Measuring the Granger causality relationship between the shadow economy and macroeconomic variables in Iraq (1990-2017)

By

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Abstract

The shadow economy includes both the activities of the informal sector that are legitimate, unregistered and not subject to supervision, in addition to the illegal activities (hidden or black sector) that include goods that are prohibited from trading and prohibited for use and dealing. The research aims to study the phenomenon of the shadow economy in Iraq and measure its causal relationship with some macroeconomic variables (national output, unemployment, inflation, tax revenues, average per capita income, and money supply) in order to address the problems resulting from the impact of the shadow economy on the structure of the Iraqi economy to cause In distorting official statistics taken as a basis for planning, which leads to the formulation of inappropriate economic policies. The research adopted the quantitative approach in measuring, and the economic analysis, according to the statistical test (Granger causality), found that there is a unilateral relationship with the gross domestic product and the rate of inflation that is affected by the shadow economy and does not affect it, while the reciprocal relationship appeared to the economy Shadow with tax revenue and cash supply.

Keywords: Shadow Economy, Macroeconomics, Granger causality, Iraq.

1- Introduction

There are many economic phenomena that threaten the economic, social and political security of many countries of the world, such as shadow economy which its distortion leaves behind on economic variables and social values. The shadow economy constitutes a high proportion of the gross domestic product of most countries and includes very large areas of legal and illegal economic activities. The shadow economy includes all of the activities of the informal sector that are legitimate, unregistered and not subject to government oversight, and therefore the state does not collect the financial dues resulting from the activities of the informal sector traded from the production of goods and services, on the other hand, there are illegal activities (hidden or black sector).

Research problem: The research deals with the problem of the spread of the effects of the shadow economy phenomenon in the structure of the Iraqi economy, especially since the nineties, during which the shadow economy was integrated with the economic siege crisis to generate illegal activities from the activities of the shadow economy represented by (illegal

trade, child labor, white slavery, tax evasion.....etc.), and this phenomenon exacerbated after 2003 due to political, security and economic instability and took another direction represented by operations such as (money laundering, human organ trade, drug trafficking and terrorism) which has become a great and serious damage to the Iraqi economy and society.

Research importance: The importance of the research lies in the increasing and diversification of the phenomenon of the shadow economy in its various forms in Iraq. Therefore, this phenomenon has become worthy of attention and study, and it has become necessary for researchers to take up the subject in order to monitor and observe the shadow economy and take into account the size of the shadow economy and its effects on official statistics of macroeconomic variables taken as a basis for planning when formulating economic policies (Sengodan & Appusamy, 2020; Sowndarya et al., 2021; Srinowati et al., 2021).

Research hypothesis: The distortion of national income accounts in Iraq through the effects of the shadow economy on macroeconomic variables.

Research Objectives: The research aims to show the severe implications of the concept of the shadow economy, especially with regard to its characteristics, estimates and contents. In the practical side, it aims to determine to measure the Granger causality relationship between the shadow economy and selected economic variables.

Research methodology: The research adopted the deductive and inductive method as well as quantitative in an econometric study. The research relied on dealing with the Iraqi economy as a spatial framework and the approved period 1990-2017 as a temporal dimension to build a standard model to show causality using the statistical test Granger Causality.

Literature review

(**Al-Quraishi: 2010**) concluded that the leakage of many economic resources outside the scope of the official income cycle caused imbalances in the structure of the Iraqi economy for the period 2003-2010 and the increase in the proportion of the shadow economy has long-term economic, social and political effects.

(**Shehan; 2013**) "The shadow economy between causality and neutralization –Iraq as a case study ", The study aimed at revealing the causes of the phenomenon of the shadow economic and the way of tackling them. The study came up with ways to measure this phenomenon and know the negative effects, as it represents a large percentage of the gross domestic product, similar to many countries of the world.

