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ASYMMETRIC RESPONSE OF NON-OIL EXPORT TO ECONOMIC DIVERSIFICATION IN NIGERIA

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Abstract

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Corresponding author Ibrahim Muhammed Dahiru Email: ibrahimmuhddahiru@fugashua.edu.ng Phone N0: 08039749731 Economic diversification remains a challenge for most developing countries and is arguably greatest for countries with the lowest incomes as well as for those whose economies are small, landlocked and/or dominated by primary commodity dependence. This study examines the asymmetric response of nonoil export on economic diversification in Nigeria for the period of 1985-2021. The empirical evidence from non-linear Auto-Regressive Distributive lag (NARDL) model shows that both agricultural export and mineral export have positive and statistically significant effect on economic diversification in Nigeria. The Wald test reveals the existence of asymmetry response in the longrun of non-oil export in the Nigeria. Furthermore, the growth rate is more influenced by positive change than the negative change in the non-oil export. The study recommends that Nigerian government should enhance the productivity and output of non-oil commodities as well as providing markets for these commodities. Diversification policy should be adopted in the economy and ensure maximum contributions from all faces of the subsectors in the economy in order to achieve economic diversification in Nigeria.

1. Introduction

The COVID-19 pandemic and the recent oil price crash with high uncertain outlook for global oil market, Nigeria is again standing at a crossroads. As much as it is a crisis, the COVID-19 pandemic is also an opportunity to foster diversification of the economy that is long overdue. The path Nigeria chooses now will have implications for decades to come.

Since Nigeria became a major oil producer in the 1970s, hydrocarbon products have persistently accounted for 90% of Nigeria's exports. Non-hydrocarbon exports composition has changed little over the past three decades and

a large share remains agricultural and mineral commodities, such as cocoa beans, wood, rubber and fertilizer. Nigeria has been a mono-cultural economy since the 1970s and relies heavily on oil as its main source of revenue. The Nigerian macroeconomic variables are highly volatile due to the change of oil prices (Enoma and Mustafa, 2011). The main impact of this fragile structure of the Nigerian economy is that, the economy has grown without creating jobs and reducing poverty (Adeniran and Ben, 2018). The oil and gas sector still accounts for 80 per cent of Nigeria's total national revenue despite crude oil theft. Nigeria's exports in the second quarter of 2022 were dominated by crude oil, accounting for 80 per cent of total export revenue despite the huge oil theft recorded in recent times (NBS, 2022). Onwualu (2012) argues that a value chain approach to agriculture has the potential to create a diverse range of activities that can open up the economy, create jobs and promote industrialization and virtually for future sustained economic growth.

In the past, the government made efforts to increase non-oil export trade by introducing supportive measures such as the protectionist policies of import substitution policies of industrialization the 1960s. in trade liberalization policies in the mid-1980s (which took the form of structural adjustment programs), export promotion policies in the 1990s through increased policy support for small and medium enterprises (SMEs) to increase productivity and export local products. Nigeria's diversification approach should cover manufacturing and exports. This includes robust manufacturing, agricultural processing, other non-agricultural production, refined products, and other services (World Bank, 2000).

Over the years, successive Nigerian governments have made efforts to diversify the economy through policy formulation, institutional support, and implementation of policies across different economic sectors. Developing countries are producing large amounts of primary raw materials that are subject to large price volatility and climate change and for economic stability it is important to diversify its export activities to make the most of its abundant natural resource base (World Bank, 2019). In this way, country's economy will experience stability and compete with other world economic powers. The importance of diversification has been discussed and established as a cornerstone of sustainable economic growth. Some authors argue that this is very important for providing employment opportunities through the development of export-oriented industries. For example. Uzonwanne (2015) argues that economic diversification requires the full inclusion and active engagement of other key sectors that can make valuable contributions to the economy and enhance Nigeria's growth potential. Sound export policies must be encouraged to promote per capita income. Ogunjimi, Aderinto and Ogunro (2015) in their studies shown that economic diversification can improve a country's balance of payments through inflows of foreign currency earnings.

