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Thomas Mwebaze (tmwebaze@gmail.com)
Makerere University School of Economics
Faisal Buyinza
Makerere University School of Economics

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Thomas Mwebaze
School of Economics, Makerere University
P.O. Box 7062, Kampala, Uganda.
Tel. +256 772-467561.
Email: tmwebaze@gmail.com
Corresponding Author

Faisal Buyinza
School of Economics, Makerere University
P.O. Box 7062, Kampala, Uganda.
Tel. +256 753-884242.
Email: bbkfaisal@gmail.com

Abstract
This article examines the relationship between economic growth and exports in Uganda using annual time series data and in the ARDL framework. The study provides evidence on the short and long run relationship between economic growth and exports and tests the export-growth-led hypothesis for Uganda. Our results reveal that exports significantly promote both short-run and long run economic growth in Uganda within the study period. Secondly, the results adjustment coefficient is negative and statistically significant, implying that there is a long-run relationship between exports and economic growth. Also, the adjustment coefficient indicates that the speed of adjustment to equilibrium is about 86% in case of any shock to the economy. In addition, our results show that foreign exchange rate, inflation and trade openness have a significant and negative effect on economic growth while private credit and capital formation have a positive and significant effect on long-run economic growth rate in Uganda. On the other hand, gross capital formation, private sector credit and exchange rate growth have a positive and significant effect on economic growth rate in Uganda in the short run. The findings of this study suggest that there is need for increased government commitment to boost production and quality of exports in order to exploit the untapped export potentials of the country. Secondly, government needs to put in place measures to ensure efficient utilization of external resources and a clear road map for trade openness. Finally, government should also put in place sound investment policies like ease of access to affordable credit plus stable macroeconomic conditions in form of low inflation and a stable exchange rate in order to stimulate economic growth that will further boast the country's overall growth and development potentials.

Key words: Exports, Economic growth, adjustment coefficient, time series, Uganda

1. Introduction

The role of exports in the economies of developing countries has been subject to a wide debate in both developed and developing countries (Bernard & Jensen, 1995; Balaasa, 1985; Tahir et al., 2015). Exports of goods and services represent one of the most important sources of foreign exchange income that ease the pressure on the balance of payments and create decent employment opportunities. Ramos (2001) points out that economies of scale and acceleration of technical change by international trade are potentially significant for economic growth. Ghartey (1993) and Tahir et al. (2015) argue that economic growth in a country is as a result of economies of scale which is the result of innovation, technological advancement, and mass scale production. Exports provide the economy with foreign exchange needed for imports that cannot be produced domestically. An export let growth strategy aims at providing producers with incentives to export their goods through various economic and governmental policies. It also aims at creating the capacity of producing goods and services that can compete in the world market, to use advanced technology, and to provide foreign exchange needed to import capital goods. Exports also have the potential to increase intra-industry trade in an economy (Antonella, 2003).

Bernard & Jensen (1995) showed that exports are important in productivity, creation of employment, absorption of international modern technology and this will boost productivity and output growth. They also found that plants that export exhibit more growth. Specifically exporting firms benefit from learning, competition, economics of scale, and exposure to foreign ideas plus foreign customers and markets. The increase in output demand of a country through the growth of exports allow the exploitation of economics of scale for an economy. The expansion in exports promotes specialization in the production of export products, which in turn boost the productivity level and cause the general level of skills to rise in the export sector. Thus, a nation could accelerate the rate of economic growth by promoting export of goods and services.

In Uganda, like other developing countries, the wave of economic liberalization and structural adjustments program (SAP) of the 1980s (IMF & World Bank, 1982) looked at the private sector as the engine of growth and this has widened the economy in terms of domestic and foreign direct investments, increasing productivity, exports, imports and job creation in the country. Over the last decade, the country has witnessed significant growth in the fields of education, health and industrial sectors (UBOS, 2018). One of the major reasons for adopting SAP was to adjust and correct imbalances for the basic macroeconomic indicators and encourage a free market through policies that relied heavily on export expansion and import substitution approaches for industrialization.

The role of exports in igniting and sustaining rapid economic growth rates, especially in emerging economies like Uganda, cannot be underscored (Balaasa, 1985; Tahir et al., 2015). Exporting is associated with static gains that include access to larger outside markets, hence exploiting economies of scale. There are also dynamic gains that include efficiency advances as a result of

knowledge and technological spillovers from exporting experience. Exporting is also associated with efficiency in resource allocation, employment generation, and relaxing the foreign exchange constraints. Accordingly, there is no wonder that countries world over are taking deliberate and purposive efforts to promote exporting activities. Owing to the usually strong synergies between rapid economic growth on the one hand, and exporting on the other, countries usually strive to achieve rapid increases in exports and, by extension, promote economic growth and development.

In Uganda, like other less developed economies, the economic importance of exports to economic growth cannot be over emphasized at any stage of economic development. Exports are the engine of any economy because they are the most important source of achieving foreign exchange earnings, ease the pressure of balance of payment and also contribute to provision of employment opportunities to the domestic labour force. Expansion of exports can be a vehicle for output growth both directly, as a component of aggregate output, as well as indirectly through efficient resources allocation, greater capacity utilization, economies of scale and stimulation of technological improvement due to foreign market competition (Awokuse, 2003). The rationale lies in the belief by many economists that trade is the engine of growth, as it contributes to efficient allocation of resources within economies and also transmits growth across countries and regions. Some economists such as Omisakin (2009) and Tsen (2006) viewed export-led growth strategy as a development strategy aimed at growing productive capacity by focusing on international markets.

It is also of consensus opinion among economists such as Tsen (2006) and Omisakin (2009) about the gains from trade by economic openness which became popular from the 1970s, supported by the theoretical arguments. The first is based on Samuelson's (1948) Comparative Advantage Theory, which analyses the benefits from trade between countries with different capital-labour ratios, the second is on the benefits of openness between countries controlling rent seeking, and the third is concerned with the benefits of openness for growth. Export-Led Growth Strategy on the other hand is an economic strategy used by some developing countries which seek to find a niche in the world economy for a certain type of export. Industries producing for exports may receive government support and could have better access to the local markets. The strategy also enhances foreign currency inflow and can be used to facilitate further importation of intermediate goods as well as technology.