(**Al-Rajhi: 2021**)   the thesis entitled "The Role of the Shadow Economy in Economic Growth". The study aimed to investigate if the economic growth in Iraq is negatively or positively affected by changes that occur in the illegal activities of the shadow economy (money laundering, tax evasion, abnormal demand for money, corruption) and what is the percentage of these effects in the short and long term. It concluded that the demand for abnormal money to meet the requirements of the shadow economy for the period 1994-2019 is inelastic to interest rate changes. Thus, monetary policy does not have any effect on liquid money in circulation, while it is affected by dealers in the shadow economy, which is reflected in raising the interest rate to achieve profits.

2- Research content

First: The theoretical rooting of the concept of the shadow economy

The shadow economy contains many concepts, definitions, and perceptions of different facts, and for the purpose of removing ambiguity from this concept, it was necessary to shed light on it and on the most important sources that dominated this economy into existence, leading to its impact on all economic variables and referring to the sedimentation it leaves in the social structures of society.

(1-1) The concept of the shadow economy phenomenon

The shadow economy activities include the informal economy, which is (the group of productive economic activities that are not included in the national accounting system and are characterized as not subject to the tax system and/or not registered **(Bernabe: 2000: P6)**. On the other hand, there are illegal activities that fall under the so-called hidden economy or the black economy, this economy coexists with the local economy, it is sometimes called the Parallel Economy, an example of this is the black market, which is also known as the parallel market for goods and currencies. The black economy includes businesses that are not subject to government control and all the dues resulting from this activity towards the state, but the goods are prohibited from trading and forbidden to use and deal such as (weapons, drugs, antiquities theft, human trafficking...etc. Figure 1 below shows the shadow economy and its divisions. Morus, Riker and Smith in 1994 indicated that the shadow economy "includes all activities that result in the generation of income that is not recorded in the national income accounts, whether these activities are legal or illegal, and whether they are taxable or not subject to any taxes**" (Mirus & al: 1994: PP.25-30).** Tenz also defined the shadow economy in as activities that are practiced away from the tax authorities which includes "all incomes that are not disclosed to the tax authorities and that may or may not be included in the national income accounts and depends on the nature of the sources of these incomes. " **(Tanze: 1983: p.1).**
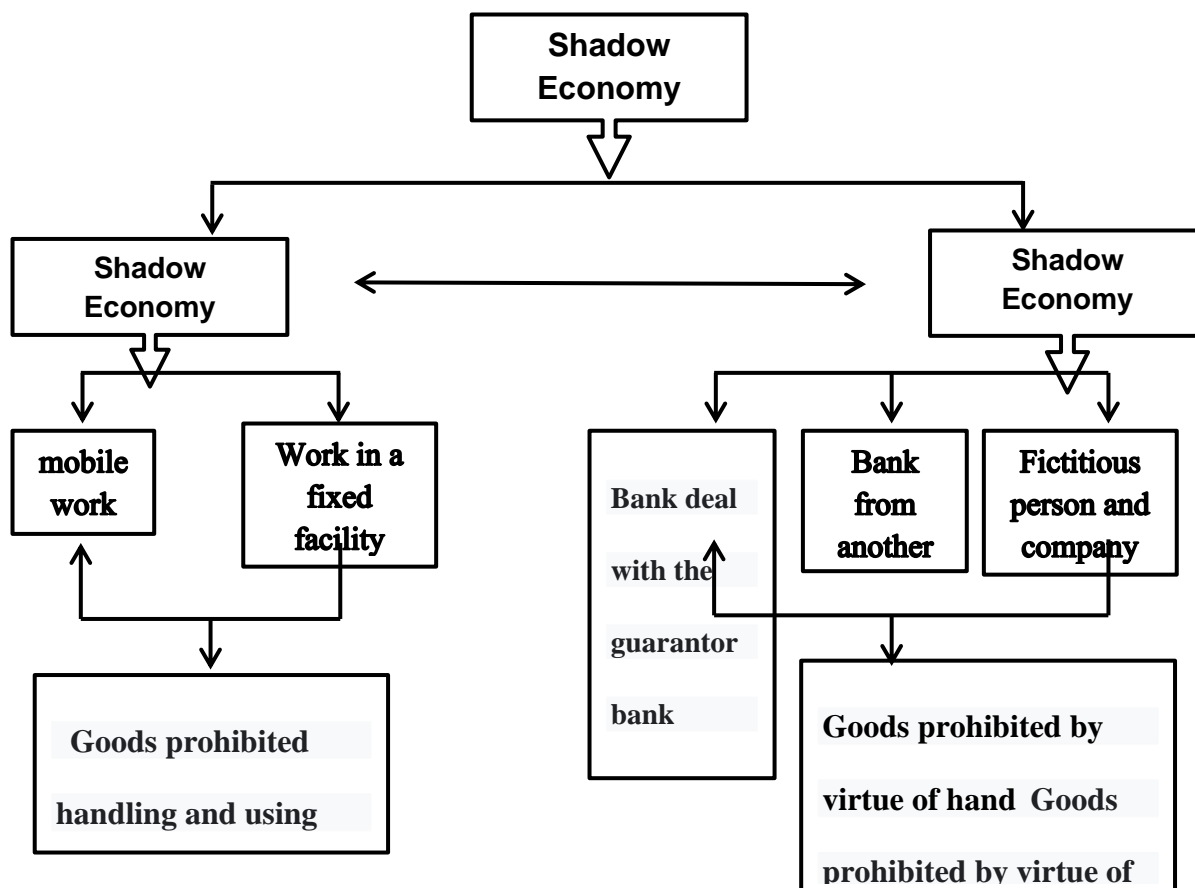
Figure (1). The shadow economy and its divisions

