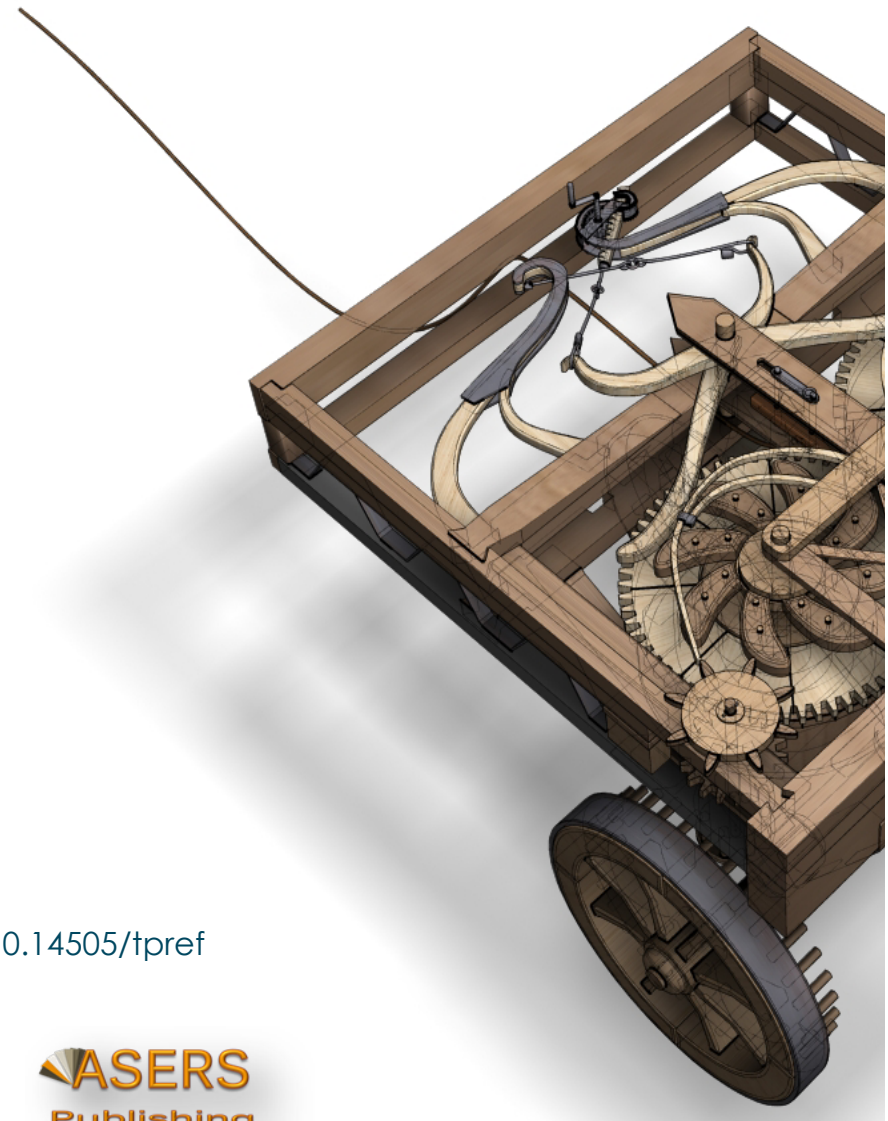
Theoretical and Practical Research in Economic Fields



Quarterly
Volume XV
Issue 3(31)
Fall 2024

ISSN: 2068 – 7710
Journal DOI: https://doi.org/10.14505/tpref

ASERS
Publishing

Volume XV
Issue 3(31)
Fall 2024

ASERS Publishing
ISSN 2068 – 7710
Journal's Issue DOI:
https://doi.org/10.14505/tpref.v15.3(31).00

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Volume XV
Issue 3(31)
Fall 2024

ASERS Publishing
http://www.asers.eu/asers-publishing
ISSN 2068 – 7710
Journal's Issue DOI:
https://doi.org/10.14505/tpref.v15.3(31).00

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Volume XV, Issue 3(31), Fall 2024

DOI: https://doi.org/10.14505/tpref.v15.3(31).16

An Analysis to the Link between Foreign Trade and Sectorial Economic Growth in Iraq

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Article info: Received 26 June 2024; Received in revised form 8 July 2024; Accepted for publication 3 August 2024; Published 30 September 2024.

Abstract: This research aims to analyse the link between oil export, commodity imports and other major sectors such as agricultural, manufacturing and service sectors over the period spanning from 2004 to 2020. So, it aims to extrapolating and analyse the role of Iraqi economic policy toward the diversification. Therefore, it tries to assess the governmental economic performance in utilizing oil revenues for reinforcement the manufacturing and agriculture sectors. For this purpose, the Granger causal relationship is used to find out the magnitude of the variables examined. The expected results will depict an assessment of the public economic policy. Thus, this paper tries to extrapolate to what extent the oil revenues can be circulated to activate the local economic sectors and enhance level of economic diversification in Iraq as an announced policy during the period studied.

