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Frank Gyimah Sackey*, Richard Kofi Asravor
and Isaac Ankrah

Department of Economics,
Ghana Communication Technology University,
PMB 100, Tesano, Accra, Ghana
Email: fsackey@gctu.edu.gh
Email: rasravor@gctu.edu.gh
Email: iankrah@gctu.edu.gh
*Corresponding author

Abstract: The study examined the impact of trade openness and domestic credit to the private sector (DCP) on the growth of the Ghanaian economy. The study therefore examined the extent to which trade openness and domestic credit to the private sector impact GDP growth with other covariates such as inflation, exchange rate and foreign direct investments both in the short and the long run. Data was gleaned from the World Bank database spanning from 1970 to 2021. The study adopted the bound test approach using the autoregressive distributed lag estimation. Our results showed that trade openness has a positive relationship with economic growth both in the short and the long run while no such significant relationship was observed for domestic credit to the private sector. Again, we observed a positive relationship between inflation and GDP growth at least, in the short run. The study recommends policies that will enhance the increase in both internal and external trade as well as those that will deal with challenges of the private sector's access to credit to achieve the desired growth.

Keywords: trade openness; domestic credit; autoregressive distributed lags; ARDLs; bound test Ghana.

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Biographical notes: Frank Gyimah Sackey is an Associate Professor and the Director for the Institute of Continuing and Distance Education at Ghana Communication Technology University. He holds a PhD in Economics from the Universitat Rovira i Virgili and he is a Marti Franques Fellow of the Universitat Rovira i Virgili in Spain.

Richard Kofi Asravor holds a PhD in Agricultural Economics from the University Ghana. He is a Senior Lecturer and the Head of Economics Department at Ghana Communication Technology University.

Isaac Ankrah holds a PhD in Energy Economics from the Xiamen University in China and a Lecturer at the Economics Department of Ghana Communication Technology University.

1 Introduction

1.1 Background

Several countries in Africa have been concerned about the level of openness of countries to international trade and their ability to accelerate economic growth (Osei et al., 2019). Additionally, domestic credit that enhances credit expansion and resource mobilisation which influence the economic growth of a country has been emphasised (Osei et al., 2019). Thus, this study will seek to examine trade openness and domestic credit to the private sector (DCP) in the Ghanaian setting and their impact on the Ghanaian economy.

DCP involves financial resources that are given by financial institutions to the private sector. This covers trade credits, purchases of non-equity securities, loans, and other accounts receivable that entrench a repayment claim. Trade openness also refers to the extent to which a country's economy sustains its outward orientation during a trade (Ivic, 2015). Trade openness and domestic credit have been found to have positive relationship with economic growth. Economic growth refers to changes in material production which also can influence socio-economic processes in a country. The economic growth of a country is often measured by the gross domestic product (GDP) (Ivic, 2015).

Due to the importance of domestic credit and trade openness, the concepts have been investigated in studies across the world.

However, the specific features of countries examined in several studies as well as proxies utilised have varied findings. For instance, in Jordan, a positive relationship between trade openness and domestic credit and economic growth has been established (Obeid and Awad, 2018). Also, in Nigeria trade openness has had a positive but insignificant impact on economic growth while domestic credit has had a negative impact on economic growth (Danlami et al., 2018). However, in the Ghanaian setting no such relationship between trade openness and economic growth has been established while a positive relationship between DCP and economic growth has been observed (Osei et al., 2019). This study seeks to provide further data on trade openness, DCP and economic growth and their short and long-run relationships using the time frame of 1970 and 2021.

1.2 Problem statement

During the 1970s and 1980s, Ghana's financial market underwent financial repression. Ghana resorted to the liberalisation of the financial sector, especially of interest rates in 1989. This was to enable the banks to set its own interest rates that reflect demand as well as costs of lending so that they will supply more loanable funds to the private sector (Aimola and Odhiambo, 2018). However, the banks still find the private sector still risky compared to the government sector and hence prefer to supply loanable funds to the government thereby crowding out private sector investments (Adams and Agbemade, 2012). Though the liberalisation of the financial sector has had some significant effect on

the economy, nonetheless, an assessment of data from 1971 and 2010 indicates that there has been a positive but insignificant relationship between domestic credit as a share of GDP and economic growth. Excessive liberalisation of the financial sector can undermine the growth of an economy in the long term which requires that the Central Bank must tighten policy (Adusei, 2013). Furthermore, the ability of trade openness to influence economic growth is inconclusive and has been a subject of debate (Lawal et al., 2016). It has been argued on one hand that trade openness enhances economic growth; however, others are of the view that increased trade openness could increase an economy's vulnerability (Mireku et al., 2017).

Additionally, proxies such as the annual growth rate of population, investment, government spending have been used to assess the economic growth of Ghana (Ofori-Abebrese et al., 2017). This study focuses on the ratio of exports to GDP and the ratio of imports to GDP as well as the DCP in assessing their impact on the economic growth of the country.

This study seeks to provide an additional perspective on the impact of domestic credit on the private sector and trade openness on economic growth between 1970 and 2021. This covers a timeline of a dominant public sector in the financial market until the liberalisation of the financial sector and addresses its impact over the years. Ghana has favourable agricultural conditions, possesses certain minerals, enjoys peace and democracy and has easy access to international shipping. These indicate that Ghana possesses suitable conditions for rapid economic growth (Diao et al., 2019). However, the country has not been able to realise its full potential despite the resources available.

