The impact of exchange rate policy in achieving economic stability

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أثر سياسة سعر الصرف في تحقيق الاستقرار الاقتصادي

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Summary: This paper aims to investigate and analyze the effectiveness of monetary policy in achieving economic stability for Libya through the channel of exchange prices in both official and black markets, using annual data from 1980 to 2020. We adopted the gross domestic product, unemployment rate, and exchange rate as model variables, while these variables are considered some of the macroeconomic indicators. The analysis is performed by using structural break unit root tests, Gregory Hansen, and threshold co-integration ("FMOLS, DOLS, & CCR" methodology). Subsequently, the results revealed the existence of a "structural break" in 2003, and the long-term inverse relationship between official exchange rates and economic growth, indicating its importance as a stabilizing factor for the Libyan economy. Furthermore, reducing the Libyan unemployment rate would lead to an increase in economic growth.

Keywords: Gross domestic income - unemployment rate –exchange rates - the Libyan economy.

Jel Classification Codes : E24, F31, O11

ملخص: تهدف هذه الورقة إلى دراسة وتحليل فعالية السياسة النقدية في تحقيق الاستقرار الاقتصادي لليبيا من خلال قناة أسعار الصرف في السوقين الرسمية والسوداء، باستخدام بيانات سنوية من عام 1980 إلى عام 2020. وقد اعتمدنا الناتج المحلي الإجمالي ومعدل البطالة وسعر الصرف كمتغيرات نموذجية، في حين تعتبر هذه المتغيرات من المؤشرات الاقتصادية الكلية. ويتم التحليل باستخدام اختبارات جذر الوحدة للتغير الهيكلي، ومنهجية جريجوري هانسن، ومنهجية التكامل المشترك العتبي (FMOLS، DOLS، CCR). وقد كشفت النتائج بعد ذلك عن وجود "تغير هيكلي" في عام 2003، والعلاقة العكسية طويلة الأجل بين أسعار الصرف الرسمية والنمو الاقتصادي، مما يدل على أهميته كعامل استقرار للاقتصاد الليبي. علاوة على ذلك، فإن خفض معدل البطالة الليبي من شأنه أن يؤدي إلى زيادة النمو الاقتصادي.

الكلمات المفتاح : الدخل المحلي الإجمالي - معدل البطالة - أسعار الصرف - الاقتصاد الليبي

تصنيف JEL : E24, F31, O11 .

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I- Introduction :

Monetary stability has been considered as one of the most important conditions for stabilizing the local currency in a confrontation foreign currency, therefore (the used exchange rate regimes and the stability of the value of the local currency is the basis of the rational exchange rate policy. Therefore, most countries seek to pursue policies aimed for stabilizing the exchange rate of their currencies; this is to avoid the sharp fluctuations in the currency from one period to another due to changing factors affecting the exchange rate, the most important of which are political factors. Also, controlling the money supply and the exchange rate is one of the basic tasks that Looking, forward by the central bank in both developed and developing economies, it is through Monetary policy The monetary authority is trying to control the exchange rate, as it reflects importance through a set of basic macroeconomic index (growth rates, inflation, unemployment…….etc.) which are used to assess the success and safety of any economic system (2019 ،الجدير).

(2012 ،جبورى و بوزيان) have get in the study on the effect of exchange rate regimes on the economic return of(Algeria ,Morocco, Saudi Arabia and Oman that the level of growth in these countries is affected by changes in the real effective exchange rate, as a rise in the exchange rate (appreciation of the local currency) improves growth in the countries that adopt In countries that adopt a fixed exchange rate, meaning that the policy of devaluation does not serve the economies of these countries.

As we mentioned above, exchange rate instability is the persistent fall and rise in value of domestic currency relative to other currencies (exchange rate), this fluctuation has an effect on most macroeconomic indicators (Mwinlaaru, 2017).