Confidentiality and not keeping an accounting book
Source: Hussein Salman, Shadow Economy or Shadow Economy, Syrian Economic Sciences Association, Damascus, 2010, p. 2

This was shown by (Molevsky) in 1982 that the term shadow economy does not mean that all transactions that take place in it are not recorded in the official statistics of national income, as there is a possibility that the shadow economy includes part of the transactions that are originally carried out in the declared economy and then are registered accordingly within his accounts, however, they are used in the shadow economy, and the resulting added value is not recorded in the national product accounts **(Molefsky: 1982: PP. 10-12)** (such as the use of some locally produced chemical compounds in the manufacture of hallucinogenic drugs). From the foregoing, it becomes clear to us that the shadow economy is a group of activities that generate income that is not officially recorded in the national income accounts, either because it is deliberately hidden to evade the legal obligations associated with the disclosure of these activities, or because these income-generating activities by their nature are in violation of the laws prevailing in country.

(1-2) Sources of the Shadow Economy Phenomenon

To complete the features of the concept of the shadow economy, it is necessary to clarify the activities that acquire the status of shadow because they are diverse and include all forms of exchange the most ancient from (barter) to the most modern (electronic commerce), the simplest types of commodities to the most complex are traded accordingly. Therefore, the sources of the shadow economy are divided into:

I) Illegal Activities: They are activities related to crime, that is, all crimes that result in income for those who engage in them, whether monetary or non-monetary, according to a study prepared by the International Monetary the illegal activities are trafficking in stolen goods, drug trafficking, their cultivation and manufacture, prostitution, gambling, smuggling and bartering of stolen or smuggled goods or drugs, as well as personal use of them **(Schneider and Ernstey: 2020: p. 2**). In addition to the illegal activities, smuggling of some plants and animals as well as valuable antiquities and paintings, bribery, administrative corruption and commissions through which many illegal acts are passed, and espionage appeared in the modern era and the accompanying huge sums of money for the spy, fraud and fictitious companies and projects, currency counterfeiting, commercial fraud, counterfeiting gold and silver, and trading in human organs, which have recently spread in some countries (**Abboud: 2007: p. 59).**