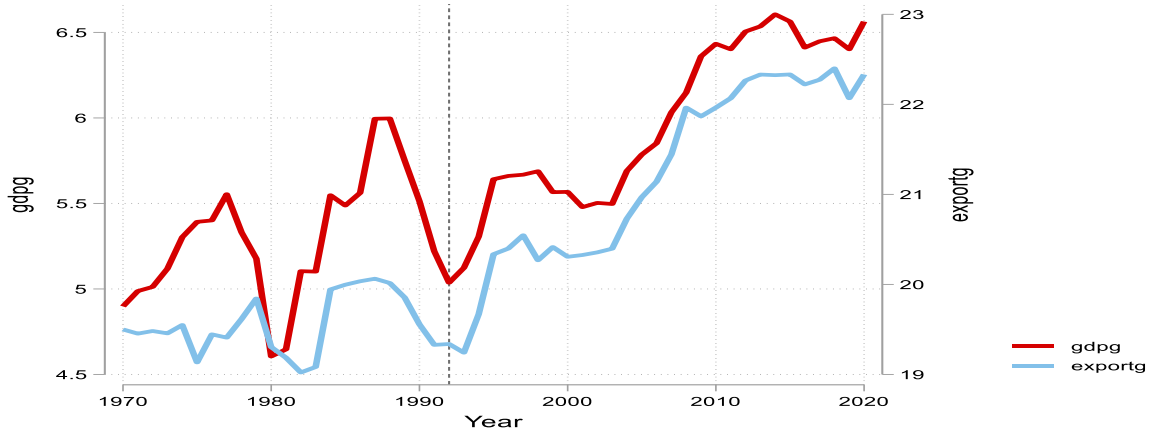
Over the last two decades, Uganda has implemented several economic reforms and strategies, aiming at promoting her exports to generate higher economic growth and welfare. These have included among others; liberalizing trade and the foreign exchange market deregulation, attaining macroeconomic stability, privatization, and the participation in regional agreements such as the Common Market for Eastern and Southern Africa (COMESA) and the East African Community (EAC). There have been several trade negotiation and autonomous reforms which have improved access to international markets such as the Africa Growth and Opportunity Act (AGOA) initiative and the European market to which Uganda is a beneficiary. Further still, the government is

committed to streamlining and liberalizing the trade regime with strong emphasis on private sector development as a major engine for economic growth.

Uganda's exports are predominantly agricultural products. About 90% of the value of total merchandise exports is agricultural. The traditional exports include coffee, cotton, tea and tobacco. Trade liberalization has led to the diversification of the export sector, encouraging both traditional and non-traditional exports- floricultural products, fruits, vegetables, fish and fish products, with the aim of improving Uganda's economic performance. Coffee continues to provide the biggest share of export revenue i.e. 91.1% (2017) of total revenue amidst a growing a share of non-traditional exports. Non-traditional exports fetch more export earnings than traditional exports i.e. 60% of total export earnings. Fish exports dominate non-traditional exports. Another emerging non-traditional export is cut flowers.

Since the early 80's, Uganda's GDP has been experiencing fluctuating upward and downward trend, as depicted in the Figure 1. However, Uganda's economy over the study period continues to gain traction as it experiences a positive growth in years. However, over the study period, economic growth has been fluctuating but with a systematic growth in the country's export growth. Economic growth accelerated to 6.7% in 2015/16 at the back of robust growth in exports, and in the last decade economic growth averaged above 5%. Also export growth has been notably persistent rising and resilient growing above 20% in the last decade. The good performance has resulted from a combination of generally sound economic policies, on-going trade and economic reforms and a benign international economic environment. Figure 1 shows that exports and economic growth in Uganda are interrelated phenomenon, because increase in economic growth creates surplus output that leads to increase export earnings and thus foreign exchange used to purchase capital goods that further boast domestic production and contribute to economic growth.

Figure 1: GDP and export growth 1970-2018



Source: World Development Indicators (World Bank, 2021)

The aim of this article is to examine the determinants of economic growth and the export-let-economic growth hypothesis in the context of Uganda. Specifically the article aims: i) to examine the short and long-term linkages between exports and economic growth; ii) to test the export-led-growth (ELG) hypothesis for Uganda. Whereas the theoretical and empirical literature on export-led growth is large, only a handful of empirical studies examine the role of export dynamics and nature of export composition and economic growth. The article examines the growth led by exports in case of Uganda. In addition, this article offers policy recommendations that can be implemented in enhancing economic growth in case of developing countries.

Findings of this article makes a number of contributes to the literature on the ELG hypothesis. First, the article uses the more comprehensive and recent bound test or autoregressive distributed lag model (ARDL) proposed by Pesaran et al. (2001) to examine the short-run and long-term dynamics between exports and economic growth, which is crucial in designing trade related policy to enhance economic growth potential in the context of a developing country like Uganda. There are mixed results from the different studies that have examined the ELG hypothesis. Most studies have used variables in nominal terms. This study makes a new contribution by using variables in their real terms-the Per capital GDP growth and per capital export growth. Against this backdrop, fresh enquiry in the issues of export-led-growth hypothesis in the context of Uganda is justified.

2. LITERATURE

The literature available indicate that there has been many studies analyzing the role of exports in the economic growth specifically for developing countries. Although most of the empirical work support the export led economic growth hypothesis, there is no overall consensus on this issue. According to the endogenous growth theories, changes in trade policy can now influence long term rates of economic growth (Musila & Yiheyis, 2015). Chuang (1998) argued that contemporary theoretical research advocates that the import of capital goods from technologically more advanced nations might enhance output growth, hence, overall economic growth, as imported machinery and equipment contain technology and knowledge and are thus transmitted by international trade.

ELG postulates that export growth is one of the key determinants of economic growth. Olayinka (2013), argues that Export-Led Strategies allow an expansion of aggregate demand without much inflationary pressure and without the danger of a wage-price spiral, compared with strong domestic demand injections. Real appreciation of the currency that result from large export earnings, which tame inflation and allow real wages to rise (Pakasa & Mardiana, 2012).

The export-led-growth (ELG) hypothesis assumes that higher exports are a major feature in enhancing long-run economic growth. There are many theoretical statements, as well as empirical studies, supporting the export-led-growth (ELG) hypothesis (Bashir, Iqbal & Nasim, 2015; Maneschiold, 2008; Silverstov & Herzer, 2006). In contrast, there are also many empirical studies

that support the growth-led-export (GLE) hypothesis (Jung & Marshall, 1985; Ahmad & Kwan, 1991; Mishra, 2011). Tsen (2010) notes that an increase in demand from domestic market is exposed to quick termination, while Abou-Stait (2005) notes that persistent growth in demand can't be sustained in a small domestic economy if viewed from a demand side. That export markets are almost boundless and do not entail limitations on growth from the demand side. Therefore, exports can be observed as a significant medium of growth in income and as an element of aggregate demand (Gabrielle, 2006). This immense effect of exports spillover in an economy in terms of productivity growth, employment creation and technological absorption has greater potential to promote economic growth in a developing country like Uganda.

Some studies conclude that there is a positive relationship between exports and economic growth, for example, Balassa (1978, 1985), Jung & Marshall (1985), Shan & Sun (1998), and Levin and Raut (1997). Most of this literature attributes the effects of exports on economic growth to several factors. One of the key factors however is that exports promote thresholds effects due to economies of scale, increased capacity utilization, productivity gains, and greater product variety exports increase total factor productivity because of their impact on economics of scale and other externalities such as technology transfer, improving skills of workers, improving managerial skills, and increasing productive capacity of the economy. Others authors (Ahmad & Kwan, 1991; Ahmad & Harnhirum,1995), did not find much support to the export led economic growth hypothesis. Positive externalities of exports are also pointed out by Balassa (1978) and Krueger (1980), such as greater capacity utilization, economies of scale, incentives for technological improvement and well-organized management due to foreign market competition.