1.3 Objectives and significance of the study

Specifically, the study seeks:

- 1 To examine if trade openness is a cause or consequence of economic growth both in the short and in the long run.
- 2 To examine if DCP is a cause or consequence of economic growth both in the short and in the long run.
- 3 To determine the short and long run relationships among trade openness, domestic credit and some macroeconomic variables on the economic growth of Ghana.

The outcome of the study will provide insight into the contribution of trade and DCP to economic growth. Researchers will also be able to use this study for future research and as a reference for academic work.

2 Theoretical Literature

2.1 Theory of comparative advantage

The theory of comparative advantage suggests that the specialisation of a country is a prerequisite for obtaining optimal benefits for trade (Kowalski, 2011). Nonetheless, specialisation in comparative advantage is not dependent on higher absolute productivity but higher relative productivity in the production of a specific commodity (Gupta, 2015).

The theory of comparative advantage indicates that the supply and demand forces dictate the prices of commodities whilst resources set aside for the production of commodities must reach an equilibrium point that enables perfect competition under the conditions of the free market (Prabhakar, 2016). Nevertheless, the theory of comparative advantage has been criticised for assuming that the international market is static and harmonious whilst it can be quite volatile (Schumacher, 2013).

Concerning this study, the theory of comparative advantage addresses the factor of trade openness and its likely relationship with economic growth. Thus, according to the theory, trade openness can allow countries with specialised commodities to obtain long-term benefits when they engage the international market.

2.2 Export-led growth hypothesis

The export-led growth hypothesis is based on a fundamental assertion that export expansion is one of the most important determinants of growth (Medina-Smith, 2000). It asserts that a country's overall growth can be achieved not only by increasing labour and capital within the economy but also by increasing exports. This further demonstrates that there is a strong relationship between an economy's performance and its volume of exports. The hypothesis is based on among other things, that the expansion of export can impose positive externalities on non-export sectors by requiring these sectors to become more efficient in resource management and production techniques.

One of the major advantages of export-led growth is that the exports of goods and services provide a boost to the circular flow of income, causing aggregate demand to rise and production to expand (Palley, 2011). This aids in the increase of per capita income and the reduction of extreme poverty, particularly in developing and rising economies.

Also, an increase in exports leads to growing export sales, and when there is growing export sales, there is the opportunity to generate more money and profits for enterprises and businesses (Zepeda et al., 2009). This can subsequently be used to boost capital investment spending via the accelerator effect. Higher investment boosts a country's production capacity, which in turn boosts its export potential.

Another advantage is that many sectors, such as insurance, logistics, and port facilities, aid in the facilitation of commerce (Palley, 2011). Investments and employment in these associated businesses are projected to increase in countries with fast-growing export sectors. The importance of commerce to countries like the Netherlands (particularly the port of Rotterdam), Singapore, and Hong Kong, which have developed into globally scaled commercial hubs, is an excellent illustration.

In short, it can be argued that the export-led growth that ensures effective exporting of goods and services from one country to another, accounts for a large portion of the expansion of the real GDP, jobs and per capita incomes. Several countries such as Ireland, China, South Korea, Vietnam, Hong Kong, Singapore and other emerging countries like Ethiopia have experienced rapid growth following the increment of exports.

Despite the advantages of export-led growth, other schools of thought have criticised that there are potential risks and drawbacks. For instance, the sole focus on export-led growth means that there may be the issue of over-reliance on the economic cycles of trading partners (countries), as well as vulnerability to external economic and political shocks (Merritt, 2017).

Also, in an export-led growth system, maintaining prolonged or persistent trade surpluses is a common occurrence, and this may provoke a protectionist response from other countries who believe that trade gains have been skewed unfairly in favour of exporting countries. Huge trade imbalances continue to be a major source of concern in the global economy (Hong, 2011).

Another potential risk or drawback of the hypothesis of export-led growth has to do with production capacity. Production capacity set aside for exporting goods and services cannot be used to meet domestic requirements and desires (Makhlouf, 2016). Domestic living standards may suffer as a result unless the country is also willing to import products and services with the income earned from exporting.

Inflationary demand and higher interest rates are also potential risks or drawbacks of the hypothesis of export-led growth (Haddad and Shepherd, 2011). When there is rapid export-led growth, this may result in inflationary demand and higher interest rates, as high relative inflation could make export sectors less competitive in international markets, and local producers less price competitive against imports.

Overall, for many countries, the hypothesis of export-led growth has been critical to their growth. On the one hand, the challenge is to ensure that a country exports a sufficient variety of products, for example, to avoid some of the risks associated with primary product dependency and also to make sure that the benefits of higher exports and growth are distributed widely among the population.

2.3 Trade openness

History has indicated that countries that are more active internationally tend to be more productive than nations that cater for only their domestic market (Semancikova, 2016). More countries have attempted to integrate themselves into international structures and have become more connected in the era of globalisation. One of the ways that countries achieve higher productivity is through trade openness in the international market. Trade openness is defined as the outward orientation of a country that presents an opportunity for trade with other countries (Dotta and Munyo, 2019) The level of a country's trade openness can be determined by the ratio of exports and imports to the GDP of the country (Tahir and Khan, 2014).

In recent times, trade openness has become one of the major policies that are expected to aid developing countries to change the pace, structure and pattern of their participation within the international market which would consequently boost technical progress, overcome balance of payments problems (Sakya et al., 2012). The benefits of trade openness can therefore lead to enhanced economic growth. Trade openness can have a positive long-term impact on the economic growth of a country; however, it would be dependent on its ability to increase investment (Semancikova, 2016).

