AFRICA'S TRADE WITH CHINA AND US: HAS COVID-19 CHANGED THE TRENDS OF TRADE?

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ARTICLE INFO

ABSTRACT

Africa's trade with China and the US is one of the international issues affecting development in the continent. This paper, therefore, examines the effects of COVID-19 on Africa's trade with the two countries by investigating whether the pandemic has changed the trends of the trade. The article explores the responses of the individual trade of China and the US with Africa to their own shocks, without and with the pandemic, using the vector autoregressive (VAR) model and monthly data covering 1970m01 (January 1970) to 2020m07 (July 2020). The results show that China's trade performs better while responding to a shock to America's trade than America's trade does while responding to a shock to China's trade, without and with COVID-19. This finding suggests that China has a stronger trade footing in Africa and that COVID-19 had not changed the trends of Africa's trade with China and America, even with the impact of the pandemic on China. China's dominant trade status in Africa is probably due to the country's large investment and aid in the continent. The key policy focus of Africa on trading with China and the US should therefore be how to achieve optimum trilateral trade thresholds in the face of potential trade-offs.

INTRODUCTION

International trade is a macroeconomic and international-relation issue that affects development in low-income countries, such as African countries. Trade promotes development in low-income countries in different ways, which include the following: (i) it increases economic growth which consequently leads to a rise in per capita income; (ii) it creates jobs; (iii) it makes a variety of goods and services to be available for consumers to purchase from both domestic and foreign sources;(iv)it promotes the flow of new technologies from advanced countries; and (v) it leads to an increase in human capital via the training and education associated with international commercial relations. These effects of trade in low-income countries promote development because they increase standards of living. Trade is, therefore, an important engine of development in low-income countries, particularly African countries which depend largely on the export of primary commodities and the import of intermediate inputs and capital goods for production.

Although Africa trades with different countries, China and the US are its leading trade partners; traditionally, the US was Africa's largest trade partner, but China's trade with Africa increased in recent years, and it overtook the US as Africa's largest trade partner since 2009 (Wenping, 2013). Due to China's dominance, the US began to compete with China regarding trading in Africa, which necessitates trilateral cooperation among China, the US, and Africa, in that Africa can only benefit maximally from trade through such cooperation and not through competition between its trade partners (Schneidman & Westbury, 2013). Africa's trade with China and the US is, therefore, an important policy issue, particularly with respect to COVID-19.

COVID-19 is a disease caused by a virus that belongs to a virus family called coronaviruses. Other viruses in the virus family are the severe acute respiratory syndrome (SARS) and the Middle East respiratory syndrome (MERS) viruses. The first case of COVID-19 was

identified by the World Health Organization (WHO) in Wuhan, a city in China, on 31st December 2019. The fast spread of the COVID-19 virus led to a national crisis in China, a declaration of a global emergency by WHO on 30th January 2020, and a further declaration by WHO of the virus as a pandemic on 11th March 2020. The pandemic has caused economic shocks at country and global levels.

While volatility points to swings in the values of variables, shocks point to extreme manifestation of volatility. That is, shocks are large and sudden changes in the values of variables, usually caused by unexpected events such as COVID-19. Shocks usually hinder macroeconomic performance in that they create uncertainty in the economic horizon, which makes economic agents to delay economic decisions, such as decisions to consume, produce, and trade (Jo, 2012). Among these decisions, decisions to trade are particularly important to Africa, in that African countries are trade-driven nations and they usually experience large macroeconomic fluctuations via the trade channel (Kose & Riezman, 2001; Mendoza, 1995). In line with the foregoing background, the objective of this paper is to examine the effects of shocks to Chinese and American trade with Africa without and with COVID-19, in order to investigate how the trends of the trade of the two economies with Africa have been affected by the pandemic. Using monthly data covering 1970m01 to 2020m07, the paper uses the vector autoregressive (VAR) model to examine the responses of the individual trade of China and the US with Africa to their own shocks, without and with the COVID-19 pandemic. Overall, the results show that, before and even with the pandemic, the resilience of China's trade with Africa to a shock to America's trade with the continent is stronger than the resilience of America's trade to a shock to China's trade. That is, China's trade tends to perform better while responding to a shock to America's trade than America's trade does while responding to a shock to China's trade. Basically, the trade of African countries is mostly with economies outside Africa, hence intra-Africa trade accounts for only 20% of the region's trade (Kohnert, 2018). This implies that shocks to Chinese and American trade with Africa will have significant effects on Africa, since China and the US are non-African countries and they are the largest trade partners of the region.

The findings suggest the following: (i) African traders have more confidence to trade with China during a shock; (ii) China has a stronger trade footing in Africa than the US; and (iii) COVID-19 has not changed the trends of Chinese and American trade with Africa, in terms of the relative shares of the countries in Africa's

trade before the pandemic. China's dominant trade status in Africa is likely due to its large investment and aid in the continent, since governments, individuals, and firms of low-income countries are usually motivated to trade with a foreign country with such financial outflows, due to their positive impacts on productivity and economic welfare.

The key policy implication of these findings for Africa is that America's commercial presence in the continent can only increase without hindering the benefits of China's commercial presence if optimum trilateral trade thresholds are determined. The paper proceeds as follows: section two presents the review of related literature; the methodology of the paper is discussed in section three; analysis and discussion of results are done in section four; while concluding remarks are made in section five.