Keywords: oil export; commodity import; economic growth; Granger causality.

JEL Classification: F10; F14; F43; L38; O11.

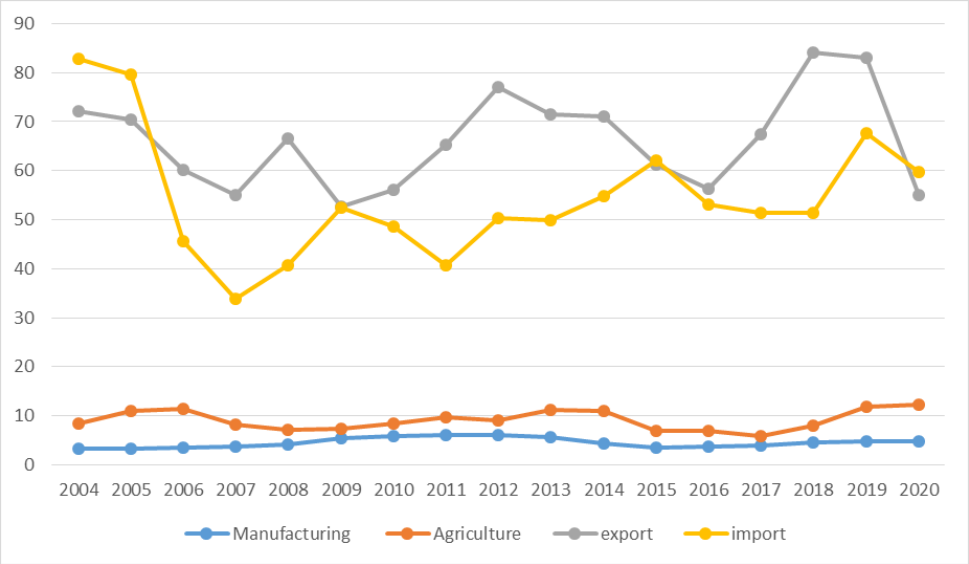
Introduction

Although the rise of level of crude oil export revenues and the availability of economic resources, the Iraqi economy still suffering from the economic structural disruption. Iraq as oil producing country has become the fastest growing consumer. Its demand for imported goods is estimated by almost USD 54.41 billion on average over the period from 2004 to 2020 (SESRIC 2023). The GDP growth level, as well-known is largely based on extractive sectors. In 2003, and then after the economic policy in Iraq has shifted toward the economic openness and diversification but these policies are not achieved in practice. However, the average of value added of agriculture and manufacturing sectors amounted by 6.8 and 13.6 percent of oil export for the said period consequentially (SESRIC 2023). Hence, these modest levels of non-oil contribution do not reflect sound economic policies that can diversify the economy and expand level of non-oil sectors, particularly agriculture and manufacturing sectors. Meaning that, there is an absence strategy toward diversification, in which the high reliance on oil sector is dominant as a major source of income. Therefore, the consumption in Iraq that represented by the high level of import will remain as a dependant variable to all fluctuations of oil market prices and world economic growth.

From the above, the non-oil sectors growth ought to be more than the share indicated above, and more than 90 percent reliance on oil sector will be not fulfilled the requirements of diversification. This means a significant increase of manufacturing and agriculture sectors is highly important to enhancing the economic structure. Furthermore, the oil revenues are not used for adopting processes to maintain non-oil economy via improving production capacity which is considered another key reason of failure of economic policies in Iraq. However, manufacturing and agriculture sectors does not witness a remarkable increase over the period of study. Whereas imports featured by a parallel link with the export. This implies that export revenues have been devoted to meet import payments. In other words, the oil revenues cannot lead to improved value added due to a high

level of reliance on import. Thus, we can state that all efforts devoted to improving level of economic structure have not resulted a positive impact on the non-oil sector in Iraq.

Figure 1. Value added of Manufacturing and Agriculture sector and Revenues of trade in Iraq in constant prices, 2004 -2020. (Billion USD)



Source: By the author based on database of SESRIC, Database of Statistical, Economic and Social Research and Training Centre for Islamic Countries. http://www.sesric.org/baseind-step5.php

In addition, the Iraqi demand for imports has increased due to the big economic disruption and failure of economic policy in producing goods that can lead to reduce level of consuming goods' import gradually and achieve surpluses that can be utilized in other projects and then expand size of economy. Therefore, this situation is majorly related to the disability of the governmental policy in subsidizing the economic activities in general through state-imposed tariffs and tax-free regulations.