Moreover, one of the policy methods used to improve trade openness is trade liberalisation. The removal or lowering of constraints or impediments to the free flow of goods between states is referred to as trade liberalisation.

2.4 Domestic credit to the private sector

DCP refers to the financial resources that are made available to the private sector by depository organisations apart from the central bank in the form of loans, trade credits

and purchase of non-equity securities that provide a claim for repayment (World Bank, 2021).

Domestic credit is a reflection of a country's financial development (Bui, 2019) Domestic credit boosts economic activities through the transfer of funds from financial intermediaries towards the private consumption of households and private investments (Khan et al., 2020). Thus, domestic credit can be beneficial to the private sector, financial institutions and the economy as a whole. Additionally, domestic credit is useful for increasing the level of investment, improving resource mobilisation, credit expansion and improving the accumulation of capital in a country (Aljebrin, 2018).

In Ghana, the Bank of Ghana is responsible for credit and money control through the development and implementation of credit and monetary control measures that guide financial institutions (Aimola and Odhiambo, 2018). Thus, the Bank of Ghana must ensure that DCP is in the best interest of the country (Obeng-Amponsah et al., 2019) Moreover, credit must be accessible and not only available to the private sector (Obeng-Amponsah et al., 2019).

To carry out industrial programme by governments in Ghana, efforts are being made to strengthen the private sector through the access of domestic credit from the financial sector (Obeng-Amponsah et al., 2019).

2.5 Overview of the Ghanaian economy

Ghana's economy is a mixture of both public and private enterprises which can be categorised into three main sectors namely agricultural sector, manufacturing sector and service sector (Diao et al., 2019).

The agricultural sector of Ghana produces varieties of agricultural products and has over the years provided formal and informal forms of employment (Raggl, 2013). The agriculture sector in 2013 employed 53.6% of the total workforce in Ghana. Ghana's economy is largely dependent on rain fed agriculture hence climate change in the country can have a consequential impact on crop production. It is worth noting that Ghana is the second largest producer of cocoa in the world, fourth largest producer of cassava, second largest producer of yam and second largest producer of plantain. Other crops produced on large scale include palm oil, maize, orange, pineapple, peanut, tobacco, natural rubber, rice, taro and sweet potato (Ghana Statistical Service et al., 2015).

The manufacturing or industry sector in Ghana accounts for about 25.3% of the total GDP with production rising at 7.8% making it the 38th fastest growing industrial production economy in the world (Davies and Andrew, 2018). In Ghana, the most important manufacturing industries include food and beverage processing, automotive manufacturing, electronic manufacturing, light manufacturing, textiles, chemical and pharmaceuticals aluminium smelting, cement and small commercial ship building.

The service sector is Ghana's largest sector as it is the main channel through which agricultural and industrial sectors operate in the economy (Baah-Boateng, 2015). In 2012, the service sector recorded an increase in growth due to significant improvement in the three sub-sectors which includes Information and communication, financial and insurance activities and transport and storage. The service sector includes hotels and restaurants, information and communication, public administration and defense, education, health and social work as well as trade, repair of vehicles and household goods (Davies and Andrew, 2018).

Consequently, about three-fifths of Ghana's GDP is obtained from the service sector, one-fifth from the agriculture sector and one-fourth from the manufacturing sector (Ghana Statistical Service et al., 2015). This indicates that Ghana's economy thrives on the three main sectors giving Ghana one of the highest GDP per capita among West African countries. In 2011, Ghana became the fastest-growing economy in the world due to its GDP debasement. In 2012, Ghana's domestic economy revolved around services which accounted for 50% of its GDP (Herrera and Aykut, 2014). The service sector in that year employed 28% of the workforce therefore playing a role in the decrease of unemployment rate in the country. Also, in 2013, 53.6% of Ghana's workforce was employed in the agriculture sector whereas the manufacturing sector remains the basic sector as the focus is on minerals and oil (Davies and Andrew, 2018). Ghana is the largest gold producer in Africa after overtaking South Africa in 2019 and is known to be the second-largest cocoa producer after Ivory Coast. Ghana is also rich in manganese ore, oil, diamonds and bauxite which facilitate export activities in the economy. In 2005, Ghana had its debts cancelled but due to government spending, there was an increase in debts which was also coupled with a plunge in oil prices. This led to economic crisis in which in 2015, the government negotiated a \$920 million extended credit facility from the International Monetary Fund (Davies and Andrew, 2018).

Ghana's economy saw growth at an average of 7% from 2017 to 2019 but in recent times, Ghana's rapid economic growth has been halted with the presence of COVID-19 pandemic which had the country experiencing a lockdown in March 2020 (Aduhene and Osei-Assibey, 2021). The lockdown led to a sharp decline in export activities therefore affecting the country's ability to generate revenue through export. Ghana's economic slowdown also had an impact on households leading to an estimated increase from 25% to 25.5% increase in poverty rate from 2019 to 2020 respectively. Also, the overall fiscal deficit of the country doubled to 15.2% in 2020 whereas the public debt increased to 81.1% of GDP. This places the country at a significant risk of debt distress.