II) Legitimate Activities: They are those activities that are not subject to government control or any obligation towards the state, whether it is a fee or a tax, but the commodity in question is allowed and not prohibited. The International Monetary Fund specified its **(IMF: 2022**) that these businesses are business income Unreported freedom, wages, salaries and assets obtained by an individual from unreported work related to legitimate services and all work done by the individual himself and assistance obtained from his neighbors such as (goods produced in unlicensed factories, private lessons, hire work, etc.) Goods sold in unregistered shops and workshops...etc.) **(Schneider, Ernst: 2020: p.2**). In general, legitimate businesses are characterized by the same characteristics as (Keith Hart) from the ease of entry and practice of the activity, the fact that the activity is family owned and its small scope, the limited production of intensively used goods to work at the expense of technology, and the work here is unregulated and takes place in unorganized markets.

Second: Quantitative analysis of the Granger Gusality relation (1990-2017)

To clarify the impact of the shadow economy on some macroeconomic variables, it is necessary to rely on one of the standard models so that the study is not purely descriptive, and to come up with complete clarity about the relationship between the shadow economy and macroeconomic variables, we have resorted to the Granger causal model to reach the above-mentioned relationship.

1-2 Models for measuring causation

An economic model is defined as a set of economic relationships that are usually illustrated by mathematical formulas called an equation or a set of equations that explain the behavioral or mechanical relationships that show the work of a particular economy or sector. The economic model in a simplified form represents the economic activity of the economic sector during a certain period of time in the form of symbols and numerical values. One of the most important objectives of the economic model is to depict the causal relationship between the main variables in the real world, which is devoid of irreplaceable complications, in order to better understand how the economy works, and accordingly it consists of fewer variables than those that exist in real life **(Mahboob: 1988: p.30)**. Economic models are divided into static models and dynamic models. The first is concerned with studying the relationship between different variables at a specific moment in time, while dynamic analysis aims to track the time paths of variables and determine their trends whether their value tends to stability over time or is it drifting away from it, undoubtedly, this type of analysis transcends the defects that characterize the static analysis represented by the abstraction that violates the real relationship between economic variables, as the change between economic variables is a function of change in time. It is also necessary to emphasize dynamic models when they take into account time, as there is a period of time between the movement of the dependent variables that respond to the independent variables or the effects of the independent variables that occurred in a previous time in the dependent variable in the current time (**Al-Edami: 2001: p. 85**). Among the causal selection models, the Granger Model was used. Symbols used in Granger's causal model include shadow economy (HEC), gross domestic product(GDP), Inflation Rate(IR), Unemployment Rate (UR), Average per Capita Income (ACI), Narrow money supply (currency in circulation + current deposits) (M1), Tax Revenue (TR).

2-2: The economic implications of the results of the Granger test

Economic time series are characterized by their instability due to the effect of the variables they represent on political conditions, which leads to their ups and downs fluctuation. Therefore, before conducting the Granger causality test, the stability of the variables was necessary to prevent the existence of a false regression. The time series stability was tested and what achieved high moral and statistical success follows:

ACF 1) Autocorrelation Function
The autocorrelation function at the gap (k) is defined as: (Gujarati: 2004: p.817).

$$PK = \frac{yk}{yO} = \frac{cov.at\ lag\ k}{var} \quad \ldots\ldots\ldots\ldots (1)$$

$$y_K^A = \frac{\Sigma(y_t - y)\ (y_{t+k} - y)}{n} \quad \ldots\ldots\ldots\ldots (2)$$

$$y_o = \frac{\Sigma(y_t - y)}{n} \quad \ldots\ldots\ldots\ldots\ldots\ldots (3)$$

Where (n) is the sample size, (k) is the length of the time gap. By drawing a diffusive figure between the values of k, p, we get the correlation figure, using the statistical program (Eviews). The scattering figures for the autocorrelation coefficients of the study variables were drawn. It was noted that all the variables were stable at the original level.