However, the economic policy in Iraq ought to be altered and catalyse local and foreign investors alike. This could be achieved via mitigation the investment cost to maintain relatively low prices of goods and services supplied in the local market. Hence, this policy can be driven by oil-based industries and engaging the surpluses of oil in activating industries such as refineries and petrochemical, where it could lead to raise value added and create links with other relevant industries and then enhancing level of diversification gradually. Consequently, the sectorial economic growth in Iraq does alter to be improved due to the availability of economic potentials, particularly relatively low prices of energy in general. This feature could be engaged ideally if the economic policy is able to avail all pillars requested; namely reforming the institutional structure and easing roles and procedures related to investments and infrastructure.

From the above, it is obvious that the Iraqi foreign trade; mainly oil export has a mutual role as a main source of revenues for activating the economy and as a source that meet various kinds of capital goods that can be a spark for non-oil growth. But this role, however, is conditioned by the strategic national policies that maintain a positive relationship between oil exports and the progress of other economic sectors. We therefore in this study attempt to empirically find out how much these variables are linked to state the most important factors that lead to activate the Iraqi economy. Finally, the significance of this study embodied in its empirical implication and in analysing the role of economic policy in Iraq over the period studied as an important period after the political regime change. It is a new investigation that tries to assess to what extent Iraqi foreign trade revenues are utilized in improving level of non-oil sectors. In other words, it tries to measure the level of economic growth that could be derived from foreign trade, particularly crude oil export revenues, in which enhancing level of other sectors implies an indirect increase in the level of value-added of crude oil export via its role in financing and supporting the agriculture and manufacturing sectors as the major financial allocations of the public budget in Iraq are linked with the oil export revenues.

1. Literature Review

Various studies have paid big concern on trade and its influence in enhancing level of growth in many countries via using different empirical methodologies. Most of these studies have adopted the causality approach focusing

on foreign trade and economic sectors. This trend also pertains to state policies needed for sustaining the economic activities which have investigated the linkage between foreign trade and other economic activities. Therefore, a special attention to countries in which oil export revenues have a dominant role in both sides; meeting the economy needs, as well as its impact as a major economic activity for a country such as Iraq. However, the oil exports almost play a significant role where the growth level is a major limitation of oil export prices in the advanced countries. In this context (Lal, *et al.* 1987) found that export, FDI and foreign exchange rate have a positive impact on the real GDP, whereas imports, inflation, and economic openness have led to a negative impact on real GDP. The study revealed that growth of international trade helps to cause a dynamic benefit to the local economy. Also, it asserts that both size of international trade and trade structure supported by high technology of export result a positive effect on Nigeria economy. Also, (Al-Salamah, *et al.* 2006) suggested a large-scale optimization model for production in the GCC for improving economic progress. This regional model determined the least cost for meeting the increased domestic demand for natural gas. Its importance, however, derived from its role as a main input of electricity generation, as well as, in re-injection process of oil wells. Therefore, a new policy actions are required for securing the main energy resources of GCC countries.

In this respect, (Sari, Ewing *et al.* 2008) is also found a positive linkage between energy consumption and the US manufacturing industries. They asserted that the real production and employment are key factors for economic growth in the long run, where they constitute for nearly all measures of disaggregate energy consumption. And (Chen, 2009) confirms the presence of a parallel link between growth of export and aggregate economic growth for seventeen country. However, in this regard (Kombargi, Waterlander *et al.* 2010) tackled the GCC gas shortage and declared that these countries have an opportunity to meet their high increase of natural gas use in the short-run. This opportunity summarized in importing natural gas from north America which witnesses a large increase in the level of gas production. For the long-run, this study explained that attracting gas-foreign companies is a good substitution to bridge the gap of gas supply-demand imbalance in GCC countries.