Theoretical Framework

First, the export-led growth theory explains the role of trade in developing countries, such as African countries. The theory indicates that exports are the main driver of growth in countries that depend largely on them, relative to labour, capital, knowledge, and technology (World Bank, 1993; Yang, 2008; Alimi, 2012). Since growth is the overall indicator of economic performance, the export-led growth theory implies that the performance of the other sectors of the economy depends on the trade sector, particularly the exports component of the sector.

Second, the theory of small-open economy explains the roles of openness and size in the international trade of small-open economies, such as African countries (Fleming, 1962; Mundell, 1963; Dornbusch, 1976). The export-led growth theory and the small-open economy theory are therefore consistent with each other in certain ways: (i) Economic openness, which points to the openness of the economy to international trade and financial flows, is required to make the export-led growth theory to work in a country. (ii) The theory of small-open economy shows that small countries, such as African countries, can be largely influenced by big economies, such as the US, while big economies cannot be influenced in the same way by small economies. This means that developments in large economies can be transmitted largely to small-open economies through the trade channel, which will consequently affect how the export-led growth theory works in small economies. This implies that the impact of COVID-19 on China and the US will likely affect their trade with Africa.

Apart from the export-led growth theory and the small-open economy theory, which are general theories that

have applicability to Africa, there are theoretical models on Africa that explain the role of trade in the continent. For example, Kose and Riezman (2001) developed a theoretical model of a typical African economy to examine the relative roles of trade and financial shocks in the macroeconomic fluctuations of African countries. The empirical estimation of the model shows that although African countries are heavily indebted, shocks to the world interest rate do not induce macroeconomic fluctuations as trade shocks do in these countries. The authors show that trade shocks cause about 44% fluctuations in aggregate output, while shocks to the world interest rate have insignificant effects. These empirical findings on Africa are consistent with those of Baxter and Kouparitsas (2005), who show that trade is the most important channel of international comovements of business cycles for all countries, including countries that are members of a currency union and use the same currency, which is a potentially strong financial link. The implication of this finding is that the co-movements induced by membership in a currency union come through the trade channel.

Empirical Literature
International shocks are unexpected and large changes in the values of economic and financial variables and can be categorized as crisis-based and non-crisis-based shocks (Baur, 2012; Guesmi et al., 2013; Dornbusch et al., 2000; Mendoza, 1995; Shimokawa & Kyle, 2003; De Waal, 2014). This definition of shocks implies that they are the differences between the expected and actual values of variables. That is, the unexpected components of the changes in the values of variables are the differences between the expected and actual components. Expectations, therefore, play a key role in measuring shocks. Crisis-based shocks, also called contagions, involve the transmission of negative events from one economy into another economy due to the behaviour of economic agents, such as investors. For example, investors can relocate their assets from one country to another one because they lose confidence in the first country due to a crisis it experiences, which can eventually make the crisis to be transmitted into the second country without changes in the latter's economic fundamentals, such as GDP.

On the other hand, non-crisis-based shocks point to large and unexpected changes in the values of economic and financial variables in tranquil periods. Unlike crisis-based shocks, non-crisis-based shocks involve changes in economic fundamentals. Crisis-based shocks are usually driven by factors such as panic during transmission via trade and financial channels. On the

other hand, non-crisis-based shocks are transmitted without such factors via trade and financial channels. The COVID-19 shock is a crisis-based shock that has affected individual countries and the global economy as a whole.

Factors such as the mobility of individuals contributed to the spread of COVID-19, but containment measures have been effective in controlling the pandemic (Deb et al., 2020). However, the economic and financial effects of the pandemic have been severe. The pandemic has reduced the performance of key stock markets of the world, such as those of Japan, Korea, Singapore, the US, Italy, and the UK, with higher effects on the markets of Asian countries (Liu et al., 2020).

One of the major economic effects of the pandemic is the plunge in the prices of oil, the most globalized commodity. World Bank (2020) shows that the pandemic caused a large fall in oil prices because the restrictions imposed to control it reduced transport, which accounts for about two-thirds of oil consumption in the global economy, consequently leading to lower revenues and standards of living in energy-exporting emerging and developing economies (EMDEs). As the author shows, the pandemic has triggered a downturn in the growth of the global economy that has been projected to be the deepest, when compared to the global recessions of the last seven decades, namely 1975, 1982, 1991, and 2009 recessions.

The downturn in the growth of the global economy is due to the fact that both developing economies, such as the EMDEs mentioned above, and developed economies have been largely affected by the pandemic. Ihrig et al. (2020) show that the US, the largest advanced country, was experiencing an unprecedented economic expansion before its activity was hindered by the pandemic, making its real GDP to fall by 5% and 33% in the first and second quarters of 2020 respectively. Such economic downturns would be transmitted into other countries of the global economy via trade and financial channels due to globalization, worsening economic conditions induced internally by the pandemic in other countries.

The cross-country transmission of economic downturns is what eventually leads to a global recession, in that when the recessions caused by the downturns in individual countries become synchronized, the world economy as a whole will experience a recession. The global economy can be viewed as an entity on its own, produced from the mix of national economies. Therefore, the global economy has its own business cycle and variables, such as global GDP, oil demand, and unemployment. Recessions in individual countries, defined as phases of their business cycles that show significant declines in economic activity that last for

considerable periods of time, such as two consecutive quarters (Abberger & Nierhaus, 2008), will lead to a similar condition of the business cycle of the global economy when they become synchronized.