An important literature on the relationship between exchange rate mechanism and economic growth by (Ashour & Yong, 2018) has been identified by using statistical approaches, the results showed that as compared to flexible exchange regime, growth rate was higher by 1.2% when fixed exchange regime was adopted and a growth rate of 0.64% was achieved under the intermediate regime when compared with the flexible regime. This positive effect has been identified in exchange rate regimes upon economic growth of the developing countries. This study is consistent

as emphasized by (Morvillier, Florian, 2020) and which mentioned that the higher the flexibility of the exchange rate regime, the lower the misalignment. While) De Vita & Kyaw, 2001) have showed that the exchange rate policy has no direct effect on the long-term growth of developing countries.

Table 1.Summary-table of the empirical research of the exchange-rate regime effect on growth

Study	Data and sample	ER classification	Model	Technique	Result (Peg and Growth)	Problems
Baxter and Stockman (1989)	1946-1984; 49 countries	Only subperiods of general fixing and general floating	Descriptive analysis	standard deviations	NO EFFECT No systematic relationship between real aggregates and	Unconditional analysis

		considered			exchange rate system	
Mundell (1995)	1947-1993; US, Japan, Canada, EC, other Europe	Only subperiods of general fixing and general floating considered	Descriptive analysis	Average growth rates between two sub-periods	POSITIVE Considerable higher growth under generalized pegging	Unconditional analysis
Ghosh *et al* (1997)	1960-1990; 145 countries	De-jure supplemented by categorizing non-floating regimes by the frequency of the parity changes	Descriptive analysis	Means and standard deviations comparison across ERRs	INCONCLUSIVE Slightly higher growth under a exchange-rate floating regime; Growth the highest under soft peg or managed float	Unconditional analysis; no evidence of whether ERR affects productivity; causal relationships and the effect on productivity only assumed
Moreno (2000 and 2001)	1974-1999; 98 developing countries East-Asia countries	De-facto classification	Descriptive analysis	Means and standard deviations comparison across ERRs	POSITIVE Higher growth under a peg by 1,1 p.p and 3 p.p respectively in both studies. The difference narrows when survivor bias considered	Unconditional Analysis
Levy-Yeyati and Sturzenegger (2002)	1974-2000; 183 countries	De-facto	Pooled regression; Real growth = f (inv/GDP; ToT; GC; political instability; initial per capita GDP; population; openness; secondary enrolment; regional dummies and exchange-rate dummies)	OLS; 2SLS to correct for endogeneity	NEGATIVE NO RELATION Slower growth under a peg for	Is growth equation good? Other policy factors?

Edwards and Levy-Yeyati (2003)	1974-2000; 183 countries	De-facto	Pooled regression; Real growth = f (inv/GDP; GC; political instability; initial per capita GDP; population; openness; secondary enrolment; regional dummies and exchange-rate dummies)	OLS	NEGATIVE Lower growth under fixed regime then compared to flexible	Same
Husain *et al* (2004)	1970-1999; 158 countries	De-jure	Pooled regression; Real growth = f(investment ratio; trade openness; terms of trade growth; average years of schooling; tax ratio; government balance; initial income/US income; population growth; population size; exchange rate dummies)	OLS	INCONCLUSIVE Pegs do not harm growth, but flexible rates do not deliver growth rate	Same; Weak robustness checks; Classification issues
Garofalo (2005)	1861-1998; Italy	De-facto	Simple regression; Real growth = f (inv/GDP; ToT; GC; political instability; initial per capita GDP; population; openness; secondary enrolment; regional	OLS; 2SLS to correct for endogeneity	INCONCLUSIVE Highest growth under soft peg or managed float	Same

			dummies and exchange-rate dummies)			
Dubas *et al* (2005)	1960-2002; 180 countries	De-facto versus de-jure especially considered	Random-effects panel regression; Real per capita growth = f(initial year GDP; initial year population; population growth; investment to GDP; secondary education attainment; a political indicator of civil liberties; trade openness; terms of trade; dummies for transitional economies; regional dummies for Latin America and Africa; time-specific dummies; exchange-rate dummies)	Randomeffects estimation	POSITIVE De-facto fixers, on average, have 1% higher growth than de-facto floaters; de-jure floaters - de-facto fixers grow at 1,12% above de-facto and de-jure floaters. Conclusions significant for nonindustrialized economies only	No robustness or diagnostics checking. Other variables not reported if in line with theory
Huang and Malhorta (2004)	1976-2001; 12 developing and 18 developed countries	De-facto	Panel regression; Per capita growth = f(Financial crisis; Openness; Government consumption; Initial GDP; Fertility rate; Secondary school enrolment	OLS	INCONCLUSIVE NO RELATION For developing economies, fixed and managed float outperform the others in terms of growth; for developed economies, no relationship revealed	Weak growthframework; no robustness checks