Evidence by Syron & Walsh (1968) support the hypothesis but produce results that are sensitive depending on the type of country under scrutiny, i.e., LDCs or developed countries. Furthermore, Pradhan (2010) carried out an empirical verification of export-led growth hypothesis from the Indian perspective by applying various time series techniques and confirms both short-run and long-run relationship between exports and economic growth. Bivariate Granger causality test suggested that the direction of causality runs from export growth to GDP growth. The study described that there is long run stability between exports, financial development and economic growth. This implies that one can use export performance also to predict the growth of Indian economy. Export shows that a one unit increase in the export cause a positive change of 0.17 in the economic growth, confirming that there is long run equilibrium relationship between trade and economic growth. And that an enhanced economic growth is dependable for internationalization of trade and financial development in the country. This is quite evident that with enhanced economic growth, the country opts for internationalization of trade and financial improvement.

Ray (2011) indicated the relationship of exports and the growth of the economy in India with annual data for the periods of 1972-1973 to 2010-2011. He used Granger causality and co-integration methods for finding out the export-led economic development strategy among

economic growth and exports, analyzing long-term and the causative connection between economic development and export level. The results indicate that there's co-integration between the growth of national economy and exports with a long-term relationship. And also, the direction which runs both from economic growth to exports and exports to economic growth, proved by Granger causality. The cointegration test confirmed that economic growth and exports are co integrated, indicating existence of long run equilibrium relationship between the two as confirmed by the Johansen cointegration test results. The Granger causality test finally confirmed the presence of bi-directional causality which runs from economic growth to export and vice-versa. The error correction estimates gave evidence that in the short run also, export and GDP are mutually causal.

Shihab, Soufan & Abdul-Khaliq (2014) used Granger methodology to address the causal correlation between the growth of national economy and exports of Jordan with time series data from the Central Bank and the Statistical Department of Jordan for the period 2000-2012. Annual change in Gross Domestic Product (GDP) (real) and exports were used. This study concluded that there was causality among the variables by using granger causality test. This research pointed out an indication of unidirectional correlation between among economic growth and exports.

Holman & Graves (1995) examined the causality relationship between growth of export and economic growth, using Granger causality test. They concluded that there existed some evidence of causality relationship between exports and growth. Tessema (2016) investigated the linkage between economic growth, export, and import in Ethiopia over the periods of 1995-2014. The result shows that the income, exports, imports and relative prices are co-integrated. This result indicates a promotion policy for import-export supports to the economic growth in Ethiopia. Furthermore, Nguyen (2017) found that FDI has a significant positive impact on economic growth of Vietnam in the long run while the effect of exports is negative. However, there was no effect of export and FDI on economic development in the short run. This analysis used time series data and the ARDL bounds testing approach to analyze the linkage among the variables from 1986 to 2015. Furthermore, Tsaurai & Odhiambo (2012) using the autoregressive distributed lag (ARDL)-bounds testing approach, found that there is a distinct causal flow from export growth to economic growth in Zimbabwe, both in the short run and in the long run. They recommend that policies which are geared towards export promotion should be intensified, to promote long-term economic growth in Zimbabwe.

3. Methodology

3.1 Theoretical model

In order to examine the export-led-growth (ELG) hypothesis for Uganda, our study is motivated by the theoretical postulations that there are numerous possible means through which higher growth can be achieved by an increase in exports. Thus, increase in exports can encourage specialization in the sectors in which the country has comparative advantages and results in

resource distribution from less efficient non-commercial sector to more export-productive oriented sectors. Helpman & Krugman (1985) argue that through economies of scale at the macro-level, export growth can enhance productive efficiency in the economy.

The key assumption in this framework is that export growth might have an effect on the overall productivity of the factors through the dynamic spillover effects on the whole economy (Feder, 1983). Knowledge is attained through learning by doing instigated by exports and dispersing it to the local economy. Chuang (1998) argues that exporting enhances better styles of organization, improves productivity, lead to higher competition, on job training, awareness of technical know-how and access to the international markets. Also, we note that there is a potential lag between the export spillover impact and its effect on productivity and hence growth in the country. Different assumptions about the duration of this lag have important implications on the effect of exports on economic growth, especially over shorter time horizons.

Low productivity of exports of primary products is biggest the obstacle for countries dependent on primary product exports because they do not provide a sustainable potential of the extended knowledge unlike the industrial sector that generates high externalities (Matsuyama, 1992). Conventional evidence (Balassa, 1978; Ram, 1987) show that exports of primary products are exposed to extreme price and quantity fluctuations, thus raising exports of primary products may lead to increased GDP volatility and uncertainty in the overall economy. Dawe (1996) notes that high uncertainty and instability might results in the slowdown of the efforts of economic planning and decrease investments' efficiency and amount.

In order to examine the determinants of export performance and export-let-growth hypothesis for Uganda, our study is motivated by a growth model used by previous authors (Siliverstovs et al., 2006; Wacziarg & Welch, 2008). The study framework assumes that the demand for goods in the international market depends on the assessment of the comparative prices of goods, the relative process of the currencies of both trading partners, and the demand for substitute goods in other countries and in the international market. The relationship between economic growth, export (X), imports (M), exchange rate (Er), import tariffs (IMT), and terms of trade (ToT). The theoretical relation among GDP growth rate and other explanatory variables is given by following expression:

$$Y_t = f(X, M, Er, Mt, ToT, U) \quad (1)$$

Therefore, the export demand in the international market depends on the world income, the elasticity of world income, and the proportional price of goods in the importing countries. Thus, the relationship between growth equation for GDP growth and export growth can be expressed as follows:

$$\frac{\dot{Y}_t}{Y_t} = \frac{\dot{A}}{A} + \alpha\left(\frac{\dot{X}_t}{X_t}\right) + \beta\left(\frac{\dot{M}_t}{M_t}\right) + \delta\left(\frac{\dot{Mt}_t}{Mt_t}\right) + \pi\left(\frac{\dot{Er}_t}{Er_t}\right) + \rho\left(\frac{\dot{ToT}_t}{ToT_t}\right) \quad (2)$$

Equation 2 reveals that economic growth ($\dot{Y}_t$) is expected to vary overtime t, and is influenced by the growth rate of exports ($\dot{X}_t/Xt$), imports ($M_{t/Mt}^{\cdot}$) import tariffs ($Mt_t\dot{/}Mtt$), exchange rate ($Er_t\dot{/}Ert$) and terms of trade and other factors that may influence economic growth. Therefore, to examine the impact of exports on economic growth in Uganda taking into its dynamic effect, we estimate the following augmented growth empirical model:

$$y_t = \alpha_0 + \alpha x_t + \beta m_t + \delta mt_t + \pi er_t + \rho tot_t + u_t \quad (3)$$