METHODOLOGY
The analysis of this paper involves exploring the responses of the individual trade of China and US with Africa to their own shocks, using a bivariate VAR model whose endogenous variables are the variables in question, and monthly data spanning 1970m01 to 2020m07. This paper aims to track the responses of the individual trade of China and the US with Africa to their own shocks based on the interdependences and interlinkages only between the two variables. Hence, the bivariate VAR model is the appropriate model for the analysis, in that it allows for dynamic interactions between the variables without the influence of other variables.

The VAR Model
As shown in the above steps, the VAR model is the main econometric model used in the analysis. The VAR model is a system of equations where each endogenous variable is regressed on its own lags and the lags of the other endogenous variable(s). A VAR (p) model is of the following form;

$$y_t = \gamma + A_1 y_{t-1} + \ldots + A_p y_{t-p} + u_t \quad (1)$$

where y_t is a vector of endogenous variables; γ is a vector of intercepts; A_i are coefficient matrices; and u_t is a vector of serially uncorrelated error terms with zero means. The lag order of the VAR model is determined by information criteria, such as the Akaike information criterion (AIC) and the Schwarz Bayesian criterion (SBC).
In line with equation (1), the bivariate VAR model of the individual trade of China and US with Africa used in this paper can be written as;

$$LRCT_t = A_1 + \sum_{j=1}^{j=p} B_j LRCT_{t-j} + \sum_{j=1}^{j=p} C_j LRUT_{t-j} + u_{1t} \quad (2)$$
$$LRUT_t = A_2 + \sum_{j=1}^{j=p} D_j LRUT_{t-j} + \sum_{j=1}^{j=p} E_j LRCT_{t-j} + u_{2t} \quad (3)$$

where LRCT and LRUT stand for the natural log of real China's trade with Africa and US trade with Africa

respectively; A_1 and A_2 are intercepts; B, C, D, and E are the parameters of the lagged terms of the endogenous variables; and u_{1t} and u_{2t} are serially uncorrelated error terms. The variables of equations (2) and (3) should be differenced accordingly, based on the results of unit root tests.
Stock and Watson (2001) show that the main objectives of VAR modeling are: (i) data description, which points to using the VAR model to show what the data say about the relationships between variables, usually without the influence of any theoretical input in the model, using impulse response functions, forecast error variance decompositions, and Granger causality; (ii) structural modeling, which involves specifying the theoretical links between the variables of a VAR model, using relevant theories; (iii) forecasting, which involves using the VAR model to extrapolate historical data for variables of interest; and (iv) policy analysis, which points to using the VAR model to explore the effects of policy options, such as the relative effects of monetary and fiscal policies. Impulse response functions, forecast error variance decompositions, and Granger causality are also employed accordingly for structural modeling and policy analysis of VAR models.
The analysis of the VAR model of the present paper is basically for data description, in that the analysis involves exploring what the data say about the relationship between Chinese trade with Africa and US trade with Africa without building the links between the variables of the model on the basis of any theory, as done for a structural VAR. However, there are theories that are consistent with the analysis of the paper that are discussed under the literature review section. The discussion of such theories is still necessary to show that the analysis of the paper has theoretical footing in the existing literature.

Data
The data used for the analysis were collected from the real sector database of the International Monetary Fund (IMF). The data on trade are situated in the Direction of Trade Statistics, a sub-section of the real sector database in question. Information on the data is given in Table 1 below. The information covers variables on which data were collected, descriptions of the variables, and the periods of data coverage.

Table 1. The Data of the Study.

Variable	Description	Period Covered
China's trade with Africa	Sum of China's exports to Africa and China's imports from Africa in millions of US Dollars.	1970m01 to 2020m07
US trade with Africa	Sum of US exports to Africa and US imports from Africa in millions of US Dollars.	1970m01 to 2020m07
US consumer price index (CPI)	CPI of the US for all items.	1970m01 to 2020m07

Note: For each country, data on exports and imports were obtained separately and added to get total trade. Thereafter, the CPI was used to deflate total trade to obtain its real value for each country.

RESULTS AND DISCUSSIONS

Graphs of Chinese and American Trade with Africa

The presentation and discussions of results start with the graphs of Chinese and American trade with Africa before and during COVID-19. Rather than presenting one graph for only the full sample, the two graphs are presented for a more robust graphical examination. The graph for the full sample (1970m01-2020m07) of the analysis is first presented in Figure1, before the graph for the COVID-19 period (2019m12-2020m07) is presented in Figure 2. The graph for the full sample shows that US was Africa's largest trade partner before it was overtaken by China in 2009. It seems competition between the two countries increased after that year, in that the graph shows that the US gained back the

position of the leading trade partner briefly and China overtook it again in 2012. China has maintained the leading position since 2012, as shown by the graph.