			ratio; exchangerate dummies)			
Bleaney and Francisco (2007)	1984-2001; 91 developing countries	De-facto	Growth = f(growth[-1]; exchange-rate dummies; time dummies)	OLS	NEGATIVE Growth is slower under more rigid exchange-rate regime	Weak specification; endogeneity not treated; no robustness checks
Domac *et al* (2004b)	10 years (1990s, different period for each country); 22 transition countries	De-jure	Growth = f (budget balance, lagged liberalization index, inflation, years under communism, share of industry, urbanization, share of CMEA trade)	Switching regression technique	INCONCLUSIVE There is an association ERRgrowth, but the strength is different for different ERRs	Small period and small sample; does not account for defacto exchange-rate behaviour
De Grauwe and Schnabl (2004)	1994-2002; 10 CEE countries	De-facto	Real growth = f(inv/GDP, export, fiscal balance/GDP, short-term GMMcapital flows/GDP, real growth of EU-15, ER dummy)	GMM	POSITIVE ER peg does not reduce economic growth	Short time period and small sample
Eichengreen and Leblang (2003)	1880-1997; 21 countries	De-jure	Real per capita growth = f(Per capita income as a share of US income; primary and secondary enrolment rates; capital controls and exchange-rate dummy)	Dynamic panel and IV estimators	NEGATIVE More flexible exchange rates associated with faster growth	De-jure classification and sample selection; weak robustness
Bailliu *et al* (2003)	1973-1998; 60 countries	De-jure and defacto, but the latter more	Real per capita growth = f(initial growth; investment-	GMM	POSITIVE ERR exercised by any monetary anchor	Weak on robustness Check

		important in terms of findings	to-GDP; secondary schooling; real government share of GDP; trade-to-GDP; M2-to-GDP; private sector credit-to-GDP; domestic credit-to-GDP; gross private capital flows-to-GDP; exchange-rate dummies)		positively affects growth; otherwise, ERR other then peg destructs growth	

Sours (Petreski, 2009). On the other hand, there are a study)Deutsche Gesellschaft für Internationale(2020 ، that agrees to some extent with the previous study which mentioned to the continued intervention of the Central Bank of Libya in the reduction t he exchange rate without developing mechanisms and studies, also, the right equilibrium price may create pressure on a basis, Local or central for sale at an unfair price, and it is Citizen capacity or ability of the Central Bank to fulfill its obligations.

As we showed above on the table (1), we noted one of the categories of studies found that a pegged exchange rate stimulates growth, while a flexible one does not, a second categories concluded the opposite holds. Moreover, a third of categories studies came up unclear with no effect or in conclusive consequences. This situation could be due to a measurement. However, and in the light of literature review and after a brief review on theoretical and empirical studies, this paper seeks to examine and evaluation the effect of exchange rate regime by takes a closer look at the research dealing , We will try to use the most available and influential variables in the Libyan economy that have very important indicators in light of the circumstances that Libya is going through, such as growth and somewhat more Available macroeconomic indicators in Libya.

Data and methodology:

In this study we have adopted modeling as study function was built from the gross domestic product variable as an indicator of Libyan economic growth, "GDP", and from three independent variables represented in "ExrO" the Libyan unemployment rate, "ExrB", the official exchange rate, and the black market exchange rate. The study function was described according to The following equation:

$$GDP = F(Ur, ExrO, ExrB) \quad (1)$$

$$\sum GDP = \alpha_0 \sum Ur + \alpha_1 \sum ExrO + \alpha_2 \sum ExrB + \varepsilon_t \quad (2)$$