3.2 The empirical model

The error correction model specification of the ARDL following Pesaran and Shin (1998) that captures both the short-run and long-run effects of the impact of exports on economic growth and other selected variables can be specified as:

$$\Delta y_t = \theta_0 + \theta_1 \Delta y_{t-1} + \alpha x_{t-1} + \beta m_{t-1} + \delta mt_{t-1} + \pi er_{t-1} + \rho tot_{t-1} + \sum_{i=1}^{p} \emptyset_i \Delta y_{t-i} + D_{1992} + \sum_{j=1}^{q} \varphi_j \Delta X_{1,t-j} + \sum_{j=1}^{q} \delta_j \Delta m_{t-j} + \sum_{j=1}^{q} \mu_j \Delta mt_{t-j} + \sum_{j=1}^{q} \gamma_j \Delta e_{t-j} + \sum_{j=1}^{q} \tau_j \Delta etot_{t-j} + u_t \quad (4)$$

The model is autoregressive because y_t is explained by lagged values of itself. It also has a distributed lag component, in the form of successive lags of the other explanatory variables. From Equation 4, θ_0 is a vector of constants, Y_t is a vector of endogenous variables. In the ARDL model specification, parameters $\theta,\ \alpha, \beta, \pi$ and ρ capture the long-run effects, while $\varphi,\ \delta,\ \mu, \gamma$ and τ capture the short-run effect, while u_t is a white noise disturbance term which is serially independent. More interestingly, with the ARDL, both the short-run and long-run parameters can be estimated at the same time unlike in the traditional OLS approach. The speed of adjustment coefficients (ADJ) reported must be negative, less than one and statistically significant. It measures how strongly the dependent variable reacts to a deviation from equilibrium relationship in one period or, in other words, how quickly such an equilibrium distortion is corrected. The short-run coefficients (SR) account for short-run fluctuations and not due to deviations from the long-run equilibrium.

The empirical model (Equation 4) is important for the test of co-integration under the ARDL approach using the bound test approach following (Pesaran & Pesaran, 1997). That is, if the calculated F-statistics is above the upper value of this band, the null hypothesis may be rejected indicating co-integration between the variables irrespective of whether they are I(1) or I(0). However, if the F-statistics falls below the band, the null hypothesis of no co-integration cannot be rejected while a value within the band implies the test is inconclusive.

In analyzing the impact of export-led-growth hypothesis in Uganda, the ARDL estimation approach is employed. This technique unlike other estimation approaches (Engle-Granger test, 1987; Johansen, 1988)[1], covers all problems in previous techniques. First, it has the advantage of flexibility in that it can be applied irrespective of whether the variables are of different order of integration (Pesaran & Pesaran, 1997) unlike the cointegration approach by Johansen (1991) and Johansen-Joselius (1990) that require that variables be of the same order of integration. Second, Inder (1993) notes that estimates from ARDL approaches are much reliable than counterparts even if the dynamic structure is over specified, and also the sizes of the t-tests for ARDL approach are much more reliable. Third, ARDL is attractive when carrying out cointegration in small samples, and that it is also more efficient than other VAR methods. Additionally, ARDL approach is adequate to simultaneously correct for residual serial correlation and removes endogeneity problem by making the model dynamic (Pesaran & Shin, 1998). Also, it gives short-run and long-run estimations separately and the error correction term, which shows how much time it will take to reach to its long-run equilibrium (Pesaran & Pesaran, 1997; Pesaran & Shin, 1998; Pesaran et al., 2001).

Following Pesaran & Pesaran (1997) and Pesaran et al. (2001), the parameter stability in estimated models are assessed using Brown et al. (1975) tests, which are known as cumulative sum (CUSUM) and as cumulative sum of squares (CUSUMQ) (Stamatious & Dritsakis, 2014). This requires that if the plots of the CUSUM and CUSUMQ statistics stay within the critical bonds of a 5% level of significance, the null hypothesis of all coefficients in the given regression is stable and cannot be rejected. To ensure the goodness of fit of the model, diagnostic and stability tests to examine the model for serial correlation, non-normality and heteroscedasticity were conducted.

Granger causality Test for Export-led-Growth Hypothesis

To examine whether the export-led-growth (ELG) hypothesis exists in the case of Uganda using time series data from 1970 to 2021, the Granger causality test is applied. This requires a significant econometric model in support of the theoretical approach to back the empirical evidence results. The Model applied for Granger causality testing the ELG hypothesis given by:

$$X_t = \sum_i^n \alpha X_{t-1} + \sum_i^n \beta GDP_{t-1} + v_t \qquad (5)$$
$$GDP_t = \sum_i^n \delta X_{t-1} + \sum_i^n \pi GDP_{t-1} + \varepsilon_t$$

The Granger causality tests model assumes that v_t are independently distributed as a white noise disturbance term, having uncorrelated series satisfying the property $E(v_t v_{t-1}) = 0$

[1]Engle and Granger technique is used for two variables relation, while Johansen cointegration (1988) is used for more than two variables. In this way, Johansen cointegration has the advantage over Engle & Granger (1987).

3.3 The data

This paper analyses time series data on Uganda, from 1970 to 2021, obtained from world development indicators(WDI).

4. Results

4.1 Descriptive analysis

Table 1 presents the summary statistics for study variables. The results show that per capita GDP growth averaged 5.6% with maximum of 11.35%. Also, over the study period, export grew on average by 13.97%, import growth rate was 0.11%, import tariffs growth rate was 3.95%, private sector credit was 7.8%, government consumption growth was -1.1% and FDI growth rate was 1.89%. In terms of coefficient of variation, all variable exhibit low variability within the acceptable levels. This means that they are less likely to cause biasness in the mode estimated results.

Table 1: Summary statistics

	N	Mean	Std. Dev.	Median	min	max	cv
GDP growth	50	5.66	.54	5.56	4.61	6.61	0.1
GDP per capita	50	332.13	185.63	260.84	100.03	739.37	0.56
Exports/GDP	50	14.07	4.69	13.51	7.06	24.28	0.33
Exchange rate	50	1152.72	1142.28	1064.55	.07	3727.07	0.99
Private sector credit	50	8.01	4.58	7.09	2.65	16.51	0.57
Terms of trade	50	160.14	71.46	127.8	92.18	315.63	0.45
FDI/GDP	50	1.94	2.04	2.05	-0.8	6.48	1.05

Sources: Author 's calculation from WDI (2021)

Table 2 presents the correlation coefficient among the study variables. The correlation coefficient, range between -1 and 1. The results indicate that correlations coefficient for all variables are within the acceptable level of less than absolute value of 0.8 and therefore the results indicate no problem of multicollinearity. Thus, the selected variables can be used to examine the export-led-growth hypothesis for Uganda and can yield unbiased parameter estimates from which meaningful conclusions and inference can be drawn.