Ghana's headline inflation was recorded at 7.8% in June 2021, and this was due to pandemic-induced food price shock eased. This led to the reduction of the policy rate by the Bank of Ghana by 100 basis points to 13.5% as a strategy to support recovery (Aduhene and Osei-Assibey, 2021). Unfortunately, inflation shot up to 9.7% in the same year due to high non-food and food inflation, while increase in demand for domestic credit is yet to impact on the economy's growth due to the rationing of credit even in the era of financial liberalisation (Sackey, 2018).

2.6 Review of empirical studies

2.6.1 The impact of major macroeconomic variables on the economy

Antwi et al. (2013) examined the impact of macroeconomic factors on economic growth in Ghana and observed that physical capital, inflation and the proportion of labour force employed have positive impacts on economic growth, with foreign direct investment (FDI) and government expenditure having a significant and negative impact on growth whilst foreign aid did not have a significant impact.

Kryeziu (2016) observed that budget deficit had a negative impact on economic growth whilst public debt and inflation had a positive impact on economic growth.

Research by Saxena and Bansal (2019) found that exchange rate had a negative effect on GDP while money supply had a positive impact on GDP.

In Pakistan, Hussain et al. (2021) assessed the impact of macroeconomic variables on GDP and indicated that although inflation rate, interest rate and the exchange rate affected GDP positively, interest rate affected GDP negatively.

Studies by Antwi et al. (2013), Kryeziu (2016), Hussain et al. (2021) and Saxena and Bansal (2019) indicated that macroeconomic variables such as physical capital, money supply, interest rate, budget deficit, inflation, public debt and labour force have a positive impact on economic growth whilst FDI and government expenditure have a significant and negative relationship with GDP.

2.6.2 The relationship between trade openness, domestic credit, and the economic growth

Keho (2020) conducted a study on domestic credit, trade openness and economic growth of West African countries. The study utilised annual data for 11 West African countries between the years 1985 and 2018. Data was analysed using the Seemingly Unrelated Regression Estimator (SURE) and the Common Correlated Mean Group method. The results showed that in the short-run, trade openness and domestic credit have a positive relationship with economic growth.

Bui (2020b) examined domestic credit, trade openness and economic growth in ASEAN countries. Data was collected from six ASEAN countries such as Malaysia, Indonesia, Vietnam, Thailand, Philippines and Singapore from the database of the World Bank between 2004 and 2017. Pooled regression (pooled OLS), random effects model (REM) and fixed effects model (FEM) were used for the data analysis. The findings showed that when domestic credit exceeds the optimal threshold it has a negative relationship with economic growth whilst trade openness has a positive relationship with economic growth.

Chimobi (2010) examined the relationship between trade openness, financial development and economic growth in Nigeria. Financial development was assessed using domestic and private credit. The findings revealed that trade openness had a positive impact on economic growth. Also, domestic credit did not have a causal impact on economic growth rather economic growth influenced domestic credit and the supply of money.

Al-Sawai and Al-Azzam (2015) conducted a study to examine the short-term and long-term relationships between trade liberalisation, financial development and economic growth in Jordan. The analysis of the data obtained was done using the autoregressive distributed lag (ARDL) model and bound testing approach to cointegration. The findings showed that there was a negative relationship between trade liberalisation, financial development and economic growth. Thus, the findings implied that trade openness, domestic credit, private credit and money supply did not enhance the economic growth.

Sghaier (2021) investigated the relationships between financial development, trade openness and economic growth in four countries in North Africa. These countries were Egypt, Tunisia, Algeria and Morocco. The study used the generalised method of moment for the panel data analysis over a five-year period. The findings of the study showed that financial development, including domestic credit, as well as trade openness had positive relationships with economic growth in the four countries. Again, the study showed that both financial development and trade openness improved economic growth following technology transfer in the four countries.

Hussain et al. (2021) conducted a study to examine the long-term relationship between trade openness, financial development and economic progress (growth) in Pakistan. In the study, financial development was measured based on deposit money bank assets (DMA) as percentage of GDP, as well as DCP. Also, economic (trade) openness was measured based on export and import contributions to GDP. The study employed the ARDL to analyse data obtained over the period of 1975 and 2018. The findings of the study showed that there was a positive relationship between trade openness, financial development and economic progress (growth).

Elfaki et al. (2021) conducted a study to examine the impact of industrialisation, trade openness, financial development and energy consumption on economic growth in Indonesia. The study used the ARDL model to assess both the long-run and short-run relationships among the variables over the period of 1984 and 2018. The findings of the study showed that financial development had a positive influence on economic growth. However, in the case of trade openness, the findings of the study showed that there was a negative influence on economic growth. These findings demonstrate that domestic credit was good for the economic progress of Indonesia, whereas trade openness did not help the economic progress of Indonesia.

The studies examined the relationship between trade openness, domestic credit, and economic growth (Keho, 2020; Bui, 2020a; Chimobi, 2010; Al-Sawai and Al-Azzam, 2015; Sghaier, 2021; Hussain et al., 2021; Elfaki et al., 2021). The findings suggest that trade openness and domestic credit have a beneficial effect on economic growth. Additionally, the results indicated that when domestic credit exceeds the optimal level, economic growth is negatively correlated with it, whereas trade openness is positively correlated with economic growth. The studies Keho (2020), Bui (2020a) and Chimobi (2010) were conducted in West Africa, Kosovo and India respectively, and provided valuable insight into the variables. Though current studies have been conducted for both developed and developing countries, recent studies have not been conducted for Ghana which has undergone financial clean up in 2017, as well as having taken advantage of financial and trade liberalisations. Thus, this study fills the gap by examining the impact of trade openness and DCP on the economy of Ghanaian.