The graph for the full sample also shows that the trade of the two countries with Africa was affected by COVID-19. The effects of the pandemic on the trade of two countries are made clearer by the graph for the COVID-19 period presented in Figure 2. This second graph confirms China's leading trade position and also shows that the trade of the two countries fell during the pandemic with different dimensions of recovery after the fall. America's trade tended to increase again in April 2020 but the increase was insignificant, while China's trade began to increase significantly beginning from May 2020.
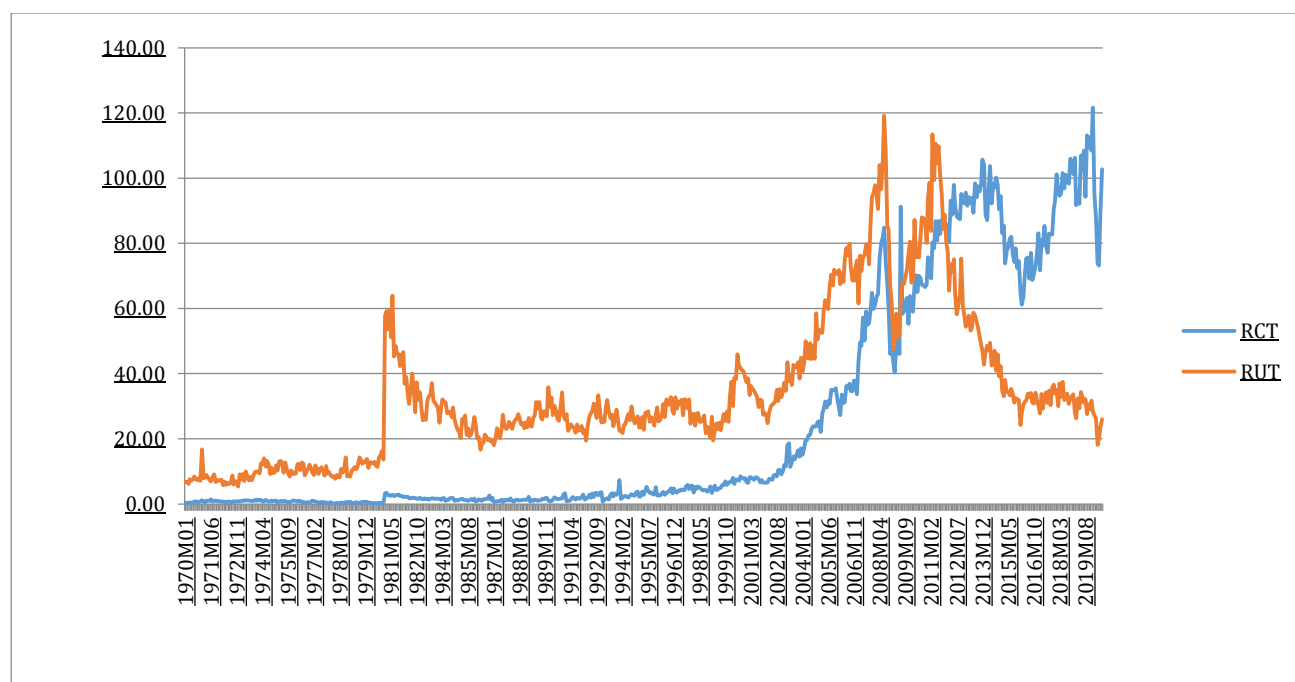

Figure 1. Chinese and American Trade with Africa, 1970m01-2020m07.

Note: RCT and RUC stand for the real trade of China and the real trade of US respectively. The nominal trade values of the countries were obtained in millions of US Dollars and deflated with US CPI.
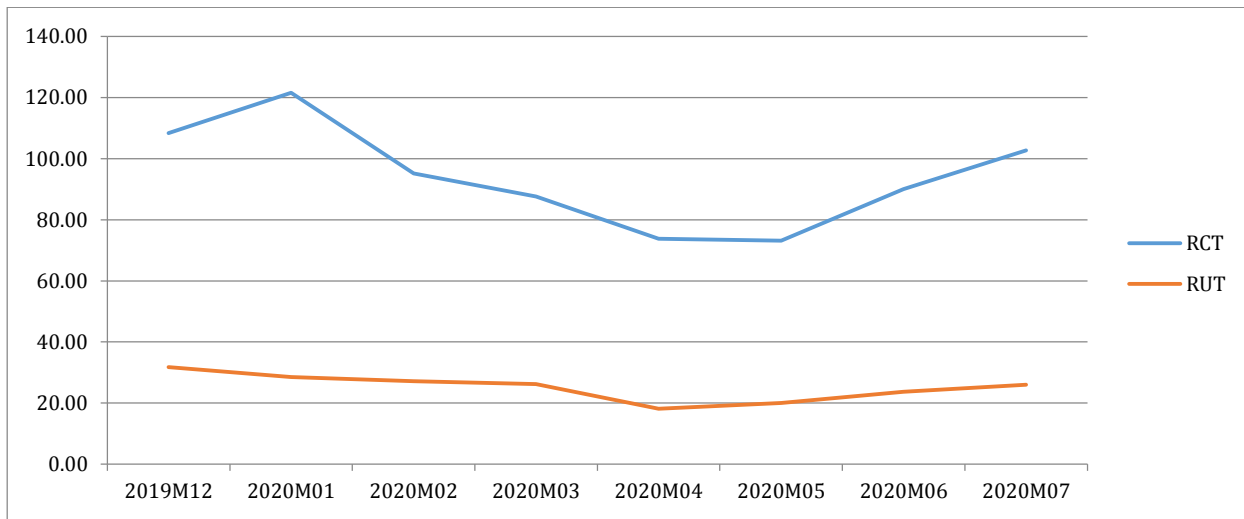
Figure 2. Chinese and American Trade with Africa During COVID-19, 2019m12-2020m07.
Note: RCT and RUC stand for the real trade of China with Africa and the real trade of US with Africa respectively. The nominal trade values of the countries were obtained in millions of US Dollars and deflated with US CPI.