Table 21: Pairwise correlation analysis among the study variables

Variables	(gdpg)	(psc)	(ltot)	(fdi)	(exc)	(expop)	(import)
gdpg	1.00						
psc	0.538*	1.00					
ltot	-0.529***	-0.493***	1.00				
fdi	0.531**	0.648***	-0.694*	1.00			
exc	0.680***	0.409***	-0.663***	0.591*	1.00		
expop	0.572**	0.662*	-0.403***	0.232***	0.499**	1.00	
import	0.612**	0.759**	-0.628***	0.590***	0.346***	0.459**	1.00

**** p<0.01, ** p<0.05, * p<0.1*

Source: Author's calculation from WDI (2021)

4.2 Unit root tests

To control for potential spurious regression, time series univariate properties were examined using the conventional Augmented Dicker-Fuller (ADF) (Dickey & Fuller, 1979, 1981) and Phillips Perron (1988) and DF-GLS unit root test. Although testing the variables for unit roots before ARDL estimation is unnecessary, because this estimation can accommodate any variables, which are I(1), I(0), or mutually co-integrated, before empirical estimation of the model, unit root properties for the study variables are tested. We note that testing for non-stationarity and co-integration of the study variables is still useful as it guides towards the optimal model choice. More importantly, unit root tests for variables is necessary to ascertain the order of integration of the study variables because ARDL cannot be estimated with I(2) series (Pesaran & Pesaran, 1997; Pesaran et al., 2001). The stationarity properties of all the variables and independent variables require that they are either I(0) or I(1), but not greater than I(1) devoid of a structural break, autocorrelation, and heteroscedasticity.

Table 3 represents the unit root/stationary tests results for Augmented Dicker-Fuller (ADF) Phillips Perron (PP) and DF-GLS unit tests for the variables in their levels and first differences. The results show that some variables are integrated of order zero I(0) and others are of order one I(1). The results show that per capita GDP growth, exports growth, imports tariffs are stationary in levels, and therefore are I(0). On the other hand, for import growth, exchange rate, and terms of trade, we fail to reject the null hypothesis for unit root, and these series are non-stationary in levels. These variables are differenced and the unit root test results show that they become stationary at first difference, and hence they are said to be integrated of order one I(1). The unit root test results confirm that the study variables are integrated of I(0) and I(1), making the ARDL approach a suitable estimation technique..

Table 3: ADF, PP and DF-GLS Unit Root Tests for variables in levels and first difference

Variables	ADF Level	ADF 1st Diff	P-P Level	PP 1st Diff	DF-GLS Level	DF-GLS 1st Diff
Per capita GDP growth	3.961**		4.500***		5.961**	
Export growth	3.521*		8.977*		3.521*	
Imports tariff	4.137***		4.913***		4.137***	
Import growth	1.996	4.137***	0.913	12.913***	0.196	4.137***
Exchange rate	2.798	6.086***	4.137	9.244***	0.218	6.086***
Terms of Trade	2.700	6.626***	2.168	10.886***	0.550	7.626***

Decision rule: *** significance at 1%, ** significance at 5% and * significance at 10%

4.3 Cointegration

Cointegration is carried out using the modified PSS bounds test with KS critical values and approximate p-values. Based on ARDL (1, 2, 2, 0, 0), we run the long-run relationship. The subsequent results of the bounds test are reported in Table 4. The estimated F-statistic based on a finite sample of 4 variables, 47 observations, 4 short-run coefficients is 18.56 whereas t-statistic is 6.25, which is above the upper bound critical values (3.38, -3.63) at 5% significance level and above the critical values of all I(1) variables at 10% and 1% levels. This is further validated by Kripfganz & Schneider approximate p-value [p-value<0.01], hence, rejecting the null hypothesis of no level relationship. Thus, both PSS bound tests and Kripfganz-Schneider critical values with approximate p-values confirm the presence of co-integration.

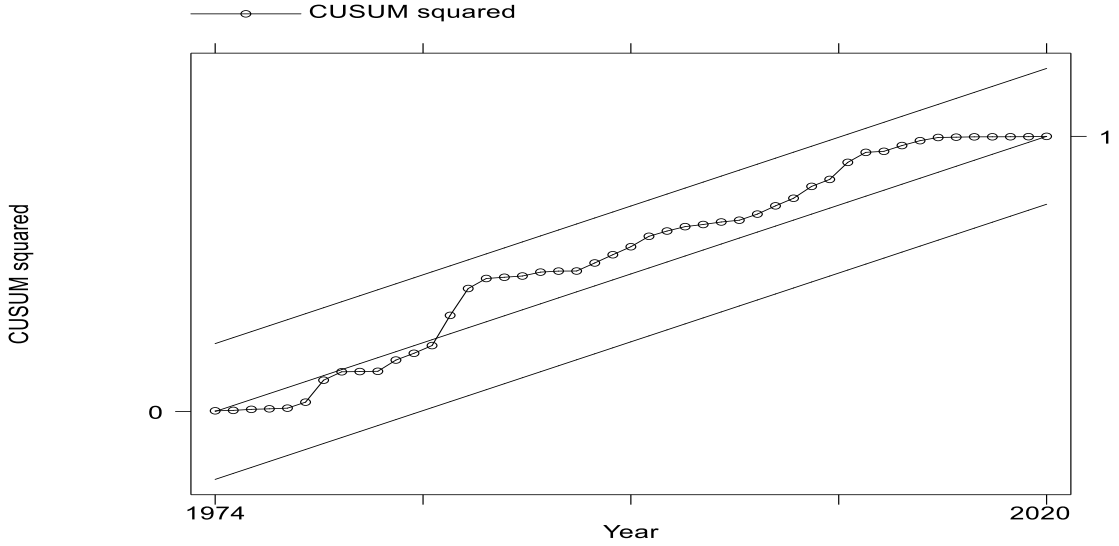
Table 4. F-statistic of Co integration Relationship

Bound Critical Values (Restricted Intercept & no Trend)		Significance Level	Values	Test statistic
I(1)	I(0)			
5.61	4.29	1%	6.42	F-Statistics
4.35	3.23	5%		
3.77	2.72	10%		

Note: * The critical values are obtained from Pesaran et al. (2001), table CI(iii) P.300, unrestricted intercept and no trend with three regressors.

Figure 2 represents the CUSUM and CUSUMSQ test plots of the cumulative sum of recursive residuals and squares of recursive residuals together with the 5% critical lines. The cumulative sums go inside the area between the two lines which illustrates that the estimated coefficient of the model are stable throughout the period of study at 5% level of significance.