Omitted the effect of time on the time series of study variables will lead to misleading analysis, however, to avoid this, all-time series of study variables were examined to ensure the presence of the unit root in it, as well as examining the difference that gets rid of the effect of time on the study variables. Consequently, the results of the "ADF" tests showed that the time series were not stable at the "I0" level, but most of the variables, stabilized when converting their time series to the first difference "I_1", with the exception of the black market currency exchange rate variable "ExrB". While the results of "PP" tests showed that all series of variables of the study function did not stabilize in the level, but all stabilized upon taking the first difference at the constant with and without trend as shows on Table (1) bellow:

Table 1: Results for the unit root tests

Variables	*Unit Root Test (ADF)*		*Unit Root Test (PP)*	
	Constant	*Trend with constant*	*Constant*	*Trend with constant*
GDP	I_1	I_1	I_1	I_1
Exrb	-	-	I_1	I_1
Exro	I_1	I_1	I_1	I_1
UR	I_1	I_1	I_1	I_1

Before starting to estimate the relationship on long and short terms, the results of the test of the specified period of time in the optimum time period are displayed, so as to obtain results that can be interpreted in the context that appears in the results of the tests that the "Lag_{-1}" is the optimal time lag period as shown in the following table (2):

Table2: Information criteria's statistic values.

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-650.9251	NA	1.10e+10	34.46974	34.64212	34.53107
1	-517.2378	232.1938	22528779	28.27567	29.13756*	28.58233*

After making sure that the time series of study variables are not stable at the level, and all of them are stable at the first differences, then a "Johannes Co-integration test" method was determined to estimate the study function in the long term. The results of the Johannes Co-integration tests showed that there is no equilibrium relationship between the variables of the study function in the long term according to the results of the "Trace" effect, followed by the results of the "Max-Eigen value" tests that there is no relationship between the variables of the study function in the long term, which indicates the absence of an equilibrium relationship for the study function in the long term.

Table3: Johansson co-integration

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None	0.405757	37.51158	47.85613	0.3238
At most 1	0.293872	17.21336	29.79707	0.6243

At most 2	0.088390	3.642948	15.49471	0.9302
At most 3	0.000865	0.033764	3.841465	0.8542

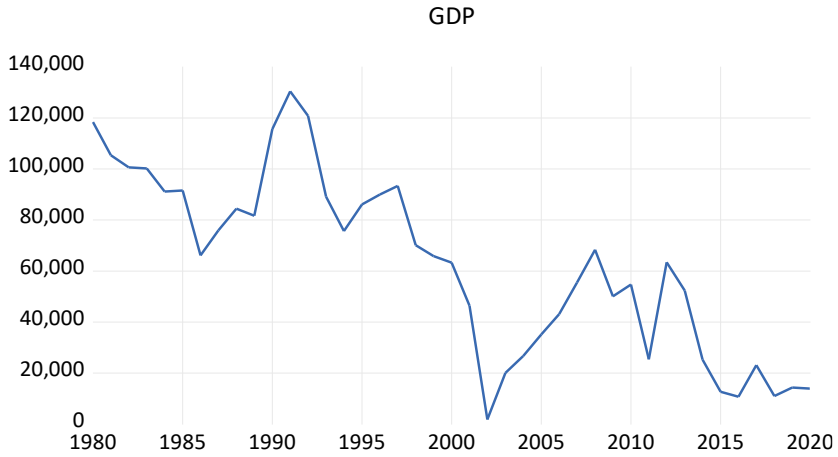
Trace test indicates no cointegration at the 0.05 level

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized		**Max-Eigen**	**0.05**	
No. of CE(s)	**Eigenvalue**	**Statistic**	**Critical Value**	**Prob.****
None	0.405757	20.29821	27.58434	0.3209
At most 1	0.293872	13.57042	21.13162	0.4013
At most 2	0.088390	3.609184	14.26460	0.8981
At most 3	0.000865	0.033764	3.841465	0.8542

Before determination the short-term relationship of the variables of the study function that extends over the period 1980-2020, a question arises about the fact that there is no equilibrium relationship in the long term, despite dissolved the effect of time on the variables of the study function, and thus the direction of the study series for the variable dependent on the period 1980-2020 was presented. In the following figure (1), which was shown as a structural break with a steep slope from 1999 to 2003, which confirms the assumption of a shock that produced spurious results in the long term. Figure (1) shows the trend of the series of dependent variable "GDP" over time for the period 1980-2020.