Unit Root Tests Results

The presence of unit roots in time series implies that the series are not stationary. The non-stationarity means that concerned series do not exhibit mean reversion. In the context of this paper which involves the simulation of shocks within the VAR framework, absence of mean reversion for variables means that the variables will not recover from the effects of shocks. That is, the effects of shocks will not die off, since the variables cannot revert to their means. Therefore, it is necessary that variables are differenced when they are not stationary.

The results of the unit root tests conducted in this paper are presented in Table 2. The results show that the two variables (log of real Chinese trade with Africa and log of real US trade with Africa) whose stationarity properties are examined are stationary after they are differenced once, meaning that they are I(1). The variables are therefore modeled in the first-difference form in the VAR model.

Table 2. Unit Root Tests Results.

Variable	ADF				PP			
	ADF Test Statistic	1% Critical Value	5% Critical Value	10% Critical Value	PP Test Statistic	1% Critical Value	5% Critical Value	10% Critical Value
LRCT (with intercept)	-0.35924	-3.44115	-2.8662	-2.56931	-1.10261	-3.44091	-2.86609	-2.56925
D(LRCT) (with intercept)	-7.84148	-3.44115***	-2.8662**	-2.56931*	-49.9706	-3.44093***	-2.8661**	-2.56926*
LRUT (with intercept)	-2.35325	-3.44093	-2.8661	-2.56926	-2.43294	-3.44091	-2.86609	-2.56925
D(LRUT) (with intercept)	-36.4511	-3.44093***	-2.8661**	-2.56926*	-37.6487	-3.44093***	-2.8661**	-2.56926*

Note: *ADF points to Augmented Dickey-Fuller; PP to Phillip-Perron; ***, **, and* to stationarity at 1%, 5%, and 10% respectively; LRCT and LRUT to the natural log of real Chinese and real US trade with Africa respectively; and "D" to first difference.*

VAR Lag Order Selection

The lag order of the VAR model is selected based on information criteria. Table 3 presents the optimum lag orders selected by the Akaike Information Criterion (AIC), Schwarz Information Criterion (SC), and Hannan-Quinn Information Criterion (HQ).SC and HQ select 2 as the optimum lag order, while AIC selects 6. The paper, therefore, models the VAR model as a VAR(2) model, since two out of the three information criteria select 2 as the optimum lag order.

Table 3. VAR Lag Order Selection Criteria.

Lag	AIC	SC	HQ
0	-0.642542	-0.627848	-0.636821
1	-0.933141	-0.889058	-0.915978
2	-1.014347	-0.940875*	-0.985742*
3	-1.020983	-0.918123	-0.980936
4	-1.033241	-0.900992	-0.981751
5	-1.046995	-0.885358	-0.984064
6	-1.058472*	-0.867447	-0.984099
7	-1.052505	-0.832090	-0.966689
8	-1.041389	-0.791586	-0.944131

Note: AIC stands for Akaike Information Criterion; SC for Schwarz Information Criterion; and HQ for Hannan- Quinn Information Criterion.

Impulse Response Functions

The responses of Chinese and American trade with Africa to their own shocks for the period without COVID-19 (1970m01-2019m11) and the period with COVID-19 (1970m01-2020m07) are shown in the impulse response functions of Figures 3 and 4 below. An impulse response function tracks the response of a variable to a shock to the variable itself or to another variable in a VAR model. A shock to a variable point to a one-unit change in the error of the variable. However, the errors terms of a reduced-form VAR model,[1] the type of model used in this paper, are usually correlated, due to the interlinkages among the endogenous variables of the model. Such correlation in turn makes the impulses of the model to be correlated.

Therefore, it is necessary that the impulses of a reduced-form VAR model are made to be uncorrelated across equations when focusing on the impulses of interest. The paper employs the Cholesky ordering technique to achieve this objective. The technique orthogonalizes the impulses of a VAR model by arranging the variables of the model in a particular way and ascribing all the effects of any correlation of impulses to the first variable in the ordering, so that a change in ordering changes the responses of the ordered variables to shocks (Eviews, 2017). The variable placed first in the Cholesky ordering should therefore be chosen on the basis of empirical discretion. China's trade with Africa is placed first in the Cholesky ordering of this paper, because the literature

and even the graphs examined above suggest that China's commercial presence in Africa is such that shocks to China's trade with Africa will likely be more powerful than shocks to US trade with Africa.

As shown in Figure 3, in the period without COVID-19, there are significant falls for both Chinese trade and American trade in the short-run when each country's trade experiences its own shock, but the variables begin to have upward trends after two months and are unable to have significant values in the long-run thereafter. However, the figure shows that the response of Chinese trade to the shock to American trade is different from the response of American trade to the shock to Chinese trade. While responding to the shock to American trade, Chinese trade first has an upward trend over a month, falls thereafter over two months and then rises over a month, before the effects of the shock begin to die. However, while responding to the shock to Chinese trade, American trade first falls over three months, then rises over a month, before the effects of the shocks begin to die. The differences in these responses, particularly the varying trends at the beginning of the responses, suggest that China's trade performs better, in that it demonstrates more resilience to the shock from US trade than US trade does to the shock from it. Let us now turn our attention to Figure 4, which shows the responses to the shocks under consideration when the sample period is extended to cover the COVID-19 time.