(Costantini and Martini 2010) analysed the impact of energy sector on the economy via adopting VECM approach. The results revealed the presence of a causal relationship between energy and real GDP. While (Erkan, Mucuk *et al.* 2010) stated a long term significant role between energy use and exports, and also the Granger-causality test showed a unidirectional association running form energy consumption to exports. (Loganathan and Subramaniam 2010) found a bidirectional effect running between energy consumption and economic performance in Malaysia. However, these studies ensure that the industrial sector, and then export manufactured goods could be considered as a main engine of the sectorial economic growth. Furthermore, the quantitative results showed that the local energy consumption in industries have a positive influence on export, which means the importance of energy use in Turkey. Moreover, (Squalli, *et al.* 2011) found a long-run causal relationship existed between economic growth and electricity consumption in GCC states. Accordingly, we note that economic growth is a result of various activities that has almost been positive, where these empirical studies show this relation via using different methods and various variables which representing growth level. However, (Kwakwa 2012) has recommended that the economic policies ought to be geared to achieving an increase in level of high supply of energy to the industrial sector, particularly manufacturing industries as an important strategy for maintaining a stable economic growth. Based on that, the government policies should focus on sustaining a steady energy supply which could be consistent with the dynamic progress of energy use. (Bibi, *et al.* 2014) conducted an empirical investigation and reveal that export, exchange rate and foreign direct investment have a positive association with real GDP while import, openness and inflation rate affect negatively on economic growth. Also, (Mkubwa, *et al.* 2014) revealed that trade openness in Tanzania has a positive effect on the economy. It was higher when the economy was closed in comparison to the open economy period. Also, the study has stated that a continuous trade deficit during 1980s was due to weak level of its export value added which is highly needed to compensate for a high value level of its import.

(Kılıc, *et al.* 2017) investigated the link between trade and economic growth for the Eurasia Economic Union countries, the study revealed a bi-directional causal relationship running from growth to export and unidirectional from growth to import. Moreover, (Necoechea-Porrasm *et al.* 2021) asserted that economic liberalization is evidence for the increase of level of growth, competitiveness of industrial sector, and then developing human capital. It found also that activities linked with foreign trade determine the size of manufactured goods; GDP and received export revenues. In addition, (Kausar, *et al.* 2022) found cointegrated association between energy use and economic progress. This confirms a long-run link of energy as an engine of the economy and its growth level, particularly in oil countries like Iraq. Also, (Aga, *et al.* 2023) revealed that trade openness has an important influence on the Iraqi economy in the short and long term. This study recommended

that the economic policy should pay high attention to the economic diversification and enhancing level of non-oil export. Furthermore, (Abdalltef 2023) found an absent relationship between the growth of gross domestic product and gross fixed capital formation in the agricultural sector due to volatility of the economic policy in Iraq. And regarding the impact of foreign trade in economic growth (Srdelić *et al.* 2024) examined the determinants of elasticities of revenues generated from foreign trade, the most important conclusion focused on the role of foreign trade during twenty years in addition to the policies adopted and human capital accumulation as a driving force of economic growth. Similarly, (Susanto *et al.* 2024) proved that export-oriented industries importantly contribute to enhancing level of economic growth, this study has focused on the role of both export and import in international trade and activating related economic activated that lead to sustain growth of gross domestic product.

From the above, we can say that major studies addressed that foreign trade and other variables that represented the economic sectors have almost a positive relationship, but also there has been an exception to this statement. This could be related with the actual economic policies and institutional system that empower the economic activities in economy. Therefore, the role of foreign trade is crucially related to the circumstances of economy and policies adopted, as well as level of economic stability which is directly linked with the political system. However, our study deals with the Iraqi economy which is highly linked to global oil markets and the fluctuations of its prices. This study seeks to analyse the relationship of Iraqis foreign trade sectors and other economic sectors. It will be differentiated by addressing the impact of export on the growth of other sectors. So, the contribution of this study will be represented by analysing the linkage amongst the said variables. This study, therefore, is an attempt to analyse the economic policies and the Iraqi governmental efforts toward diversifications apart from the high reliance of the whole economy on oil export and its linked fluctuations with partner economies.

2. Methodology

The methodology of this study employs the VAR model to analyse the causal association between the variables adopted. The study investigates annual data spanned from 2004 to 2020. Four variables are included in the analysis which are agriculture (*Ag*), manufacturing (*Mnf*), export (*Ex*), and import sectors (*Im*). The model adopted is represented in the following equation:

$$Ex=f\ (Im,\ Mnf,\ Ag) \tag{1}$$

Where,
Ex: Export of goods and services (US Dollar)
Im: Import of goods and services (US Dollar)
Ag: Value added of agriculture sector in the economy (US Dollar)
Mnf: Value added of manufacturing sector in the economy (US Dollar)
Equation (1) above could be formulated in the logarithmic model, as follows:

$$log\ Ex = \alpha 0 + \beta 1\ log\ Im + \beta 2\ log\ Mnf + \beta 3\ log\ Ag + Ut \tag{2}$$

Where,
α_0: is the intercept term,
β_1, β_2, and β_3: coefficients, which are more than zero.
U: Error term.
t: time subscripts of variables in the time series. The method used is based on the Vector Autoregressive (VAR) model, which could be written as follows:

$$\log Ex = \alpha_0 + \beta_1\ log\ Im + \beta_2\ log\ Mnf + \beta_3 logAg + Ut_1 \tag{3}$$
$$\text{Log } Im = \alpha_1 + \beta_4\ log\ Ex + \beta_5\ log\ Mnf + \beta_6\ log\ Ag + Ut_2 \tag{4}$$
$$\text{Log } Mnf = \alpha_2 + \beta 7\ log\ Ex + \beta 8\ log\ Im + \beta 9\ log\ Ag + Ut_3 \tag{5}$$
$$\text{Log } Ag = \alpha_3 + \beta 10\ log\ Mnf + \beta 11\ log\ Ex + \beta 12\ log\ Im + Ut_4 \tag{6}$$