3 Methodology

3.1 *The theoretical model*

The classical linear regression models are based on the assumption that the means and the variances are constant and independent of time while the effect of explanatory variables on the outcome variable occurs at the same time and independent of time. However, unit root tests have shown that these assumptions are not satisfied by a large number of macroeconomic time series variables. There are often times that there required for the explanatory variables to influence the outcome variable, known as time lags including dynamic models (Jatiningrum, 2008). The dynamic auto regressive which combines the dynamic distributed lag model that gives the dynamic autoregressive modelling is a good example of estimating such models.

Given a dynamic distributed lag model

$$Y_t = \alpha + \beta_0 X_t + \beta_1 X_{t-1} + \beta_2 X_{t-2} + \dots + \varepsilon_t \quad (1)$$

and a dynamic autoregressive model as

$$Y_t = \alpha + \beta_0 X_t + \dots + \beta_k X_{kt} + \delta_1 Y_{t-1} + \dots + \delta_z Y_{t-z} + \varepsilon_t \quad (2)$$

Equations (1) and (2) are combined to form the ARDL model as

$$Y_t = \alpha + \beta_0 X_t + \beta_1 X_{t-1} + \dots + \beta_k X_{t-k} + \delta_1 Y_{t-1} + \dots + \delta_z Y_{t-z} + \varepsilon_t \quad (3)$$

where

$X_t, X_{t-1}, X_{t-2}, X_{kt}, X_{t-k}, Y_{t-1}, Y_{t-z}$	the explanatory variables
Y_t	the outcome variables
$\alpha, \beta_0, \beta_1, \beta_k, \delta_1, \delta_z$	the coefficients
ε_t	the error term.

The ARDL model thus include not only the variable in its present times but also past values since it may take time for an explanatory variable to have an impact on the outcome variable.

3.2 The empirical model

We employ the ARDL cointegration that tests for both short-run and the long run relationship between GDP growth as the outcome variable and DCP and trade openness as the independent variables while, inflation rate, exchange rate, and FDI were used as the covariates.

Our empirical model for estimating the impact of women empowerment on the girl-child education shall be of the form:

$$\begin{aligned} GDPgrowth_t = & \beta_0 + \beta_1 DCP_t + \beta_2 \ln TRADE_t + \beta_3 IFR_t \\ & + \beta_4 EXCHR_t + \beta_5 \ln FDI_t + \varepsilon_t \end{aligned} \quad (4)$$

where $GDPgrowth$ is GDP growth, the outcome variable, the variable DCP represents DCP. The variable $\ln TRADE$ represents the natural log of trade openness variable. The variables IFR and $EXCHR$ denote the annual rates of inflation and exchange rates respectively, while the variable $\ln FDI$ represents the natural log of FDI and ε being the error term. The natural log of FDI ($\ln FDI$) and trade openness ($\ln TRADE$) were used to deal with the problems associated with outliers. The coefficients of the independent or explanatory variable including the covariates are represented by β_1 – β_5 while β_0 signifies the constant term. Model (4) examines the impact of trade openness and DCP on economic growth proximate by GDP growth.

3.3 Steps and results

3.3.1 Unit root tests

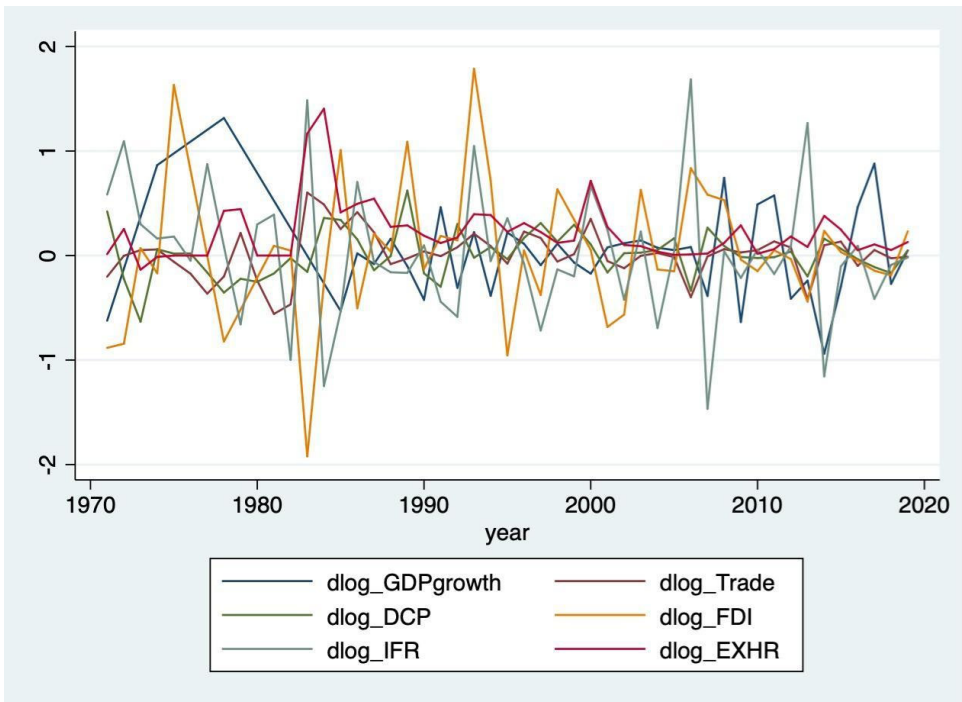
Our Dickey-Fuller test results show that our variables are all stationary at I(1), being at the first difference. Figure 1 presents the graphical picture of the test of stationarity for our variables and shows that the variables after the first difference trend along with zero.