A battery of development policies to promote non-oil exports, including the Structural Adjustment Program (SAP) between 1986 and 2000, the National Economic Empowerment and Development Strategy (NEEDS) between 2004 and 2017, and the Economic Recovery and Growth Plan (ERGP) more recently, have had limited impact on export diversification. The negative effects of over-reliance on the oil trade have increased the need and reputation to diversify Nigeria's economy from oil to non-oil export trade. Proponents of this increased share of non-oil exports argue that non-oil trade has great potential to lead the Nigerian economy to desired growth and development. Recently, Zero oil Initiative was developed in 2016 by the Nigerian Export Promotion Council in partnership with the Ministry of Budget and National Planning, the Zero Oil Initiative aims to boost exports, diversify the economy away from oil dependency and enhance the country's reserve status. The plan is incorporated into the Economic Recovery and Growth Plan and was developed in response to the 2016 economic recession and to reduce over-reliance on crude oil exports for export growth and economic diversification in general. However, despite the adoption of the Zero Oil Initiative in the Federal Government's 2017-2020 Recovery and Growth Plan (ERGP), the performance of the non-oil sector remains limited as diversifying the agenda.

2. Literature Review

2.1 Economic Diversification

In general, the term "economic diversification" is used to describe the process by which a country seeks to expand the range of annual output produced through various production channels. It can also be viewed as the process of investing in different sectors of the economy. This ensures that failure of one sector or recession affecting one sector does not adversely affect the rest of the economy. Some scholars suggest that growth and development in a diversified economy is reasonable if savings are mobilized from surplus to deficit sectors of the economy (Eko, Utting and Onun, 2013).

Economic diversification is no longer ideal for the Nigerian economy, but a necessity for sustained economic growth. The recent global oil shock triggered by the COVID-19 pandemic has itself added to a long history of oil price shocks, highlighting the uncertainty of Nigeria's over-reliance on crude oil for its export markets 89 million people (45% of the population) live below the poverty line and economic vulnerabilities in oil-dependent countries are further exposed by the COVID-19 pandemic is particularly important for both Government and private sector participation as to develop shortand medium-term strategies on the development of viable non-petroleum products in Nigeria to diversify Nigeria's export markets. Previous attempts to diversify exports and establish diversified sources of foreign income while generating increasing profits have not produced the levels of productivity and growth needed to sustain the Nigerian nation. In order to promote export diversification, it is necessary to identify key economic values that may induce market actors (both public and private) to move from a single export market to a diversified export market and stay away from oil into non-oil sectors. One such collaborative effort is NEPC's Zero Oil Initiative. The initiative aims to provide an avenue for export diversification through trade by prioritizing viable non-petroleum products with the potential to generate transformative economic impact.

Economic diversification can be defined as the shift toward a more varied structure of domestic production and trade with a view to increasing productivity, creating jobs and providing the base for sustained povertyreducing growth.

According to Olaleye, Edun and Taiwo (2014), Nigeria is stepping up efforts to improve its non-oil sector as a step towards diversification through its macroeconomic policy framework. These policies had attributes of protectionism, trade liberalization, and export promotion. The authors cite the establishment of several institutions such as the Nigerian Export-Import Bank (NEXIM) and the Nigerian Export Promotion Council (NEPC) as further efforts to effectively implement the guidelines developed (Olaleye, et al, 2014).

2.2 Empirical Literature

Nigeria's oil sector, which is its major source of revenue, has been faced with a myriad of challenges in recent times. There is need for diversification from the oil to the non-oil sectors. The connection between diversification and nonoil export was explored extensively in the literature with no consensus in empirical results.

Babawole (2020) analyses the challenges undermining the promotion of non-oil export in Nigeria using survey method. The result reveals weak infrastructure, poor access to finance and unstable export policies discourage the promotion and undermining the performance of non-oil export in Nigeria. Udeh, Onuoha and Nwokorobia (2021) assess diversification of Nigerian's economy: option for sustainable growth in Nigeria. The study describe that the already identified challenges, if properly addressed in line with diversification policies, Nigeria's economic growth and sustainable development would be far beyond oil.

