameroon's political and economic environment attract capital investments which influences long-term economic growth.

Foreign direct investment negatively and significantly affects economic growth across the current year first lag and second lags in the long run. This implies a 1% increase in FDI decreases economic growth by −1.1% in the current year, −2.57% in the first lag and −1.4% in the second lag. The negative sign indicates that Cameroon still lacks the "absorptive potential," like structured financial sector, trained labor force and infrastructural factors. This result is worrying given the type and attention Cameroon's government employs to attract FDI. The results are consistent with Chang and Mendy (2012) but defy economic growth theory and expectations.

Broad money, human capital development and Foreign aids negatively affect economic growth in the current year, but positively affect growth in the first and second lags. The indicators' long-term impact on economic growth is felt after the first and second year's

indicators' injection at 1% and 5% levels. The findings contradict economic theory but support the findings of Ndambiri *et al.* (2012).

Inflation negatively and significantly impacted economic growth. This implies a 1% inflation rise produces a 1.4% economic growth drop. The results meet theoretical expectation. Inflation creates price uncertainty for goods and services thus lower inflation increases attracts investors confidence towards investing. An inflation year lag positively impacted economic growth implying a normal level to promote Cameroon's economic growth. The results agrees with that of Fischer (1992), Biswas and Saha (2014), Chen and Feng (2000).

5.4 ARDL error correction regression estimated short-run coefficients
Table 4 indicates the short-run relationship using an ARDL model. The ECM results of short run indicate that all the macroeconomics determinants have a significant influence on GDP growth in the short run. The immediate effect of human capital development, foreign aid, money supply, inflation and foreign direct investment on economic growth has remain deflationary in the short run while government consumption expenditure, trade openness, investment and exchange rate affects economic growth positively and significantly in the short run. In the short term, the ARDL results indicate that in order for Cameroon to achieve positive and meaningful economic growth, the contribution of human capital development,

Dependent variable: D(LNGDP)
Selected model: ARDL(1, 2, 2, 1, 2, 2, 2, 2, 2, 2)
Case 2: Restricted constant and no trend

Variable	Coefficient	Std. Error	t-statistic	Prob
D(LNGOVEXP)	0.460555	0.062830	7.330228	0.0002***
D(LNGOVEXP(−1))	−0.772735	0.051263	−15.07388	0.0000***
D(LNHCD)	−0.609411	0.044793	−13.60505	0.0000***
D(LNHCD(−1))	−0.283407	0.037832	−7.491217	0.0001***
D(LNAIDS)	−0.075715	0.007599	−9.963248	0.0000***
D(LNTOP)	0.430851	0.042374	10.16793	0.0000***
D(LNTOP(−1))	−0.133029	0.024411	−5.449512	0.0010***
D(LNFDI)	−0.011809	0.001524	−7.749262	0.0001***
D(LNFDI(−1))	0.014175	0.001499	9.453678	0.0000***
D(LNINVEST)	0.463569	0.031118	14.89710	0.0000***
D(LNINVEST(−1))	−0.275403	0.027371	−10.06195	0.0000***
D(LNM2)	−0.672165	0.048661	−13.81331	0.0000***
D(LNM2(−1))	−0.332649	0.055055	−6.042071	0.0005***
D(LNEXCHRATE)	0.440642	0.033998	12.96062	0.0000***
D(LNEXCHRATE(−1))	−0.346896	0.037402	−9.274717	0.0000***
D(LNINFLA)	−0.014703	0.001686	−8.721322	0.0001***
D(LNINFLA(−1))	0.006354	0.001794	3.542178	0.0094***
ECM(−1)*	−0.289703	0.017532	−16.52425	0.0000***
R^2	0.982626	Adjusted R^2		0.965252
Adjusted R^2	0.965252	S.D. Dependent var		0.059628
Durbin–Watson stat	2.576619			

Diagnostic test

Test statistics	F-statistics	p-value	Interpretation
Heteroskedasticity test: Breusch-Pagan-Godfrey	0.656476	0.7983**	No heteroskedasticity
Jacque-Bera test	0.041672	0.9793**	Normal distribution
Ramsey RESET stability	0.621856	0.5739**	Model correctly specified

Source(s): Author Construction (2020), (***), (**) and (*) denote 1%, 5% and 10% significance level

Table 4.
Short-run ARDL test

foreign assistance, money supply and foreign direct investment must be improved. This can only happen if the government of Cameroon lay down stimulating and robust economic policy that takes in to consideration changes on the domestic and international front in advance.

The adjustment speed to equilibrium (ECM) when there is a shock from last period's equilibrium error is corrected for in the current period is negative at a 1% level of significant hence confirming the long-run stability of the model. The ECM is (-0.289703) implying that the speed of adjustment to long-run equilibrium is approximately 29% annually. Therefore the outcome of the short run suggest that government consumption expenditure, trade openness, investment and exchange rate influences economic growth positively and significantly while human capital development, foreign aid, money supply, inflation and foreign direct investment leads to economic slowdown.

Diagnostic test for serial autocorrelation, heteroskedasticity and normality test of the residual are undertaken for model's robustness. The Breusch-Pagan-Godfrey correlation test, Breusch-Pagan-Godfrey heteroskedasticity test, Jacque-Bera normality test and Ramsey RESET test were used. The results show that the model accepts the null hypothesis of no autocorrelation, homoscedasticity and normal distribution. The relationship between the dependent and independent variables is correctly defined as the p-values are greater than 5% significance level. The CUSUM and CUMSUMQ tests results in Figure 2 reveal that all the parameters exhibit long-run stability at the 5% significance level.