Figure 2: Plot of CUSUM and CUSUM of square of the ARDL model



4.4 ARDL model validation

Table 5 presents the model diagnostic tests in terms of model robustness, goodness of fit, stability, credibility and sensitivity of the model. Examining the independence of the residuals of the estimated model is very critical. Autocorrelation in the model residuals is examined using Breusch-Godfrey LM tests with four lags. The autocorrelation results show that we fail to reject the null hypothesis of no serial correlation based on 5% significance level, confirming the residual of the estimated ARDL (1, 2, 2, 0, 0) model free of autocorrelation. Second, heteroscedasticity in the residual is tested using Cameron & Trivedi's decomposition of IM-tests, and the results in Table 5 show that the null hypothesis of homoscedasticity cannot be rejected at 5% significance level, confirming the residual are homoskedastic. In addition, Ramsey RESET test for functional form and Jarque-Bera test for normality (skewness and kurtosis) results reveal that the null hypothesis of normal distribution could not be rejected at 5% significance level for the estimated long and short-run coefficients of ARDL model. Since all the four tests are insignificant, there is no autocorrelation, heteroscedasticity, misspecification and non-normality as results in Table 5 indicates.

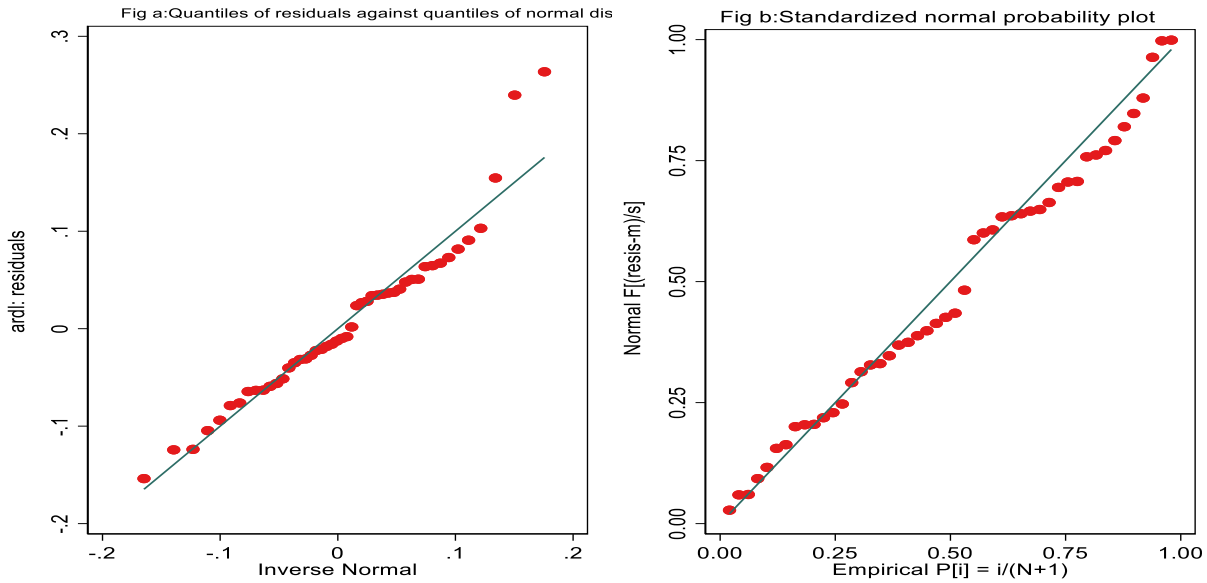
Table 5: Diagnostic results for ARDL estimated model

Model diagnostic	Stat	P-value
Portmanteaus test up to lag 40 (chi2)	49.4	0.167
Breusch/Pagan heteroscedasticity test(chi2)	0.583	0.445
Ramsey RESET test (F)	0.416	0.742
Jarque-Bera test on normality (chi2)	1.405	0.496

Decision rule: *** significance at 1%, ** significance at 5% and * significance at 10%

We further validate the distribution using both standardized normal probability plot (Fig3a) and quantiles of residuals against quantile of normal distribution estimates (Fig 3b), below. The resulting plots (Fig3a & b) confirm the residuals based on the estimated ARDL (1, 2, 2, 2, 3) are normally distributed.

Figure 3: Residual plot for model diagnostic



4.5 Lag selection

Table 6 shows the information criteria for selecting the lag-lengths in time-efficient way: the final prediction error (FPE), Akaike's Information Criteria (AIC), Schwarz's Bayesian Information criterion (SC), and the Hannan and Quinn Information Criterion (HQIC) lag-order selection statistics for a series of vector autoregressions. The optimal model is the one with the smallest value (most negative value) of the AIC or BIC. The BIC tends to select models that are more parsimonious. Most of the results display that the optimal lag length of the variable is 3.

Table 6: Selection-order Criterion

Lags	LL	LR	DF	P	FPE	AIC	HQIC	SBIC
0	28.92				0.003	-01.16	-1.09	-0.99
1	249.73	441.62	16	0	0.002	-10.68	-10.38	-9.87
2	277.99	56.52	16	0	0.002	-11.25	-10.71	-9.78
3	310.37	64.75	16	0	0.007*	-12.02	11.23*	-9.89
4	326.95	33.16*	16	0	0.001	-12.04	-11.02	-9.26

Note: Sample 1981-2021. Num. obs.: 50. * denotes the optimal lag length of the variables.

4.5 Granger causality test results for ELG hypothesis

For empirical testing of the export-led-growth hypothesis for Uganda, the Granger causality test is applied. The Granger causality tests results (Table 7) shows that there's a unidirectional relationship from exports to economic growth in Uganda, satisfying the ELG hypothesis. This means that exports play a significant role in promoting economic growth in Uganda. In addition, the Granger causality test reveal a unidirectional causality from imports to economic growth, which confirms an import-led-growth for Uganda. Interestingly, the results show a unidirectional

from exchange rate to economic growth, which implies that foreign exchange earnings are a key driver of Uganda's economic growth.

In addition, the results in Table 7 show that there's a unidirectional Granger causality from imports and exchange rate on exports. This means that Uganda's exports are mainly driven by the imports and exchange rate. The results indicate that imports and exchange rate have a unidirectional causal effect on import tariffs, while imports and import tariffs have a unidirectional granger causality on exports. Interestingly, exports granger causes the exchange rate, while imports have a significant effect on terms of trade.

The Granger causality test indicates presence of a long-run correlation between the variables, which signifies that they must have causality, at least in a single direction (Tang, 2008). According to Engle & Granger (1987), this confirms the presence of significant association in the long run. On the other hand, it should be observed that this does not refer to the direction of a chronological causal relationship among the variables. Therefore, in order to identify the long-term and short-term causal relationship, the granger causality test based on error correction causality models applied is referred to as weak (short-term) Granger causality and the long term Granger causality.