Ordinary least square method in error correction mechanism and co-integration by Nwanne (2014) investigate the link between diversification of non-oil export and economic growth in Nigeria, empirically there is a link between diversification of non-oil export and economic growth in the country. More so, nonoil export i.e. agricultural and manufacturing components reveal significant and positive association to economic growth while solid minerals components posit negative and insignificant link with economic growth in Nigeria. For example Owan, Ndibe and Anyanwu (2020) observed positive and significant effect of non-oil gross domestic product on economic growth. The exchange rate on the other hand reveals negative but significant effect economic growth in Nigeria under the period of investigation. Moreover, economic growth receives positive but insignificant shock from non-oil export and investment in the country. Odi (2015) the estimated results using ordinary least squares method and found moderate effect of non-oil diversification to economic growth in Nigeria. Moreover, increase in non-oil export product has a positive impact on productive capacity on goods and services under the period of investigation. The carried out by Adegbie, Ajayi, Aguguom and Otitolaiye (2023) empirical evidence from descriptive and inferential support GDP growth rate is significant and positively related to sustainable growth. Furthermore, the paper posits insignificant but positive effect of infrastructural

expenditure to sustainable growth. In investigating the challenges and prospects of economic diversification and national development in Nigeria by Olamide, Kalu, Soloman and joseph (2019) found that the connection between economic expansion and national advancement is positive and statistically significant. In applying Autoregressive Distributed Lag Model by Riti, Gubak and Madina (2016) in analyzing the growth of nonoil sectors as key to diversification of economic performance in Nigeria. The study confirmed the mixture or combination of variable and the existence of co-integration which justifies the application of ARDL. The findings show that agricultural, manufacturing and telecommunication component Granger cause economic growth at five percent level of significant. Also, agriculture and telecommunication component parameters contribute positively to economic growth in the long run while manufacturing component contributes negatively to growth in Nigeria. The speed of adjustment of error correction mechanism from short run to long run is statistically significant and negative.

Similarly, Oyelami and Alege (2018) investigate macroeconomic implication of trade diversification in Nigeria and found that trade diversification enhances economic growth and also reduces exchange rate movement. The results from the bound test confirm the existence of co-integration of trade diversification on both economic growth and exchange rate movement in the country. The study conducted by Duhu (2022) in assessing the impact of export diversification on economic growth in Nigeria using Autoregressive Distributed Lag Model. The study reveals that short run and long run results of export diversification and economic growth is insignificant but positive. Moreover, dummy variable is insignificant but positive effect on economic growth in short run and long run. Openness to economic growth both in the short run and long run is negative in the country.

Nwosa (2018) found insignificant effect of trade policy to export diversification while foreign direct investment has negative and significant impact on export diversification in Nigeria.

research is anchored on the This Endogenous Growth Theory as developed by Pagano in 1993. The Endogenous Growth Theory explains the lasting effects of non-oil sector diversification on the economic development in advanced and still developing nations such as Nigeria. This presumption is hinged on the belief that a planned non-oil sector diversification positively influence will development and advancement economic through three key channels namely: Agricultural sector, Manufacturing sector and the Extractive Industry. Therefore, the implication of the Endogenous Growth Theory is that diversification of non-oil sector will guarantee an increase in government revenue which will aid the nation in accelerating growth of its economy.

The study contributes to the existing literature by investigate the impact of non-oil export on economic diversification in Nigeria using nonlinear ARDL model so as observe the asymmetric response which were not considered based on the reviewed literature above.

3. Data and Methodology

The secondary data sourced from the World Development Indicators (WDI) International Monetary Fund (IMF) and National Bureau of Statistic (NBS). The main objective of this study is to investigate the impact of non-oil export on economic diversification in Nigeria for the period of 1985-2021. Zivot and Andrew unit root test with break was employed in order to confirm the order of integration among the variables of interest. Therefore, this study used Non-Linear ARDL model to examine both short-run and long-run relationship. The specification can be presented as:

$$RGDP = F(AGREXP, MNREXP$$
 1

Where *RGDP* the Real Gross Domestic Product is used as a proxy for economic diversification and *AGREXP* is the agricultural export measured by agricultural raw materials exports, *MNREXP* is the mineral export measured by mineral rent percentage to GDP.

$$\Delta y_{t} = \mu + \sum_{i=1}^{n-1} a_{i} \Delta y_{t-i} p + \sum_{i=1}^{n-1} a_{i} \Delta y_{t-i} N + \sum_{i=0}^{m-1} Y_{i} \Delta x_{t-i} p + \sum_{i=0}^{m-1} Y_{i} \Delta x_{t-i} N - \pi \hat{e}_{t-1} + \varepsilon_{t}$$