However, to ensure the stationrity of data adopted, a unit root test is used for the study variables. This implies the absence of unit root, and the model is statistically valid. Therefore, we can run the model and where the results obtained will not be spurious, it could be used for a meaningful economic analysis.

Table 1. VAR Granger causality results of the model estimated

VAR Granger Causality/Block Exogeneity Wald Tests Sample: 2004 2020 Included observations: 15			
Dependent variable: MANUFACTURING			
Excluded	Chi-sq	df	Prob.
IMPORT	3.896619	2	0.1425
EXPORT	7.443074	2	0.0242
AGRICULTURE01	1.562328	2	0.4579
All	13.19717	6	0.0400
Dependent variable: IMPORT			
Excluded	Chi-sq	df	Prob.
MANUFACTURING	8.999903	2	0.0111
EXPORT	6.605728	2	0.0368
AGRICULTURE01	9.905001	2	0.0071
All	25.60461	6	0.0003
Dependent variable: EXPORT			
Excluded	Chi-sq	df	Prob.
MANUFACTURING	4.382663	2	0.1118
IMPORT	5.877975	2	0.0529
AGRICULTURE01	5.594658	2	0.0610
All	7.567370	6	0.2715
Dependent variable: AGRICULTURE01			
Excluded	Chi-sq	df	Prob.
MANUFACTURING	7.005173	2	0.0301
IMPORT	2.855822	2	0.2398
EXPORT	8.442353	2	0.0147
All	13.75761	6	0.0325

Source: By the author via using Eviews Software.

2.1 Model Estimation and Result Analysis

The VAR ganger causality approach is conducted for the variables tested. The model examined showed the following results, as shown in table (1) above. It shows that there is a unidirectional causal relationship run from export to manufacturing sector. This asserts that the Iraqi exports – which majorly oil exports - have an important role in the industrial sector and other public activities in Iraq as well, whereas the manufacturing sector has no positive impact on exports.

However, this implies the absence of value-added achieved over the period studied resulting from the low level of contribution as a share to oil export revenues. This case depicts the inverse impact of structural disruption, and the domination of oil revenues compared to other sources of income.

In addition, we found that the causal relationship from agriculture sector to manufacturing is absent, where this indicates the weak share of agriculture sector to GDP and in its link with the industrial sector in general.

Furthermore, it was found a bidirectional causality between import and export, where this proves the high reliance on the oil revenues in meeting the payments of imported goods from abroad.

However, there is approximately a parallel relationship between the two variables resulting from the modest level of local production. Accordingly, this case explains that the value-added of oil imports is not completely circulated inside the local economy to enhance level of economic capacity as much as it is in turn devoted for importing various kinds of consuming and capital goods.

Table 2. Cointegration test results

Sample (adjusted): 2006 2020
Included observations: 15 after adjustments
Trend assumption: Linear deterministic trend
Series: MANUFACTURING IMPORT EXPORT AGRICULTURE
Lags interval (in first differences): 1 to 1
Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.953685	99.37418	47.85613	0.0000
At most 1 *	0.839147	53.29000	29.79707	0.0000
At most 2 *	0.672205	25.88101	15.49471	0.0010
At most 3 *	0.456668	9.150509	3.841466	0.0025

Trace test indicates 4 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values
Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.953685	46.08418	27.58434	0.0001
At most 1 *	0.839147	27.40899	21.13162	0.0057
At most 2 *	0.672205	16.73050	14.26460	0.0200
At most 3 *	0.456668	9.150509	3.841466	0.0025

Source: By the author via using Eviews Software.
Max-eigenvalue test indicates 4 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level

Furthermore, the result illustrates that there is a bidirectional effect running from export to agricultural sector. This implies that this sector still highly reliant on the revenues gained from oil exports, where any decline

in the level of oil prices will be translated to a negative impact on the non-oil sectors, particularly manufacturing and agriculture sector. Therefore, we can say that most efforts which concentrating to reinforcement level of economic diversification were not feasible, in which the financial allocations of public budgets spanned from 2004 to 2020 are not influenced positively on other sectors.