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[1]VAR models can be classed as reduced-form, recursive, and structural models, based on how endogenous variables

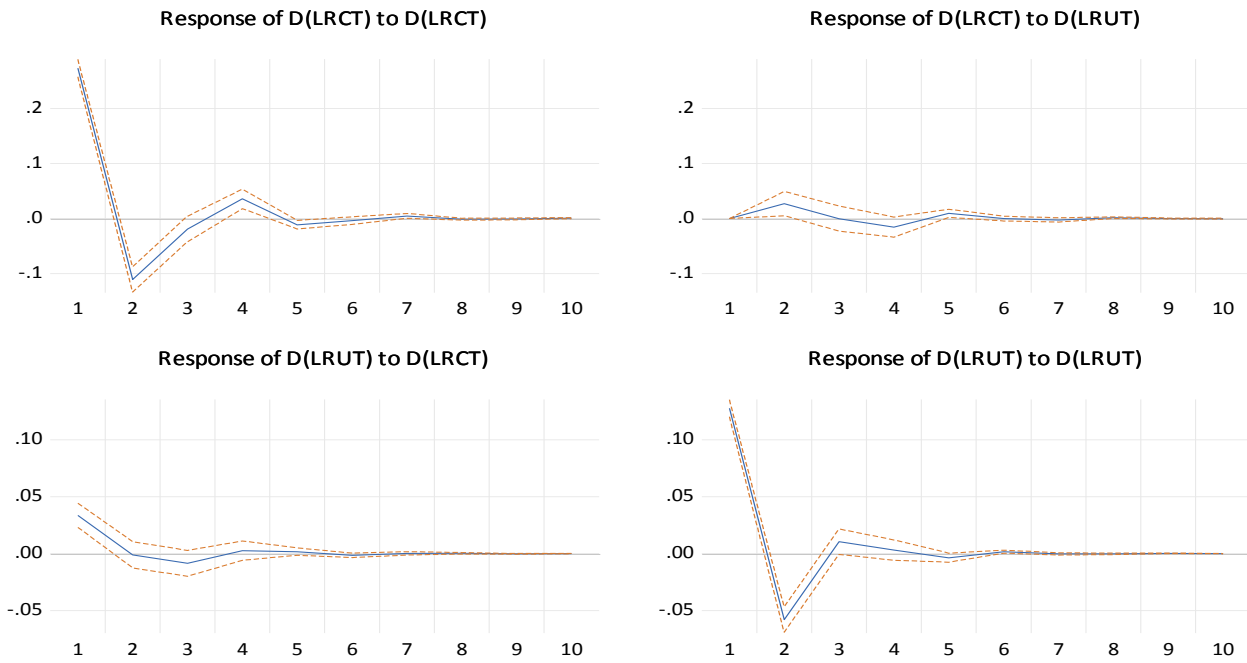are specified and correlations of errors terms across equations are dealt with.

Response to Cholesky One S.D. (d.f. adjusted) Innovations ± 2 S.E.

Response of D(LRCT) to D(LRCT)

Response of D(LRCT) to D(LRUT)

Response of D(LRUT) to D(LRCT)

Response of D(LRUT) to D(LRUT)

Figure 3. Impulse Responses to Trade Shocks in the Period without COVID-19, 1970m01-2019m11.
Note: LRCT and LRUT represent the natural log of real Chinese and real US trade with Africa respectively; while "D" points to first difference. Magnitude of shock impact on trade and time (month) are measured on y and x axes respectively. The impulses of the impulse response functions are orthogonalized ones associated with the following Cholesky ordering: D(LRCT), D(LRUT).

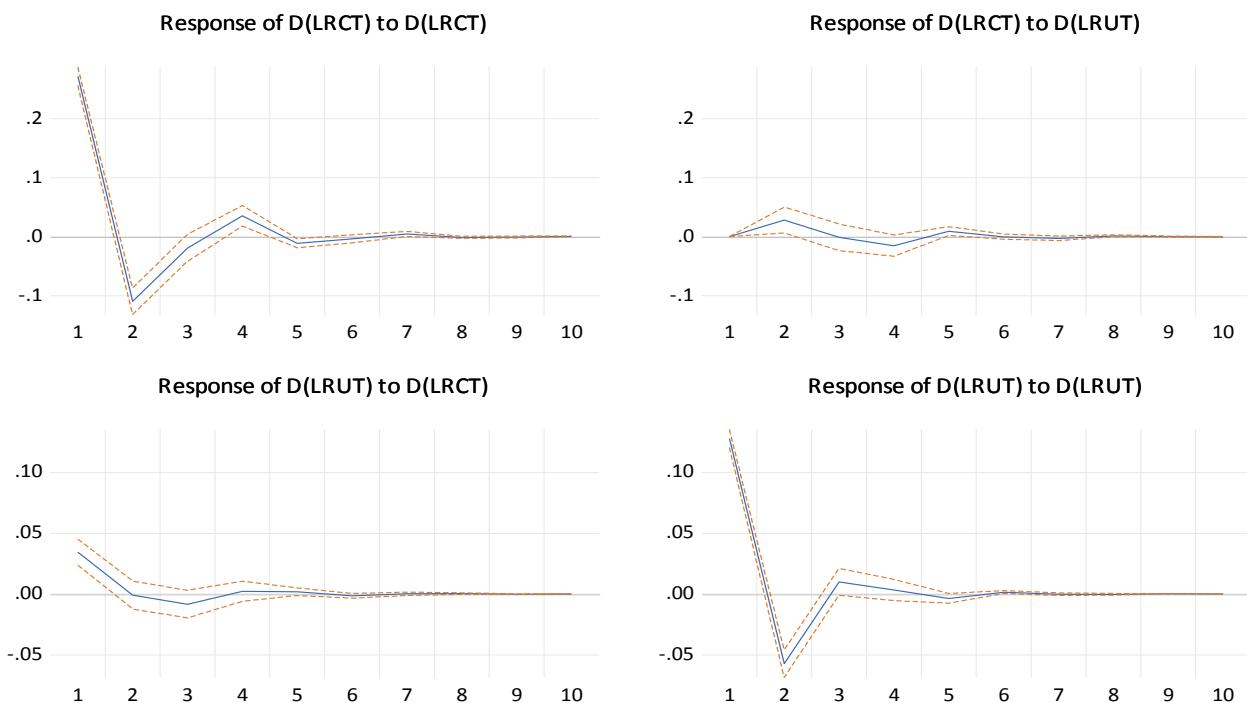**Response to Cholesky One S.D. (d.f. adjusted) Innovations ± 2 S.E.**