Where Δ is the difference operator, y_t is a vector of dependent variable, x_{t-1} is the matrix of lag values of explanatory variables and π is the adjustment effect or error correction coefficient which is expected to be negative for the error to be corrected. Specifically the ECM model is to be tested in the specified equation two above while _P and _N represent the partial sum of positive and negative changes in the independent variables respectively.

$$\Delta RGDP_t = \mu + \sum_{i=1}^{n-1} a_i \Delta RGDP_{t-1} + \sum_{i=0}^{m-1} \beta_i \Delta AGREXP_{t-i}P + \sum_{i=0}^{m-1} u_i \Delta AGREXP_{t-i}N + \sum_{i=1}^{n-1} a_i \Delta MNREXP_{t-i}P + \sum_{i=0}^{m-1} Y_i \Delta MNREXP_{t-i}N - \pi \hat{e}_{t-1} + \varepsilon_t \qquad 3$$

4. Empirical Results and Discussion

Table 4.1 depicts the result of descriptive statistics of the study; it shows that the standard deviations of the variables of interest are not far away from their means, this means that there is a minimum chance to have errors in the study. The

Skewness of the distribution in shows that real gross domestic product which is the proxy of diversification is skewed to the right and the values are less than one while agricultural export and mineral export are skewed to the left and less than one, by implication the variables employed are normally distributed. The Kurtosis shows that all the variables employed are normally distributed because the values are less than or equal to 3. The Jarque-Bera test for normality is

also estimated. It indicates that all the variables employed are normally distributed as their pvalues are greater than 5%.

Table 4.1 Descriptive statistics

Statistics	LRGDP	LAGREXP	LMNREXP
Mean	11.116	-0.476	-3.501
Median	10.922	-0.322	-3.565
Maximum	11.759	0.861	-1.653
Minimum	10.443	-2.225	-5.542
Std. Dev.	0.448	0.727	1.373
Skewness	0.154	-0.724	-0.073
Kurtosis	1.293	3.623	1.432
Jarque-Bera	4.259	3.527	3.511
Probability	0.118	0.171	0.172
Sum	377.977	-16.196	-119.047
Sum Sq. Dev.	6.639	17.478	62.236
Observations	34	34	34

Source: Researchers' computation using econometric software package E-views 10.

4.2 Zivot and Andrew Unit Root Test

The study used Zivot and Andrew unit root test in order to confirm the order of integration among the variables employed, because ignoring

unit root test with break may lead the acceptance of null hypothesis where is supposed to be rejected.

Break point

1994

2002

-6.762692

	able 4.2 Ervot Andrew Chit Root Test			
	Level		First difference	
Variables	Statistics	Break point	Statistics	
LRGDP	-2.930377	2015	-6.358881	

Table 4.2 Zivot-Andrew Unit Root Test

LAGREXP

LMNREXP

2005 Source: Researchers' computation using econometric software package E-views 10.

2009

Table 4.2 presents the Zivot-Andrew unit root test indicates that real gross domestic product and agricultural export are integrated of order one in other words are stationary at first difference i.e. they are I(1) process, the break

-2.634129

-7.200132

4.3 NARDL Bound Test for Long run

The test is conducted in order to ensure the existence of long run association among the variables employed. From table 4.3, the result of

dates are 1994 and 2002. The variable mineral export is integrated of order zero in other word it is stationary at first level i.e. it is I(0) process, the break date is 2002.

co-integration bound test indicates a higher value of F-statistics than any of the critical values of all bounds 5.809341. Therefore, there

is a strong evidence of long run nonlinear equilibrium relationship between RGDP as proxy of economic diversification, AGREXP and MNREXP variables in the model. Furthermore, means that the null hypothesis claiming no asymmetric cointegration is rejected. This indicates strong evidence for asymmetric cointegration among the variables

Table 4.3 Result of Cointegration Bounds test of NARDL

Statistics	Value		Critical			
			bounds			
F-statistics	5.809341		1%	2.5%	5%	10%
		I(0) Bound	3.29	2.88	2.56	2.2
		I(1)Bound	4.37	3.87	3.49	3.09

Source: Researchers' computation using econometric software package E-views 10.