In other words, the duration from 2004 to 2020 witnessed an inefficient use of economic resources, where this could be related to the administrative corruption that hinder any effort for using the investment allocations efficiently

Finally, the variables examined are correlated – except for export as a dependant variable on the long run, this means that these variables can drifted together due to the possible interdependence between agriculture, manufacturing and import and this is compatible with the real economic situation in Iraq. However, this fact has been proved by the co-integration test, where the test probability depicts a significant relationship between all variables regressed, as shown in the table above.

The test above identifies that the time series used in this study has no deviation in the long run and are integrated together. This explains the degree of sensitivity of all variables examined to the same average over the period of study. Furthermore, the data of study illustrates the value added of manufacturing and agriculture sectors, and revenues of export and imports as well. It was noted that a parallel relationship between export and import over the period spanned from 2011 to 2020. This explains the high reliance on the global market in which the oil revenues majorly return to meeting the Iraqi local market of various kinds of goods imported from abroad. In other words, it implies that the structural disruption has mitigated the economic efforts towards increasing level of investment allocations in the public budget due to devoting the main revenues for consuming goods rather than capital goods. Therefore, policies of encouraging local and foreign investments are highly needed to enhance level of private sectors and improving of non-oil sectors as an important policy to mitigate share of export oil revenues to GDP and reducing fluctuations resulted from fluctuations of global oil markets.

From the above, it is evident that a modest contribution of manufacturing and agriculture sectors associated with the absence of their growth over the period studied from 2004 to 2020. This indicates that the relevant policies have not succeeded in reinforcement the two sectors, agriculture and manufacturing sectors. However, enhancing level of sectorial economic growth ought to be linked with the sound economic policies that could be able to utilize the revenues of foreign trade in improving level of non-oil sectors, which can lead to avail local made goods and then reduce level of imports. Meaning that, economic stability cannot be achieved without activating a real role of private sectors in the agriculture and industrial manufacturing sectors using policies that catalyse local investors and elevate all restrictions that imped foreign investors as well.

Conclusion and Policy Recommendations

The financing of manufacturing and agriculture sectors will continuously facing periodical fluctuations that can impede the governmental efforts for diversifications due to the high reliance on the oil export revenues as a major source of income. This implies that the non-oil economic growth is highly conditioned with the efficiency of public policies in activating the role of private sector that can finance the economy away from the public revenues and create the competition between investors as well. Therefore, the results proved that the manufacturing sector has no positive impact on exports, and this means that this sector is still not active in diversifying the foreign trade due to the weakness of value-added achieved over the period studied. The non-oil sectors still highly reliant on the revenues gained from oil exports, where any decline in the level of oil prices will be translated to a negative impact on the non-oil sectors, particularly manufacturing and agriculture sector.

Moreover, the value-added achieved of oil imports is not completely circulated inside the local economy to enhancing level of economic capacity as much as it is in turn devoted for importing various kinds of consuming and capital goods, where this explains that the economic policy must be taking into account all surpluses of oil revenues to be geared for reinforcement of non-oil sectors and raise level of economic growth. This policy should be supported by real governmental actions in practice, most importantly easing and accelerating all procedures that can create competition between investors and attract foreign companies, particularly in sectors that are not preferred by local investors.

Declaration of Competing Interest

The author declares that he has no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Declaration of Use of Generative AI and AI-assisted Technologies

The author declares that he has not used generative AI and AI-assisted technologies during the preparation of this work.

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Appendix

Table 1. Value added of Manufacturing and agriculture sector, and import and export values, 2004 – 2020, USD

year	Manufacturing	Agriculture	export	import
2004	3296374777	8403719246	72809874948	82762890222
2005	3260225830	11038686106	70406211011	79535150609
2006	3602617748	11515017045	60236988593	45584522906
2007	3826339987	8326038008	55104992310	33847086262
2008	4082704714	7168524787	66679858871	40710444600
2009	5552019271	7423697682	52676179880	52525315598
2010	5904042614	8426989211	56173635645	48568950791
2011	6041790860	9798183285	65282225028	40790886826
2012	6168668460	9122162261	77069792406	50389328425
2013	5584995340	11303773573	71415159217	49958213358
2014	4346292264	11076227235	71130387488	54872013205
2015	3627684380	6990950628	61142814964	62141028595
2016	3762212708	6969370899	56309038163	53046702949
2017	4054718067	5854404452	67465178287	51449858035
2018	4564045327	8059369443	84071305596	51509192869
2019	4868548873	11779564003	83113688270	67575581588
2020	4898101068	12309677989	55104077855	59753307589

Table 2. Augmented Dickey-Fuller Test of Manufacturing variable

Null Hypothesis: MANUFACTURING has a unit root
Exogenous: Constant
Lag Length: 1 (Automatic - based on SIC, maxlag=3)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.881190	0.0498
Test critical values:	1% level	-3.959148	
	5% level	-3.081002	
	10% level	-2.681330	