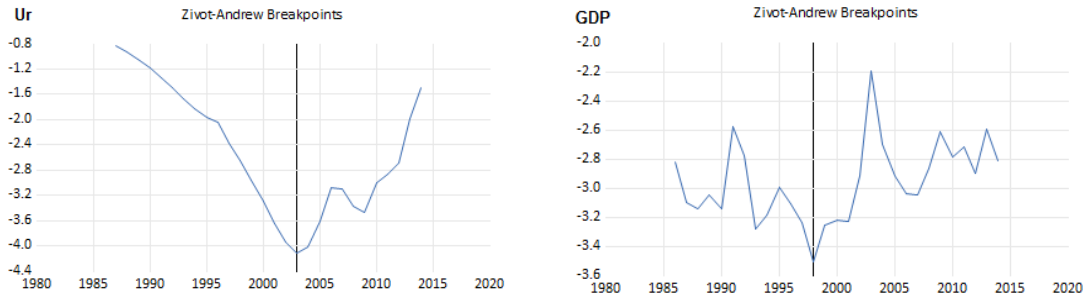
Figure 1: GDP (1980-2020)



The analysis presented led to the necessity of examining the structural break point before continuing to evaluate the study function in order to ensure that the correct methodology is used that leads to accurate results that help in achieving the objectives of the study, and to develop solutions that help the decision maker and economic policy makers from building a plan and taking A decision that would solve the problem under study or limit its repercussions. When conducting the "Zivto-Andrews" test, the graphs showed the presence of structural breaks for two variables of the study function, where he found the roots of the structural breaks of the two series economic growth variable "GDP" and the variable unemployment rates in Libya "UR", that these structural breaks are

concentrated in the last two decades of the time period for the study series, specifically in the period between 1999 and 2003, as shown in Figure (2) below:

Figure3: GDP ","UR "structural sections



Due to Structural break unit root that found, and by using Zivto-Andrews tests, the results showed in Table 4 below:

Table 4: Zivto-Andrews Structural break unit root tests

Variables	Break Point	ZA Statistic
GDP	1998	-3.510054*
Ur	2003	-4.111296**
ExrO	2014	-5.275026
ExrB	2012	-3.112570

The results mentioned that there is Structural break unit root for GDP at 1998 5% significant and Ur at 2003 5% significant, while ExrO, ExrB were non significant statistically.

The existence of the Structural break unit root, the results of the tests of "Johanssen-Juselius, 1990" became useless in detecting the existence of a long-term relationship between the variables of the study function. The economist, "Phillips-Perron," confirmed , That omitted structural sections in the model not only weakens tests of unit roots, but also tests of joint integration. ”(Perron, P, 1989) Likewise, economist Kunitomo stressed, saying,“The existence of a structural segment in time series would cause results. False joint co-integration "(Kunitomo, 1996). Based on the above, the" Gregory "economist and" Hansen "economist prepared two papers in which they proposed four models based on the" Augmented Dickey-Fuller "methodology, as follows (Gregory & Hansen) 1996a, & Gregory & Hansen, 1996):

$$Y_t = \mu_0 + \mu_1 \varphi_{t,\tau} + \mu_2 X_t + \varepsilon_t, t=1, \ldots,n \quad (3)$$

$$Y_t = \mu_0 + \mu_1 \varphi_{t,\tau} + \mu_2 t + \mu_3 X_t + \varepsilon_t, t=1, \ldots,n \quad (4)$$

$$Y_t = \mu_0 + \mu_1 \varphi_{t,\tau} + \mu_2 t + \mu_3 X_t + \mu_3 X_t \varphi t_{,\tau} + \varepsilon_t, t=1, \ldots,n \quad (5)$$

$$Y_t = \mu_0 + \mu_1 \varphi_{t,\tau} + \mu_2 t + \mu_3 X_t + + \mu_4 X_t + \mu_5 X_t \varphi t_{,\tau} + \varepsilon_t, t=1, \ldots,n \quad (6)$$

φt dummy variable , Yt depended variable as GDP,(Ur, ExrO, ExrB) are depended variable and εt as Wight Noise .