4.4 Results of Nonlinear Autoregressive Distributed Lag (NARDL) model

The results of the unit root and bound tests conducted suggest that ARDL model is appropriate. The numbers of lags are selected automatically and Akaike Information Criterion (AIC) was used. The short-run and long-run results are presented.

4.4.1. Short-run Relationship

Below the result of short-run parameters of the NARDL model is presented. AIC suggests a (3, 4, 4, 4, 4) model after testing for up to 2500 different models.

Table 4.4 Short run parameters of the NARDL Model

Variables	Coefficient	Std error	t- statistics	Prob.
$\Delta(LRGDP(-1))$	0.607080	0.182040	3.334869	0.0103
$\Delta(LRGDP(-2))$	0.512187	0.177590	2.884097	0.0204
Δ (LAGREXP_Positive)	0.011383	0.034451	0.330404	0.7496
Δ (LAGREXP_Positive(-1))	-0.302388	0.064243	-4.706932	0.0015
Δ (LAGREXP_Positive(-2))	-0.188709	0.061433	-3.071774	0.0153
D(LAGREXP_Positive(-3))	-0.122012	0.060413	-2.019620	0.0781
Δ (LAGREXP_NEGATIVE)	0.005424	0.028026	0.193549	0.8514
Δ (LAGREXP_Negative(-1))	0.090488	0.027553	3.284188	0.0111
Δ (LAGREXP_Negative(-2))	0.072887	0.033859	2.152653	0.0635
D(LAGREXP_Negative(-3))	0.055277	0.034959	1.581169	0.1525
Δ (LMNREXP_POSITIVE)	0.093875	0.045993	2.041071	0.0755
Δ (LMNREXP_Positive(1))	-0.192063	0.059382	-3.234368	0.0120
Δ (LMNREXP_Positive(-2))	-0.096920	0.037389	-2.592168	0.0320
Δ (LMNREXP_Positive(-3))	0.030401	0.024805	1.225626	0.2552
Δ (LMNREXP_NEGATIVE)	-0.029424	0.062767	-0.468779	0.6517
Δ (LMNREXP_Negative(-1))	-0.310577	0.097815	-3.175157	0.0131
Δ (LMNREXP_Negative(-2))	-0.222034	0.069818	-3.180197	0.0130
Δ (LMNREXP_Negative(-3))	-0.215782	0.071614	-3.013117	0.0167
-				
R-squared	0.996001			

Adjusted R-squared	0.984502
S.E. of regression	0.054662
Sum squared resid	0.023903
Log likelihood	69.78561
F-statistic	86.62064
Prob(F-statistic)	0.000000
Durbin-Watson stat	2.950301

Source: Researchers' computation using econometric software package E-views 10.

The result of the non-linear ARDL from Table 4 indicates positive autoregressive and statistically significant impact of the dependent variable (economic diversification) at all lag, this means that economic diversification is largely depends itself in the short run. The positive coefficient of agricultural export indicates positive and statistically significant effect on the economic diversification in Nigeria in the short run, at lag 1, 2, and 3 shows negative effect on the real economic diversification, and also the negative coefficient of agricultural export positive but statistically insignificant effect on the economic diversification, at lag at lag 1, 2, and 3 shows positive effect on the economic diversification. The positive coefficient of mineral export indicates positive but statistically insignificant effect on the economic diversification in Nigeria, at lag 1, 2, and 3 indicates negative

effect on the economic diversification, and the negative coefficient of mineral export negative and statistically insignificant effect on the economic diversification, and also lag 1, 2, and 3 indicates negative effect on the economic diversification. The R-squared and its adjusted value are very high 0.99 this implies that 92% change in the economic diversification is explained by agricultural export and mineral export in Nigeria. The p-value of f-statistics indicates (0.000), this means that agricultural export and mineral export have 100% significance influence on the economic diversification.

4.4.2 Long-run and Error Correction Result

As a result of the NARDL bound test which confirms the existence of a long-run relationship among the variables of interest.