Response of D(LRCT) to D(LRCT)

Response of D(LRCT) to D(LRUT)

Response of D(LRUT) to D(LRCT)

Response of D(LRUT) to D(LRUT)

Figure 4. Impulse Responses to Trade Shocks in the Period with COVID-19, 1970m01-2020m07.
Note: LRCT and LRUT represent the natural log of real Chinese and real US trade with Africa respectively; while "D" points to first difference. Magnitude of shock impact on trade and time (month) are measured on y and x axes respectively. The impulses of the impulse response functions are orthogonalized ones associated with the following Cholesky ordering: D(LRCT), D(LRUT).

As shown in Figure 4, there are no significant differences in the effects of the trade shocks when the period with COVID-19 is covered in the analysis, which implies that the pandemic has not changed the trends of Chinese and American trade with Africa. This means that China has stronger trade footing in Africa than the US before and even with COVID-19. These results are confirmed by the forecast error variance decompositions of Tables 4 and 5.

Forecast Error Variance Decompositions
The forecast error variance decompositions for the period without COVID-19 (1970m01-2019m11) and the period with COVID-19 (1970m01-2020m07) are presented in Tables 4 and 5 below. The forecast error variance decompositions show the share of the forecast error of a variable of a VAR model that is ascribed to

shocks to the variable itself and to other variables of the model. Since this technique involves decomposing the forecast error variance of the forecast for a variable into components accounted for by shocks or innovations to all the variables of a VAR model, the forecast error variance technique is also called innovation accounting. The forecast error variance decompositions show the extent of future uncertainty of a variable of a VAR model that is ascribed to the variable itself and to other variables, in that the technique is concerned with forecasting, which involves the prediction of the future values of variables. The forecast error variance decompositions require that shocks are orthogonalized like the impulse response functions do. Hence, this paper also employs the Cholesky ordering to orthogonalize shocks for the forecast error variance decompositions.

Table 4. Forecast Error Variance Decompositions for the Period without COVID-19, 970M01-2019M11.

Forecast variance decomposition in	Period	Shares of forecast error variance accounted for by shocks to	
D(LRCT)		D(LRCT)	D(LRUT)
	1	100.0000	0.000000
	2	99.16185	0.838155
	3	99.16531	0.834693
	4	98.90529	1.094709
	5	98.80913	1.190872
	6	98.80932	1.190685
	7	98.80094	1.199062
	8	98.79853	1.201471
	9	98.79853	1.201467
	10	98.79836	1.201642
D(LRUT)	1	6.489197	93.51080
	2	5.450935	94.54906
	3	5.749764	94.25024
	4	5.776595	94.22340
	5	5.786597	94.21340
	6	5.796831	94.20317
	7	5.797058	94.20294
	8	5.797522	94.20248
	9	5.797733	94.20227
	10	5.797735	94.20227

Note: LRCT and LRUT represent the natural log of real Chinese and real US trade with Africa respectively; while "D" points to first difference. The forecast error variance decompositions are based on the following Cholesky ordering: D (LRCT), D(LRUT).

Table 5. Forecast Error Variance Decompositions for the Period with COVID-19, 1970M01-2020M07.

Forecast variance decomposition in	Period (month)	Shares of forecast error variance accounted for by shocks to	
		D(LRCT)	D(LRUT)
D(LRCT)			
	1	100.0000	0.000000
	2	99.08820	0.911800
	3	99.09067	0.909326
	4	98.84041	1.159587
	5	98.74297	1.257028
	6	98.74314	1.256862
	7	98.73505	1.264946
	8	98.73265	1.267355
	9	98.73265	1.267350
	10	98.73248	1.267520
D(LRUT)	1	6.745560	93.25444
	2	5.692392	94.30761
	3	5.981664	94.01834
	4	6.000744	93.99926
	5	6.012927	93.98707
	6	6.022589	93.97741
	7	6.022702	93.97730
	8	6.023229	93.97677
	9	6.023426	93.97657
	10	6.023426	93.97657

Note: LRCT and LRUT represent the natural log of real Chinese and real US trade with Africa respectively; while "D" points to first difference. The forecast error variance decompositions are based on the following Cholesky ordering: D(LRCT), D(LRUT).