Table 1 Augmented Dickey-Fuller (ADF) test for unit root

Variable	Test statistics	1% critical value	5% critical value	10% critical value
<i>d.GDPgrowth</i>	-4.630	-2.647	-1.950	-1.603
<i>d.lnTrade</i>	-5.304	-2.625	-1.950	-1.609
<i>d.DCP</i>	-5.364	-2.625	-1.950	-1.609
<i>d.lnFDI</i>	-5.001	-2.636	-1.950	-1.606
<i>d.IFR</i>	-7.718	-2.625	-1.950	-1.609
<i>d.EXHR</i>	-2.877	-2.625	-1.950	-1.609

Source: Author’s construct

Figure 1 Stationarity graph for variables used for our analysis (see online version for colours)



3.3.2 Optimal lag selection criterion

Table 2 presents the results for the optimal lag selection criterion using the AIC criterion. The table shows *GDPgrowth* has a lag of (1), *DCP* has a lag of (2), *IFR* has lag of (2), *EXCHR* has (2), *lnTRADE* has lag of (1) and *lnFDI* has a lag of (1) using the *FPE*, *AIC*, *HQIC* and *SBIC* criteria.

Table 2 Optimal lag selection criterion for data variables

<i>Lag</i>	<i>LL</i>	<i>LR</i>	<i>Df</i>	<i>p</i>	<i>FPE</i>	<i>AIC</i>	<i>HQIC</i>	<i>SBIC</i>
<i>GDPgrowth</i>								
0	-139.45				20.37	5.852	5.867	5.891
1	-135.36	8.187*	1	0.004	17.91*	5.724*	5.753*	5.801*
2	-135.36	0.0033	1	0.954	18.67	5.765	5.809	5.882
3	-135.05	0.6193	1	0.431	19.23	5.793	5.853	5.947
4	-134.46	1.185	1	0.276	19.563	5.811	5.885	6.005
<i>DCP</i>								
0	-150.09				31.73	6.295	6.310	6.334
1	-91.54	117.1*	1	0.000	2.88	3.897	3.926	3.975*
2	-89.97	3.138	1	0.077	2.818*	3.873*	3.918*	3.991
3	-89.17	1.597	1	0.207	2.846	3.882	3.941	4.038
4	-89.16	0.0166	1	0.897	2.966	3.923	3.997	4.118
<i>IFR</i>								
0	-227.52				799.52	9.522	9.536	9.561
1	-223.42	8.199	1	0.004	702.67	9.392	9.422	9.471
2	-220.80	5.243*	1	0.022	656.84*	9.325*	9.369*	9.442*
3	-220.70	0.2041	1	0.651	682.03	9.362	9.421	9.518
4	-220.54	0.3305	1	0.565	706.44	9.397	9.471	9.592
<i>EXCHR</i>								
0	-92.23				2.848	3.884	3.899	3.923
1	20.29	225.05*	1	0.000	0.0274	-0.7623	-0.7328*	-0.6843*
2	21.49	2.41	1	0.121	0.0271*	-0.7708*	-0.7266	-0.6538
3	21.57	0.1539	1	0.695	0.0282	-0.7324	-0.6734	-0.5764
4	21.65	0.1456	1	0.703	0.0293	-0.6937	-0.6200	-0.4988
<i>TRADE</i>								
0	-47.89				0.4491	2.037	2.052	2.076
1	-1.548	92.69*	1	0.000	0.0679*	0.1478*	0.1773*	0.2258*
2	-0.8804	1.34	1	0.248	0.0688	0.1616	0.2058	0.2786
3	-0.5760	0.609	1	0.435	0.0708	0.1906	0.2495	0.3466
4	-0.3344	0.483	1	0.487	0.0732	0.2223	0.2959	0.4172
<i>lnFDI</i>								
0	-111.03				6.235	4.668	4.683	4.707
1	-52.31	117.45*	1	0.000	0.5627*	2.262*	2.293*	2.341*
2	-52.18	0.249	1	0.617	0.5836	2.299	2.344	2.416
3	-52.06	0.241	1	0.623	0.6056	2.335	2.395	2.492
4	-51.33	1.45	1	0.228	.6127	2.347	2.421	2.542

Note: *Indicates the lag selected.

3.4 Data

This study made use of annual time series data spanning 1970 to 2021. This data was used for the estimation of both long-term and short-term relationships between changes

between trade openness, domestic credit and economic growth in Ghana. The World Bank's World Development Indicators and data from the Bank of Ghana were used to compile the sample period's data. The ratio of imports and exports to GDP was used to determine trade openness (Huchet-Bourdon et al., 2017). This study utilised the ratio of private sector credit divided by GDP (denoted DCP) as a proxy of domestic credit (Tahir and Khan, 2014). FDI's open up the economy for the transfer of foreign technology. This transfer of technology impacts development and competition in exports. High returns on investment and high prices for some investment goods can lead to further innovation in research and development, especially where there is a well-developed system of patent rights (Botchkarev and Andru, 2011). The rate of growth of real GDP is used to measure economic growth.