Table 7. Results of short-run Granger causality

Dependent variables	$\Delta PerGDPg$	ΔX	ΔIm_T	ΔM	$\Delta Exch$	ΔToT	Direction of causality
$\Delta GDPg$		7.22** *	2.55	8.44***	14.33* *	1.99	$X, M, Exch \rightarrow GDPg$
ΔX	2.15		2.33	11.68** *	7.48*	1.78	$M, Exch \rightarrow X$
ΔIm_T	2.47	3.52		5.44*	5.66** *	3.14	$M, Exch \rightarrow Im\_T$
ΔM	1.23	14.75* *	**5.77****		2.55	3.19	$X, Im\_T \rightarrow M$
$\Delta Exch$	2.19	9.52**	2.33	3.14		2.73	$X \rightarrow Exch$
ΔToT	2.93	2.56	3.57	7.16**	3.68		$M \rightarrow ToT$

Note: ** statistical significance at 5% and *** statistical significance at 1%.

4.6 Estimated ARDL model results for long-run and short-run

From the previous Granger causality test results (Table 7), the results indicates that there exists a long-run relationship among economic growth and exports in Uganda. In order to obtain further evidence of the existence of the long-run relationship among economic growth and exports, the ARDL approach estimates the long-run coefficients along with the short-run dynamics, to confirm the presence of the relationship (Table 8). Different models are estimated for the period 1970 to 2021. First, the R-squared for the 3 models show that about 78%, 80% and 73% of the variation in

economic growth is explained by the selected macroeconomic variables used in the model, as well as a goodness of fit for the three estimated model. Also, these R-squared do not reveal any likely problem of multicollinearity as the associate VIF will be below 10%. The overall performance of the estimated models is satisfactory, as the probability (F-statistics) values are highly significant. Furthermore, the Durbin-Watson value are very close to the desired value (DW=2) that reject the chances of auto-correlation, as well as of spurious relation (R^2<DW), providing that error terms are white noise and independent of each other.

Second, the results (Table 8) reveal that the adjustment coefficient is negative and statistically significant at 1%. This means that indeed, the ECM is a version of Granger causality test and co-integration and can ensure that both magnitudes of effects and causality are revealed by the coefficients themselves. The error correction coefficient is negative (-0.78), (-0.90) and (-0.85) as required, and is significant at 1% confidence level, which indicates that any deviation from the long-run equilibrium between variables is corrected about 78% in Model I, by 90% in model II, and by 85% in model III each year. Our results are supported by the findings by Bahmani & Ardalani (2006), who noted that for all the variables in an ARDL model to adjust towards their long run equilibrium, the adjustment coefficient must be negative and statistically significant for the economy to return back to its long-run equilibrium point.

Third, exports and economic growth are positively and significantly associated in both the short-run and long-run. This result reveal that a unit increase in export growth leads to a 3 percentage point increase in economic growth, other factors being constant. Note that an increase in exports growth leads to an expansion in production and employment through the foreign trade multiplier. Second, availability of foreign exchange by export growth allows the importation of capital goods, which, in turn, may increase the production potential of the economy. Third, the volume of and the competition in exports markets cause economies of scale and an acceleration of technical progress in production, all which promote economic growth. This finding is in line with previous studies (Balaasa, 1978; Levin, 1997) who argue that exporting is the engine of economic growth for a country as it is a source of technology through learning by doing and source of funding for capital imports embodied within modern technology.

As expected, the coefficient on imports have a negative and significant effect on economic growth, which indicates that imports have an inverse relationship with economic growth. This finding is consistent with the economic theory. The results indicate that a unit increase in imports reduces economic growth by 8.2 percentage points, other factors remaining constant. This finding is in line with previous studies (Bastola & Sapkota, 2015) who found a negative relationship between imports and economic growth. Regarding the effect of economic liberalization captured by the Dummy1992, it is revealed that trade liberalization is positively and significantly associated with economic growth in the long-run. This result indicates that after embracing trade liberalization, economic growth has been increasing by 0.78 percentage points. The result is in line with the

endogenous growth theories which postulates that a change in trade policy can influence long-term economic growth (Musila & Yiheyis , 2015). However, in the short-run, trade liberalization has no significant effect on economic growth.

The short-run results in Table 8 reveal a negative and significant association between imports and economic growth over the study period. This result indicates that a unit increase in imports reduces economic growth by 0.9 percentage points keeping other factors constant. This finding implies that over the study period, Uganda has been experiencing a high growth leakage due to her big importation of consumptions goods, fuel and petrochemical products and military-hardware rather than plant and machinery that is more likely to boast local production. On the other hand, in the long-run, imports are positively and significantly associated with economic growth in Uganda. For the three estimated models, a unit increase in imports potentially increases economic growth by 0.7, 1.2 and 1.6 percent in models 1, 2, & 3, respectively.

Interestingly, our study results reveal a positive and significant association between exchange rate and economic growth in the long run. The results indicate that a unit increase in exchange rate leads to 1.45, 09 and 1.26 percentage increase in economic growth in models I, II & III, respectively. This finding can be attributed to the fact that exchange rate is relatively stable for the Uganda shilling and major currencies and the country pursues a flexible exchange rate system. This finding supports previous evidence (Holma & Graves, 1995; Ray, 2011; Syron & Walsh, 1968) who documented that exchange rate is growth enhancing in recipient countries. However, exchange rate is negatively and significantly associated with economic growth in the short run. This finding indicate that a short-run unit increase in exchange rate reduces economic growth by 0.8, and 1.2 percentage points in models I and III, respectively. This could be attributed to the information asymmetry problem and lack of sufficient export capacity and more specifically that Uganda depends on export of primary products with a long gestation period. The implication for this finding is that there is need for export diversification to promote high quality processed agriculture exports.

Table 8: Estimated long and short-run coefficients from the ARDL model

	Model 1	**Model 2**	**Model 3**	**Model 4**
Adjustment Coefficient	-0.723***	-0.303***	-0.369**	-0.957***
	(0.000)	(0.000)	(0.003)	(0.000)
Long-run Results:				
Export growth	0.442***	0.431***	0.230*	0.315***
	(0.001)	(0.000)	(0.047)	(0.000)
Private sector credit growth		0-.021	0.003	0-.006**
		(0.113)	(0.111)	(0.002)
Inflation		-0.002	0.002	0.001**
		(0.002)	(0.001)	0(.011)
Gross capital formation growth			0.072	0.195***
			(0.222)	(0.000)

Exchange rate growth				0.010**
				0(.015)
Import growth				-0.001
				(0.002)
Foreign Direct Investment growth				0.012***
				(0.000)
Short-run results:				
$L.\Delta$ GDP growth	0.510***	0.216***	0.225*	0.385**
	(0.000)	(0.002)	(0.081)	(.043)
Δ export growth	0.302***	0.384***	0.186**	-0.479*
	(0.000)	(0.003)	(0.081)	(0.053)
$L.\Delta e$xport growth	-0.242**	0.091	-0.023	-0.961***
	(0.012)	(0.108)	(0.172)	(0.00)
Dummy 1993	-0.012	-0.016	-0.050	-0.079
	(0.166)	(0.167)	(0.191)	(0.172)
Δ.private sector credit growth		-0.006***	-0.002*	-0.003***
		(0.002)	(0.081)	0(.001)
Δ Inflation		0.003***	0.016***	0.002*
		(0.001)	(0.000)	(0.077)
$L.\Delta$ Inflation		0.015***	0.036**	0.052*
		(0.001)	(0.014)	(0.053)
Δ.gross capital formation growth			0.455***	0.395***
			(0.001)	(0.000)
$L.\Delta$.gross capital formation growth			0.129	0.302***
			(0.079)	(0.098)
Δ. Exchange rate				0.005**
				(0.002)
$L.\Delta$ Exchange rate				.002***
				(0.001)
Constant	-2.406***	-0.962	-1.652*	-4.642***
	(0.004)	(.716)	(0.085)	(0.000)
Observations	47	48	47	41
Log likelihood	60.37	*84.23*	72.46	*84.23*
R^2	.601	.618	.843	.982

Note: ** statistical significance at 5% and *** statistical significance at 1%.