*MacKinnon (1996) one-sided p-values.
Warning: Probabilities and critical values calculated for 20 observations
and may not be accurate for a sample size of 15

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(MANUFACTURING)
Method: Least Squares
Date: 12/15/22 Time: 12:13
Sample (adjusted): 2006 2020
Included observations: 15 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
MANUFACTURING(-1)	-0.344255	0.119483	-2.881190	0.0138
D(MANUFACTURING(-1))	0.639010	0.194357	3.287809	0.0065
C	1.63E+09	5.59E+08	2.919315	0.0129

R-squared	0.567137	Mean dependent var	1.09E+08
Adjusted R-squared	0.494994	S.D. dependent var	6.11E+08
S.E. of regression	4.34E+08	Akaike info criterion	42.79155
Sum squared resid	2.26E+18	Schwarz criterion	42.93316
Log likelihood	-317.9366	Hannan-Quinn criter.	42.79004
F-statistic	7.861212	Durbin-Watson stat	2.300286
Prob(F-statistic)	0.006578		

Table 3. Augmented Dickey-Fuller Test of Import variable

Null Hypothesis: D(IMPORT) has a unit root
Exogenous: Constant
Lag Length: 2 (Automatic - based on SIC, maxlag=3)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.848046	0.0027
Test critical values:	1% level	-4.057910	
	5% level	-3.119910	
	10% level	-2.701103	

*MacKinnon (1996) one-sided p-values.
Warning: Probabilities and critical values calculated for 20 observations
and may not be accurate for a sample size of 13
Augmented Dickey-Fuller Test Equation
Dependent Variable: D(IMPORT,2)
Method: Least Squares
Date: 12/15/22 Time: 22:28
Sample (adjusted): 2008 2020
Included observations: 13 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(IMPORT(-1))	-1.862765	0.384230	-4.848046	0.0009
D(IMPORT(-1),2)	0.445995	0.228761	1.949611	0.0830
D(IMPORT(-2),2)	0.289133	0.201410	1.435544	0.1850
C	1.66E+09	2.14E+09	0.775890	0.4577

R-squared	0.781953	Mean dependent var	3.01E+08
Adjusted R-squared	0.709271	S.D. dependent var	1.36E+10
S.E. of regression	7.34E+09	Akaike info criterion	48.51838
Sum squared resid	4.85E+20	Schwarz criterion	48.69221
Log likelihood	-311.3694	Hannan-Quinn criter.	48.48265
F-statistic	10.75852	Durbin-Watson stat	2.380861
Prob(F-statistic)	0.002475		

Table 4. Augmented Dickey-Fuller Test of Export variable

Null Hypothesis: D(EXPORT) has a unit root
Exogenous: Constant
Lag Length: 2 (Automatic - based on SIC, maxlag=3)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.529778	0.0249
Test critical values:	1% level	-4.057910	
	5% level	-3.119910	
	10% level	-2.701103	

*MacKinnon (1996) one-sided p-values.
Warning: Probabilities and critical values calculated for 20 observations
and may not be accurate for a sample size of 13

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(EXPORT,2)
Method: Least Squares
Date: 12/15/22 Time: 22:30
Sample (adjusted): 2008 2020
Included observations: 13 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(EXPORT(-1))	-2.285527	0.647499	-3.529778	0.0064
D(EXPORT(-1),2)	1.144884	0.479426	2.388029	0.0407
D(EXPORT(-2),2)	0.563620	0.375746	1.500002	0.1679
C	6.27E+08	3.21E+09	0.194951	0.8498

R-squared	0.617690	Mean dependent var	-1.76E+09
Adjusted R-squared	0.490253	S.D. dependent var	1.59E+10
S.E. of regression	1.13E+10	Akaike info criterion	49.38551
Sum squared resid	1.15E+21	Schwarz criterion	49.55934
Log likelihood	-317.0058	Hannan-Quinn criter.	49.34978
F-statistic	4.847026	Durbin-Watson stat	1.955226
Prob(F-statistic)	0.028302		

Table 5. Augmented Dickey-Fuller Test of Agriculture variable

Null Hypothesis: D(AGRICULTURE) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=3)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.215796	0.0393
Test critical values:	1% level	-3.959148	
	5% level	-3.081002	
	10% level	-2.681330	

*MacKinnon (1996) one-sided p-values.
Warning: Probabilities and critical values calculated for 20 observations
and may not be accurate for a sample size of 15
Augmented Dickey-Fuller Test Equation
Dependent Variable: D(AGRICULTURE01,2)
Method: Least Squares
Date: 12/15/22 Time: 22:29
Sample (adjusted): 2006 2020
Included observations: 15 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(AGRICULTURE01(-1))	-0.835317	0.259754	-3.215796	0.0068
C	47669878	5.35E+08	0.089171	0.9303