6. Conclusion and policy implications

This study examined key macroeconomic determinants on Cameroon's economic growth in the long and short term from 1970 to 2018. The unit root tests checked the stationary properties of variables. The variables had different integration order hence the bound test and ARDL approach estimated the model. Government expenditure, human capital development, foreign aid, trade openness, foreign direct investment, gross capital formation, money supply, exchange rate and inflation were regressed on economic growth. The results indicate that the determinants have short and long-runs influence on GDP growth.

The findings show significantly positive relationship between economic growth and government expenditure, trade openness, gross capital formation and exchange rate in the long and short runs. A significantly negative relationship exists between economic growth and human capital development, foreign aid and money supply in the short and long run. The main macroeconomic determinants positively or negatively affect Cameroon's long and short-term economic development. The long and short-runs results show that government spending, trade openness, gross capital formation and the exchange rate are the most significant and powerful determinants of Cameroon's economic growth. Proper use of government spending, trade openness, gross capital formation and the exchange rate would promote economic growth. Unlike human capital development, foreign aid, money supply, inflation and foreign direct investment showed a significantly negative effect. The Cameroon government can ignite the indicators for an effective economy with broad base economic policy. The human development expenditure should be transformed to a revenue model.

The government should strengthen the educational system by introducing technical courses in secondary schools and mobilize idle capital into long-term economic development. Government should encourage broad money supply with caution to significantly improve economic growth by decreasing inflation, structural rigidity and corruption. The government should create a favorable investment environment using investment attractive policies and laws. The Cameroonian government's foreign direct investment economic policies have positive spillover effects like technology transfer, skills and know-how, domestic production enhancement, production costs reduction, management performance improvement, mergers and acquisitions competitiveness, domestic investments reorganization and infrastructural
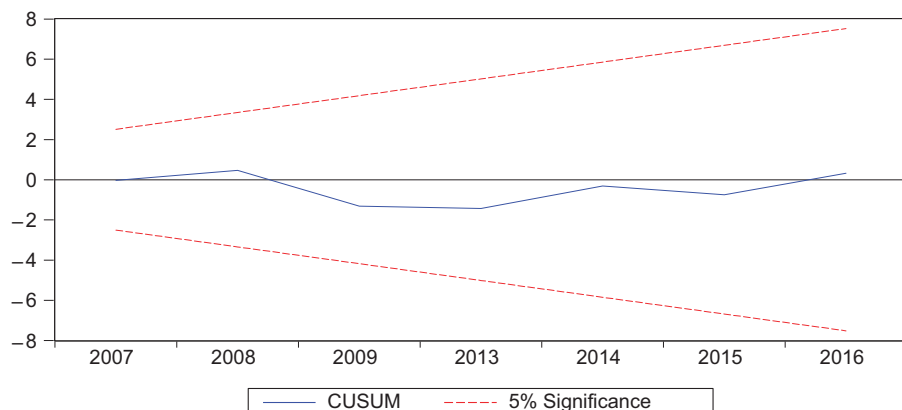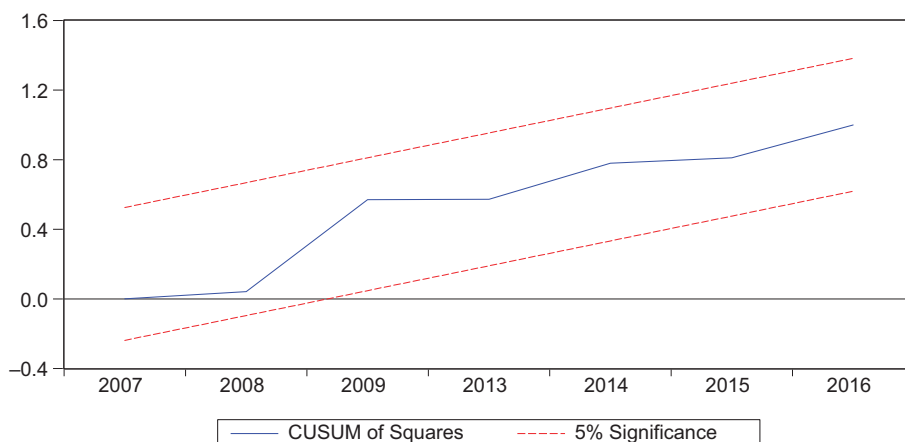
development. Wholly, all of the considered macroeconomic factors have strong positive and
negative impacts on Cameroon's economic development. This indicates that Cameroon
macroeconomic indicators are alive. The variables positively impact Cameroon's economic
growth when the government implements policies that activates and sustain economic growth.

7. Limitations of the study and future research
This paper captures the impact of macroeconomic determinants on economic growth.
However, the variables affect each other unit directionally or bi-directionally. The paper is
unable to capture the impact of other macroeconomic variables due to data unavailability.
The findings suggest researchers should evaluate macroeconomic factors independently in
the future to determine the direction of skewness.

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Corresponding author
Kesuh Jude Thaddeus can be contacted at: kesuhjude1@gmail.com