As shown in tables 4 and 5, the forecast error variances of Chinese and American trade are significantly caused by own shocks over the period of 10 months, without and with COVID-19. However, before and with COVID-19, the forecast error variance of China's trade accounted for by shocks to US trade is about 1% on average, while the forecast error variance of US trade accounted for by shocks to China's trade is about 6% on average. These results indicate a stronger influence of China's trade and that COVID-19 has not changed the trends of Chinese and American trade with Africa, confirming the results of the impulse response functions.

Granger Causality Tests
The Granger Causality tests are also conducted for the periods before and with COVID-19. The results are presented in Tables 6 and 7. Granger causality is based on the principle of cause and effect which shows that a cause should come before and not after the effect. Hence, for the case of the VAR model of this paper in which each of the two endogenous variables (i.e. Chinese trade with

Africa and US trade with Africa) is modeled as a function of its own lagged terms and the lagged terms of the other variable, the following are the four possibilities of Granger causality.

(i) Unidirectional Causality from Chinese Trade to US Trade: This occurs when the coefficients of the lagged terms of Chinese trade have statistically significant effects on the current value of US trade, while the coefficients of the lagged terms of US trade do not have statistically significant effects on the current value of Chinese trade.

(ii) Unidirectional Causality from the US Trade to Chinese Trade: This occurs when the coefficients of the lagged terms of US trade have statistically significant effects on the current value of Chinese trade, while the coefficients of the lagged terms of Chinese trade do not have statistically significant effects on the current value of the US trade.

(iii) Bilateral Causality between Chinese Trade and US Trade: This occurs when the coefficients of the lagged terms of each of Chinese trade and US trade have statistically significant effects on the current value of the

other variable. This case of causality, also called feedback causality, is the combination of the two cases of unidirectional causality.

(iv) Independence of Chinese Trade and US Trade: This occurs when the lagged terms of Chinese trade do not have statistically significant effects on the current value of US trade and the lagged terms of US trade do not have statistically significant effects on the current value of Chinese trade. This case of causality implies that the two variables are independent of each other.

Table 6. Granger Causality Test for the Period without COVID-19, 1970M01-2019M11.

Pairwise Granger Causality Tests			
Sample: 1970M01 2019M11			
Lags: 2			
Null Hypothesis:	Obs	F-Statistic	Prob.
D(LRUT) does not Granger Cause D(LRCT)	596	3.77381	0.0235
D(LRCT) does not Granger Cause D(LRUT)		3.68627	0.0256

Note: LRCT and LRUT represent the natural log of real Chinese and real US trade with Africa respectively; while "D" points to first difference.

Table 7. Granger Causality Test for the Period withCOVID-19, 1970M01-2020M07.

Lags: 2			
Null Hypothesis:	Obs	F-Statistic	Prob.
D(LRUT) does not Granger Cause D(LRCT)	604	4.02178	0.0184
D(LRCT) does not Granger Cause D(LRUT)		3.83515	0.0221

Note: LRCT and LRUT represent the natural log of real Chinese and real US trade with Africa respectively; while "D" points to first difference.

As shown in Tables 6 and 7, China's trade with Africa and US trade with Africa Granger cause each other, without and with the pandemic. The results imply that the past values of one variable affect the current value of the other variable, without and with COVID-19. That is, the "history" of China's trade is an important determinant of the current level of America's trade, without and with COVID-19. The same is applicable to the "history" of US trade and the current level of China's trade. These findings indicate that some degree of competition exists between the two countries regarding trading in Africa, in that commercial competitors usually look at the past records of each other to make decisions. Overall, the results of this paper are consistent with existing literature, which shows that although Africa is a trade-driven continent (Kose & Riezman, 2001), whose main trade partners are US and China, the dominant role of China's share in the continent's trade has not changed since it overtook the US in 2009 (Wenping, 2013; Schneidman & Westbury, 2013). COVID-19 has not even changed China's status as Africa's dominant trade partner, as shown in the graph of Figure 2, drawn with data obtained from the IMF, which shows that China's trade is significantly above America's trade during the pandemic.

CONCLUSIONS

Three important conclusions have been derived from the findings of this paper regarding Chinese and American trade with Africa. First, China's trade with Africa performs better while responding to a shock to America's trade than the latter performs while responding to a shock to the former. This suggests that China has stronger trade footing in Africa than America and that China is Africa's dominant trade partner. Second, COVID-19 has not changed the trends of Chinese and American trade with Africa, as the dominance of China's trade is observed before and even with the pandemic.

The third conclusion on Chinese and American trade with Africa is that the current level of one country's trade is driven by the past values of the other country's trade, before and even with COVID-19. This implies that the two countries compete for commercial presence in Africa and that COVID-19 has not stopped the competition.

An important development policy implication of the above conclusions is that Africa can only benefit maximally from the commercial presence of China and the US in the continent, if trilateral trade thresholds are determined through cooperation among the three economies. This is because competition between China and US on trading in Africa will not impact positively on Africa's economy and the wellbeing of individuals in the continent like cooperation will do. For example, the US-China war on commercial presence in Africa will affect the confidence of Africans to trade with the two countries because such a war will create uncertainty, which will consequently lead to falls in the prices of traded goods and services and reductions in the incomes of African traders.

Finally, although this paper has got useful findings on the effects of COVID-19 on the trends of Chinese and American trade with Africa, another important aspect of this subject is predicting the future course of the trade through a forecasting analysis. This requires extrapolating historical data that cover the COVID-19 period. It would be useful that future research focuses on this aspect.

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