In the case of the first function, the structural break affects only the constant term, and the second function, the structural break only affects the constant term, but with a general trend, and in the

third function the structural break affects the fixed term with the presence of independent variables, while the fourth function the structural variable affects the term The constant, general trend and independent variables, and after estimating the four functions, a stabilization study is immediately followed to estimate according to three options, which are as follows (Miyazaki, T., & Hamori, 2014, and Ayyad, 2017):

$$ADF = inf\ \tau\ e\ T\ ADF\ (\tau) \quad 7$$

$$Z\alpha = inf\ \tau\ e\ T\ Z\alpha(\tau) \quad 8$$

$$Zt = inf\ \tau\ e\ T\ Zt(\tau) \quad 9$$

Consequently, the results of co-integration test for "Gregory Hansen" shown in Table (5) showed that all tests revealed the existence of long-term subscriber integration relations "ADF, Zt, & Zα", that is, there are three common integration relationships with a structural break in 2003 and this year, following the international blockade on the Libyan economy during the 1990s due to the Lockerbie plane crisis, which ended with the Libyan state paying exorbitant compensation to the families of the victims, as well as the 2003 invasion of Iraq, which has the largest energy reserves in the world, which caused a shock to oil prices in the year through the impact. In his presentation, just as the Libyan economy began to open up to the outside world and make fundamental changes in the economic system, which was called at the time "capitalist socialism." Therefore, it is noticed that the results of the "Johannes Co-integration test" which showed the absence of a balance relationship between the series of study variables in the long term according to the effect results and the maximum value, it turned out to be false as a result of its inability to show the implications of the sectional structure on the series of variables of the study function.

Table (5) shows the results of the tests of co-integration with the structural point.

Tests	Statics Value	Structural Break point
ADF	-8.365796***	2003
Zt	-8.472370***	2003
Zα	-53.09875***	2003

The results of estimating the long-term relationship using "FMOLS, DOLS, CCR" methods showed, with the addition of a dummy variable symbolized by the symbol "D0", in order to get rid of the implications of the structural break for the year 2003 on the relationship of independent variables on economic growth in the long term. "FMOLS, CCR" is the presence of long-term equilibrium relationships, while the "DOLS" method of joint integration did not appear, as is evident by the results of the following equations: 9

FMOLS GDP = 111877.7*** - 19742.42** ExrO -1589.677 ExrB - 2140.713* Ur + 1025.766 D0 — 10

DOLS GDP = 142954.3*** - 155432.4 ExrO + 4929.644 ExrB - 1370.781 Ur + 121020.1 D0 — 11

CCR GDP = 112956.3*** - 23254.82 ExrO* - 495.6659 ExrB - 2254.615 Ur* - 4727.064 D0 — 12

It is noted from the evaluation of the long-term relationship that the effect of the official exchange rate is significant at 5% according to the "FMOLS" method, and 10% according to the "CCR" method, and this indicates that lowering the official exchange rate would lead to an increase in growth and vice versa, and that the ability to explain this result is high, and this result is expected and normal for an economy that does not have a share or competition in the global market with any product or service except energy, and almost the country's income depends on natural energy resources, and even their prices and sales quantities do not enter the local economic decision-maker in it, all of which are in the hands of the global market and its directions. The evaluation of the long-term relationship also showed that the Libyan unemployment rate according to the “FMOLS & CCR” method is significant at 10%, and that the relationship between unemployment rates and economic growth is inverse and influential, and this indicates the loss that the Libyan economy suffers from wasting labor and not benefiting from the head. Human money because the economic decision-maker relied on easy earning and not devising programs and plans that would add an added value to income and benefit from the human and material resource, which made unemployment, in its disguised parts, and the habit affecting the Libyan economy. After estimating the long-term relationship, it was estimated in the short term, and the results shown by the following function were approved, after making sure that they were free from the diagnostic problems attached to the appendix (1-2-3-4):

$$ECM \quad D(Log(GDP)) = - 0.576808^{**} [Log(GDPP_{-1}) - 0.0788832667461\ UR_{-1} + 0.200727766961\ ExrO_{-1} - 0.0353172116388\ D0_{-1} - 9.46268418759] + 0.241626\ D(Log(GDP_{-1})) + 0.023685\ D(UR_{-1}) + 0.001612\ D(EXRO_{-1}) - 0.080504 D(D0_{-1}) + 0.001412 \quad (13)$$