4 Presentation and discussion of results

4.1 *Do trade openness and DCP stimulate economic growth? The ARDL short-run*

Table 3 presents the short-run results of the relationships between GDP growth as the outcome variable and DCP, trade openness, inflation rate, exchange rate, and FDI as the explanatory variables. Our results show that increase in previous year's trade increases GDP growth. Our results therefore support the findings of Keho (2020), Bui (2020a), Chimobi (2010), and Sghaier (2021) who found a positive relationship between trade openness and economic growth. Again, we observe a positive relationship between rate of inflation and economic growth which supports the findings of Hussain et al. (2021), Antwi et al. (2013) and Kryeziu (2016).

4.2 *The Pesaran/Shin/Smith (2001) ARDL bounds test*

To effectively determine whether there exist long run relationships among the variables used for our analysis we conduct the Pearson-Shin-Smith autoregressive bounds test. Table 4 reports the results of the bounds test. Our results show an F-test of 4.798, which is greater than the upper boundary of our F-statistic of 3.79 (at the 5% level), while our T-test of -4.916 is also lower than the lower boundary T-statistic of -2.57 . These results indicate that long run relationships exist among variables. We shall therefore go ahead to examine the long run relationships among the variables and how they impact on the outcome variable.

4.3 *Do trade openness and DCP stimulate economic growth? The ARDL long-run*

Table 5 presents the results of the long-run relationships between GDP growth as the outcome variable and DCP, trade openness, inflation rate, exchange rate, and FDI as the explanatory variables. Our results show an adjustment -0.832903 indicating long run convergence among variables which is also an indication that previous errors will be corrected in the current period.

Table 3 Do trade openness and DCP stimulate economic growth in Ghana?: A bound test approach

<i>GDPgrowth</i>	<i>Coef.</i>	<i>Std. err.</i>	<i>t</i>	<i>P> t </i>	<i>[95% conf.</i>	<i>Interval]</i>
<i>GDPgrowth</i>						
L1	0.1671	0.1694	0.99	0.331	-0.1768	0.5110
<i>DCP</i>						
--.	-0.2478	0.4234	-0.59	0.562	-1.107	0.6118
L1	0.2015	0.4137	0.49	0.629	-0.6384	1.042
L2	0.2737	0.3394	0.81	0.425	-0.4153	0.9628
<i>IFR</i>						
--.	0.0057	0.0302	0.19	0.851	-0.0557	0.0672
L1	0.0659	0.0266	2.47	0.018	0.0117	0.1200
L2	-0.0108	0.0279	-0.39	0.699	-0.0676	0.0458
<i>EXHR</i>						
--.	-4.252	4.180	-1.02	0.316	-12.73	4.234
L1	0.5869	6.842	0.09	0.932	-13.30	14.47
L2	4.298	4.678	0.92	0.365	-5.199	13.79
<i>InTrade</i>						
--.	8.072	2.601	3.10	0.004	2.793	13.35
L1	-4.781	2.728	-1.75	0.089	-10.32	0.7593
<i>lnFDI</i>						
--.	0.6543	0.8937	0.73	0.469	-1.160	2.468
L1	-0.5234	0.9787	-0.53	0.596	-2.510	1.463
_cons	-15.640	11.962	-1.31	0.200	-39.92	8.645

Table 4 The Pesaran/Shin/Smith (2001) ARDL bounds test

<i>H0: no levels relationship</i>		F= 4.798						
		T = -4.916						
critical values (0.1–0.01), F-statistic, case 3								
	[I_0]	[I_1]	[I_0]	[I_1]	[I_0]	[I_1]	[I_0]	[I_1]
	L_1	L_1	L_05	L_05	L_025	L_025	L_01	L_01
<i>k_5</i>	2.26	3.35	2.62	3.79	2.96	4.18	3.41	4.68
accept if F < critical value for I(0) regressors								
reject if F > critical value for I(1) regressors								
Critical values (0.1–0.01), t-statistics, case 3								
	[I_0]	[I_1]	[I_0]	[I_1]	[I_0]	[I_1]	[I_0]	[I_1]
	L_1	L_1	L_05	L_05	L_025	L_025	L_01	L_01
<i>k_5</i>	-2.57	-3.86	-2.86	-4.19	-3.13	-4.46	-3.43	-4.79
accept if t > critical value for I(0) regressors								
reject if t < critical value for I(1) regressors								
<i>k</i> : # of non-deterministic regressors in long-run relationship								
Critical values from Pesaran/Shin/Smith (2001)								

We observe that in the long run trade openness stimulates economic growth and this finding, again, support that of Chimobi (2010), Hussain et al. (2021) and Elfaki et al. (2021) who found a positive long run relationship between trade openness and economic growth.