R-squared	0.443048	Mean dependent var	-1.40E+08
Adjusted R-squared	0.400206	S.D. dependent var	2.66E+09
S.E. of regression	2.06E+09	Akaike info criterion	45.85149
Sum squared resid	5.51E+19	Schwarz criterion	45.94589
Log likelihood	-341.8861	Hannan-Quinn criter.	45.85048
F-statistic	10.34134	Durbin-Watson stat	1.898105
Prob(F-statistic)	0.006759		

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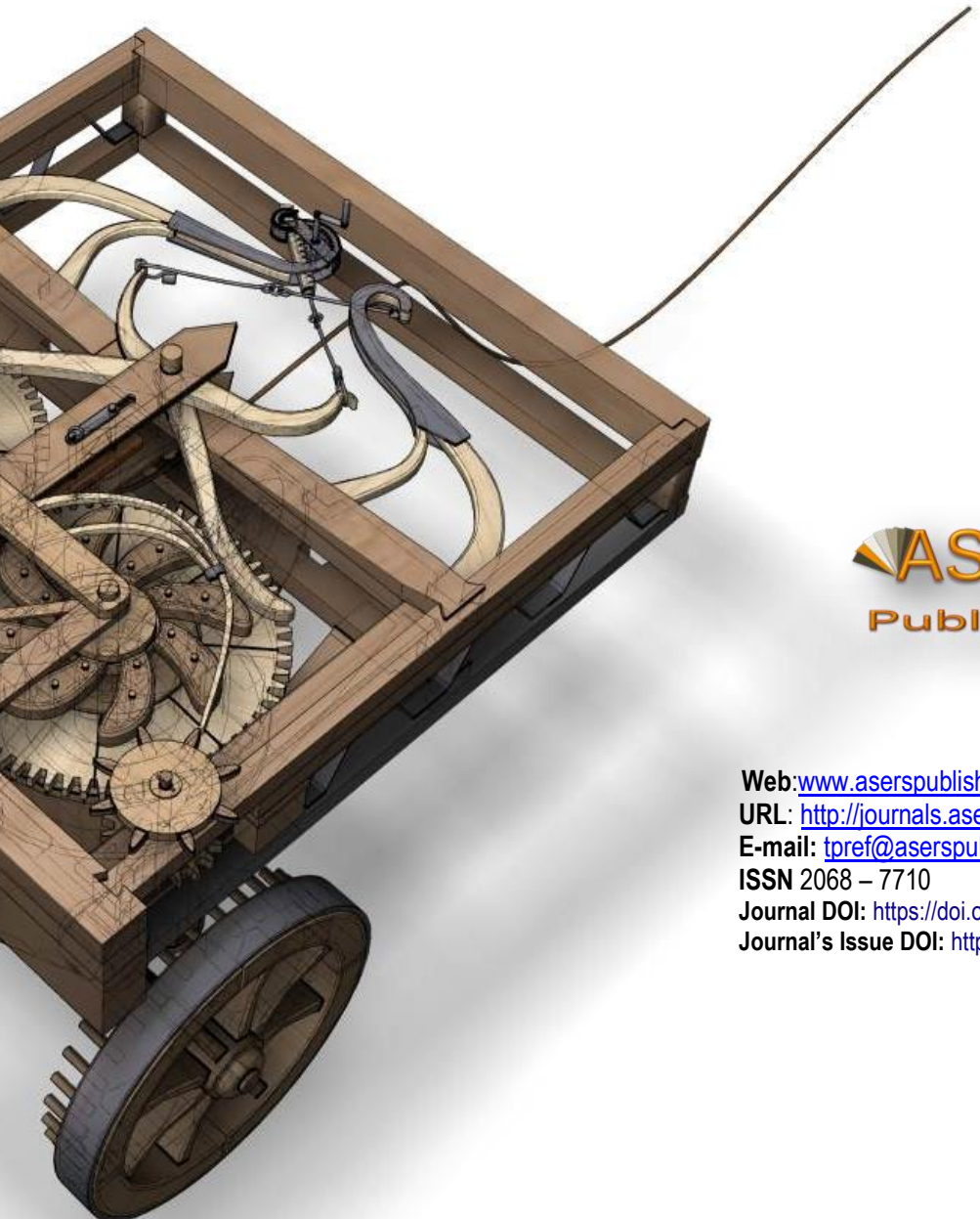

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ISSN 2068 – 7710
Journal DOI: https://doi.org/10.14505/tpref
Journal's Issue DOI: https://doi.org/10.14505/tpref.v15.3(31).00