	U			
Variables	Coefficient	Std error	t- statistics	Prob.
LAGREXP_POS	0.185124	0.056334	3.286158	0.0111
LAGREXP_NEG	-0.019900	0.026093	-0.762673	0.4675
LMNREXP_POS	0.161806	0.041052	3.941508	0.0043
LMNREXP_NEG	0.254624	0.030325	8.396517	0.0000
ECM	-0.685089	0.276500	-6.094348	0.0003

Table 4.5 NARDL ECM and Long run Form Results

Source: Researchers' computation using econometric software package E-views 10.

Table 4.5 depicts the nonlinear auto regressive distributed lag model results, it shows that the positive coefficient of agricultural export has a positive and statistically significant effect on the economic diversification in Nigeria, this simply means that if agricultural export increase by single digits the economic diversification will increase by 18% and the negative coefficient of agricultural export indicates negative and statistically insignificant effect on the real gross domestic product, this implies that a single digit decrease in agricultural export will result 1% increase on the economic diversification. The positive coefficient of mineral export shows positive and statistically significant effect on the economic diversification in Nigeria, this simply means that if mineral export increase by single digits the economic diversification will increase by 16% while the negative coefficient of mineral export indicates positive and statistically significant effect on the economic diversification in Nigeria, this implies that an increase in mineral export will bring about 25% decrease on the economic diversification. The error correction term meets all its condition, that is negative, less than one and statistically significant, it shows that there is a high speed of adjustment, if there is any disequilibrium in the system, it takes an average of 68% of this NARDL model to adjust back from short run to long run.

4.4.3 Wald Test

An asymmetry test shows whether the coefficients are equal or not. If they are not identical, there is evidence of asymmetry; otherwise, it would not be. To test the long run asymmetry in using Wald test.

Table 4.6 NARDL Wald test

Test	Value	Df	Probability
Statistic			-
F-	86.11277	(3,	0.0000
statistic		24)	
Chi-	258.3383	3	0.0000
square			

Source: Researchers' computation using econometric software package E-views 10.

Table 4.6 indicates that the null hypothesis of symmetry is rejected because the p-value is less than 5%. The result of the Wald test reveals an asymmetry impact exist in the long-run of non-oil export in the Nigerian economic diversification. It is shown that the growth rate is more influenced by positive change than the negative change in non-oil export.

4.4.4 Post estimation tests

Table 4.7	Post	estimation	tests
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Tests	P-value
Serial correlation	0.3038
Heteroscedastics	0.3157
Normality	0.0000
Ramsey test	0.8452

Source: Researchers' computation using econometric software package E-views 10.

The nonlinear ARDL model estimated passed all post estimation tests such as serial correlation, Heteroscedasticity, and Ramsey except normality test, because their probability values are greater than 5%. Based on this we can conclude that the model is robust.

4.4.5 Structural Stability test

To check the structural stability test, recursive estimation has been applied. There are two types of tests in recursive estimation. The Cumulative Sum and Cumulative Sum of squares test are used to detect the structural stability of the nonlinear ARDL model.







Figure 4.2 Cusum Square Plot Recursive Residual of ARDL Model

Source: Researchers' computation using econometric software package E-views 10.

The decision rule is that we cannot reject the null hypothesis if the Cumulative Sum (CUSUM) and Cumulative Sum of squares test line lies between two critical lines at a 5% significance level. Otherwise, the null hypothesis would be accepted. In this case the current study cannot reject the null hypothesis, which implies that the NARDL model is structurally stable over study time.

5. Conclusion and Recommendation

The study investigates the impact of non-oil export on economic diversification in Nigeria for the period of 1985-2021. The study employed Zivot /Andrew unit root test with structural break shows that real gross domestic product and agricultural export are integrated of order one while mineral export is integrated of order zero. The non-linear Auto-Regressive Distributive lag (NARDL) model shows that agricultural export has a positive and statistically significant effect on the economic diversification in Nigeria and mineral export shows positive and statistically significant effect the economic on diversification in Nigeria. Furthermore, the study concludes that non-oil exports have a positive effect on economic diversification in Nigeria. The study recommends that Nigerian government should enhance the productivity and output of non-oil commodities as well as

providing markets for these commodities. Diversification policy should be adopted in the economy and ensure maximum contributions from all faces of the subsectors in the economy in order to achieve economic diversification in Nigeria.

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