Table 5 Do trade openness and DCP stimulate economic growth? A bound test approach: long run

<i>D. GDPgrowth</i>	<i>Coef.</i>	<i>Std. err.</i>	<i>t</i>	<i>P> t </i>	<i>[95% conf.</i>	<i>Interval]</i>
<i>ADJ</i>						
<i>GDPgrowth</i>						
L1	-0.8329	0.1694	-4.92	0.000	-1.176	-0.4889
<i>LR</i>						
<i>DCP</i>	0.2730	0.3637	0.75	0.458	-0.4653	1.011
<i>IFR</i>	0.0729	0.0566	1.29	0.207	-0.421	0.1879
<i>EXHR</i>	0.7592	0.9868	0.77	0.447	-1.244	2.762
<i>lnTrade</i>	3.952	2.017	1.96	0.053	-0.1429	8.047
<i>lnFDI</i>	0.1571	0.8077	0.19	0.847	-1.482	1.796
<i>SR</i>						
<i>DCP</i>						
D1	-0.4752	0.3696	-1.29	0.207	-1.225	0.2751
LD	-0.2737	0.3394	-0.81	0.425	-0.9628	0.4153
<i>IFR</i>						
D1	-0.0550	0.03716	-1.48	0.148	-0.1304	0.02041
LD	0.0108	0.02795	0.39	0.699	-0.0458	0.0676
<i>EXHR</i>						
D1	-4.885	4.3194	-1.13	0.266	-13.65	3.883
LD	-4.298	4.6786	-0.92	0.365	-13.79	5.199
<i>lnTrade</i>						
D1	4.7805	2.7289	1.75	0.089	-0.7594	10.32
<i>lnFDI</i>						
D1	0.5234	0.97878	0.53	0.596	-1.464	2.510
<i>_cons</i>	-15.64	11.962	-1.31	0.200	-39.92	8.645

4.4 Post-estimation tests

4.4.1 Test for autocorrelation and serial correlation

Our results of the tests for autocorrelation and serial correlation as shown in Appendices 1 and 2, respectively show the absence of autocorrelation and serial correlation.

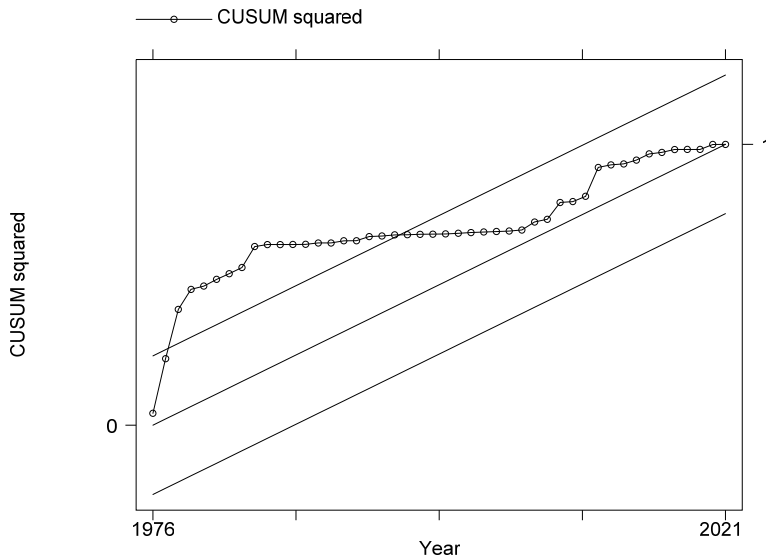
4.4.2 Test for homoskedasticity and normality

Our results in Appendix 3 indicate the absence of heteroskedasticity while variables are normally distributed.

4.4.3 Test for stability

The cumulative sum of squares graph (cusum graph) shows that there is stability. Though there was a very slight digression, the graph shows a return to stability. Figure 2 show the cusum graph.

Figure 2 Test for stability: the cumulative sum of square test



5 Summary, conclusions and recommendations

5.1 Summary

The study aimed at investigating the impact of trade openness and DCP on the Ghanaian economy between 1970 and 2019. To address the main objective, the study examined if trade openness and DCP including other covariates, stimulate economic growth. The study adopted a quantitative approach where time series analysis was used. Also, secondary data spanning 1970 to 2021 was used. To conduct the analysis, the unit root test for stationarity was first done to check for the stationarity between the dependent variable (economic growth) and the independent variables (trade openness, domestic credit, inflation rate, exchange rate and FDI). The study adopted the ARDL method of estimation for its analysis of the data. The results from the GDP growth equation reveal that trade openness have both short-run and long-run positive effect on economic growth while DCP did not have any significant impact on GDP growth. Again, our results show that inflation has a positive impact on economic growth, at least, in the short run.

5.2 Conclusions

The study concludes that trade openness causes economic growth both in the short and the long while inflation causes GDP growth at least, in the short run.

5.3 Recommendations

The study recommends that the government should embark on policies that will facilitate trade (both internally and externally) to bring about the needed impact on economic growth.

The study further recommends that the government should come up with policies that will effectively address the challenges of access to domestic credit by the private sector to facilitate private sector investments to stimulate growth in the economy both in the short and long run.

We recommend for further studies, a comparative analysis between Africa countries and European countries to see if economic growth is affected by these factors given the differences in socio economic development and characteristics.

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Appendix 1

Table A1 DW test for autocorrelation

Durbin-Watson d-statistic (5, 51) = 1.639407

Appendix 2

Table A2 Breusch-Godfrey LM test for autocorrelation and serial correlation

Lags(ρ)	Chi ²	df	Prob > chi ²
1	1.381	1	0.2399
1	1.381	1	0.2399
1	1.381	1	0.2399
1	1.381	1	0.2399
2	4.127	2	0.1270
2	4.127	2	0.1270

Appendix 3**Table A3** Trivedi's decomposition of IM-test: White's test for homoskedasticity

<i>Source</i>	<i>Chi²</i>	<i>df</i>	<i>p</i>
Heteroskedasticity	10.26	14	0.7431
Skewness	2.32	4	0.6770
Kurtosis	1.41	1	0.2350
Total	13.99	19	0.7843