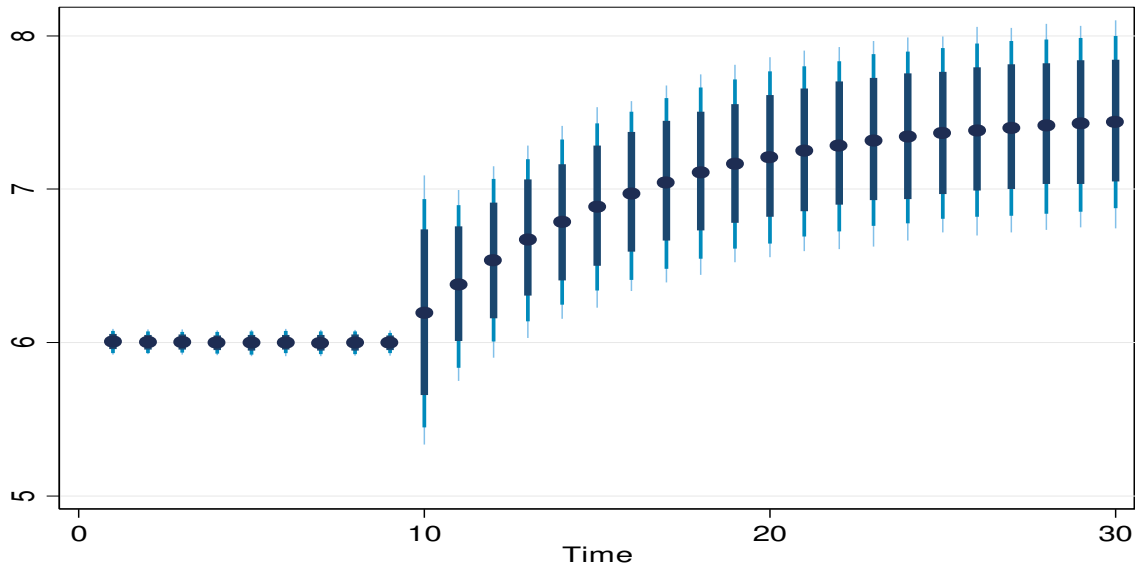
This study reveals that import tariffs have a negative significant effect on long-run economic growth over the study period. The results indicate that a unit increase in import tariffs reduces economic growth by 1.45, 0.99 and 1.21 percentage points in models I, II & III, respectively. This means that import tariffs are detrimental to economic growth because they implicitly increase the cost of both consumption and capital goods, consequently limiting the country's capacity to acquire machinery and equipment with embodied modern technology to enhance local productivity. This finding is in line with previous studies (Musila &Yiheyis , 2015; Pakasa & Mardiana, 2012) who concluded that import tariffs are key determinants of a country's import of capital goods which have a great potential to enhance the production capacity and propels economic growth. Our results in the short run show no effect of import tariffs on economic growth in Uganda.

Interesting, our results reveal that lagged per capita GDP is positively and significantly associated with current per capita GDP growth rate. The coefficients on lagged per capita GDP growth in the three models reveal that last year growth rate has a strong and positive bearing on the current growth per capita GDP growth. Overall, in the short-run it can be observed that last year per capita GDP growth enhances current per capita GDP growth by about 0.4 s, 1.3 and 1.21 percentage points in models I, II and III, respectively. This finding indicates that there is a significant pass through effect of sound economic performance to future expected economic growth rates.

4.7 Dynamic simulation of ARDL models

The output in the dynamic simulation (Figure 4) helps us visualize the effect of a counterfactual change in export growth at a single point in time, holding all else equal, using stochastic simulation techniques (Breunig & Busemeyer, 2012; Williams & Whitten, 2011). It is clear from Figure 4, that a unit negative shock in exports at shock time of 10 year, produces a small increase in economic growth that is not statistically significant in the short-run, which eventually increases to a predicted value of about 7.4 over the long-run, an increase that is statistically significant. This further confirms that exports are a key driver of economic growth on the long-run in Uganda.

Figure 4: Residual plot for model diagnostic



5. Concluding remarks

In this paper, we examine the long and short-run relationship between economic growth and export flows in Uganda empirically for the period 1970-2021. Empirically, we used the Autoregressive Distributed Lag Model (ARDL) to co-integration approach to ensure the existence of the long-run

linear combination among variables over the study periods as well as the short-run dynamics. In addition, we used the Granger causality tests to examine the export-led-growth (ELG) hypothesis in Uganda using annual time series data for the period 1970 to 2021. This study fills that gap by overcoming the shortcomings of sample selection and methodology that persisted in most previous papers. First, the empirical results show that there is a stable long-run equilibrium relationship among economic growth, flow of exports, imports, gross capital formation and exchange rate. Second, the bound test results clearly indicate that there a strong co-integration relationship among the study variables used in the empirical model. Third, the estimated adjustment coefficient of the error correction term (ECM) is significant and relatively slow. This indicates that although there is a positive long-run relationship between flow of exports and economic growth, it takes about one year for the disequilibrium to adjust in the case of Uganda. Also, the granger causality results strongly support the export-growth hypothesis for Uganda over the study period. Other factors that are positively and significantly associated with economic growth in both short-run and long include imports, FDI, private sector credit, exchange rate, and terms of trade, while import tariffs, capital formation are negatively and significantly associated with economic growth in the short-run over the study period.

These results can generate important implications and recommendations for policy makers in Uganda. Our study findings of export-led growth for Uganda has policy implications for other developing countries that aspire to grow fast but confront dilemmas with trade liberalization and economic openness. The study findings indicate that there is need for government to promote measures aimed at increasing exports in order to expand production and employment through the foreign trade multiplier. In addition, increased exports leads to availability of foreign exchange to the country and this allows the importation of capital goods, which in turn increases the production potential of the country. Also, the volume of and the competition in export markets cause economies of scale and an acceleration of technical progress in production. The most important implication of the econometric results is to use exports as the main engine of economic growth.

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