Which states that the value of the error correction factor "Etc" is negative and significant at 5%, which confirms the existence of a joint co-integration relationship moving from the explanatory variables to the variable of economic growth or gross domestic income, and that the model is able to correct the imbalance caused by time, where the percentage of imbalance is estimated The equilibrium is about 0.58 in each period of the period "t". Therefore, when the income of the GDP deviates from its equilibrium value due to the change in the behavior of the explanatory variables during the short period, it will take about 1.7 year to return to the direction of its equilibrium value. It also showed the absence of a statistically significant relationship for all study variables in the short term.

Results:

1- The results of the estimation of the relationship by the Johannes Co-integration test showed that there is no equilibrium relationship between the variables of the study function in long terms.

2- The tests "Zivto-Andrews" revealed the existence of unit roots for the structural sections "Structural break unit root" of the economic growth variable "GDP" and the variable of unemployment rate.

3- co-integration tests revealed to "Gregory Hansen" showed that there are three co-integration relationships with a structural segment in the year 2003 AD.

4- The long-term results according to "FMOLS and CCR" methods showed that the relationship between Official exchange rates and economic growth is inverse.

5- The long-term results, according to "FMOLS and CCR" method, showed that reducing the Libyan unemployment rate would lead to an increase in economic growth.

Recommendations:

1- Restructuring state institutions and limiting parallel institutions, and respecting specialization in tasks. .

2-A local currency must be raised, especially since the Libyan economy is a reinter economy and its economy depends virtually on the natural resource,. 5. Work to revitalize other sectors in the Libyan state in order to play its role in diversifying sources of income..

3- Utilizing financial and human resources to support the private sector and eliminating unemployment.

4- Diversifying sources of income through reforming, security and political stability.

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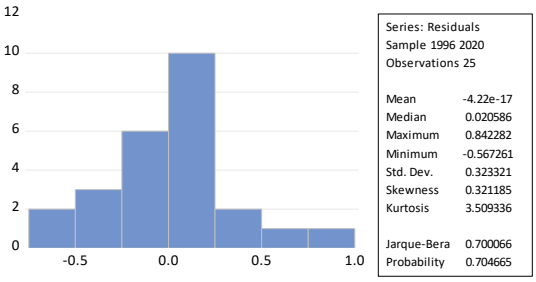
Appendixes:

Appendix **(1) (Normality -Test).**



Appendix (2)Serial Correlation

Breusch-Godfrey Serial Correlation LM Test:

Null hy o hesis: No serial correlation at up to 2 lags

F-statistic	*0.911477*	*Prob. F(2,17)*	*0.4207*
*Obs*R-squared*	*2.421185*	*Prob. Chi-Square(2)*	*0.2980*

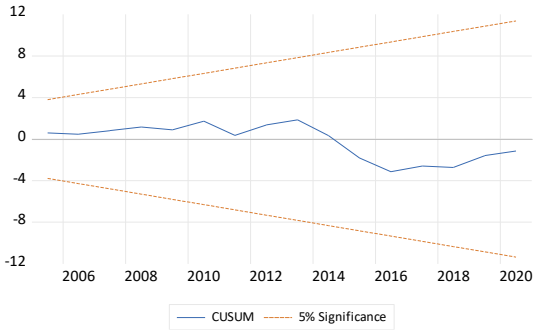
Appendix (3) Heteroskedasticity

Heteroskedasticity Test: Breusch-Pagan-Godfrey

Null hypothesis: Homoskedasticity

F-statistic	*2.659720*	*Prob. F(8,16)*	*0.0456*
*Obs*R-squared*	*14.26974*	*Prob. Chi-Square(8)*	*0.0750*
Scaled explained SS	*10.34123*	*Prob. Chi-Square(8)*	*0.2419*

Appendix (4) (Stability Test).



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