3-2: Unit root using the Extended Dickey Fuller Test ADF

To analyze the stability of the time series of the approved variables (shadow economy, GDP, money supply in the narrow sense, inflation rate, tax revenues, average per capita income) the expanded Dickey-Fuller was adopted according to the three levels (with a fixed limit - a fixed limit and a time trend or without them) where the tabular (t) value is examined and compared with the calculated (t) value at a significant level (10%, 5%, 1%). The stability of the variables at the original level was observed in the cases shown in Table (1), where the calculated (t) value was greater than the tabulated (t) value.

Table (1). *Statistical Results of the Extended Dickey-Fuller Test (ADF) for Shadow Economy and some economic changes in Iraq*

	The level			The first difference		
Variables	fixed limit only	Fixed boundary and general trend	Without a fixed limit and general direction	fixed limit only	Fixed boundary and general trend	Without a fixed limit and general direction
GDP	0.88	0.3	0.44	0.14	0.5	0.01
HEC	0.0005	0.0030	0.000	-	-	-
IR	0.847	0.304	0.773	0.043	0.152	0.06
UR	0.466	0.866	0.28	0.002	0.005	0.0001

Source: From the work of researchers based on the results of the statistician (Eviews).

Both Dickey and Fuller calculated the tabular values of the t-test based on Monte Carlo simulation and were placed in tables named (t) tables according to significant levels (10%, 5%, 1%) depending on the regression formula and sample size.

Sleep test

To verify the quiescence of the time series of the economic variables included in the analysis, the Extended Dickey-Fuller test (ADF) was used to test the unit root of the time series. This method is based on the null hypothesis (Ho: B = 0) that the time series of a variable is not stable, (there is a unit root) against the alternative hypothesis (H1 B< 1) which states the stability of the time series, and as shown in Table (2), where we found that the time series of the research variables (GDP, inflation, unemployment) have stabilized at the difference the first. While the time series for the shadow economy variable was stable at the level (3).

Table (2): *Expanded Dickey Fuller Test (ADF) Results (Unit Root Test*

Variables	)Level(			)st difference(1		
	fixed limit only	Fixed boundary and general trend	Without a fixed limit and general direction	fixed limit only	Fixed boundary and general trend	Without a fixed limit and general direction
	p-value	p-value	p-value	p-value	p- value	p-value
GDP	0.0016	0.0022	0.0003			
HEC	0.9998	0.2069	0.9997	0.5617	0.0033	0.4023
IR	0.1471	0.1253	0.0299	0.0007	0.0044	0.0000
UR	0.0427	0.0006	0.5250	0.0000	0.0002	0.0000

Source: From the work of researchers based on the results of the statistician (Eviews)

And since the variables have been stationed after taking the first difference and a stationary variable in the level. It has become possible to use the ARDL model, because the most important features of this model are its ability to estimate the relationship between

variables, whether they are stable at the level, the first difference, or a combination of the two. The application of this model enables us to obtain the most efficient estimate of the long and short-term parameters. After showing the stability of the time series of the study variables and that there is no false regression, we run the Granger test in order to determine the direction of causation between the variables, and whether they are singular or mutual, meaning that each of the variables causes the other and there is no causal relationship between them according to the previously mentioned formulations.

Third: The analysis of standard models

After showing the stability of the time series of the study variables and that there is no false regression, we run the Granger test in order to determine the direction of causation between the variables (Index 1), and whether they are singular or mutual, meaning that each of the variables causes the other and there is no causal relationship between them according to the mentioned formulations, previously the results were as they are shown in Table (3).

Table (3). *Granger's causation test*

Causation direction	F-stat.	F-prob.	Result	Nature of relation Ship
GDP→HEC	0.53196	0.59971	No CAUSE	Reciprocal
HEC→ GDP	1.00141	0.39401	* CAUSE	
ACl→HEC	2.07380	0.16531	* CAUSE	unilateral
HEC→ ACl	1.36932	0.28863	* CAUSE	
TR→HEC	7.46170	0.00695	* CAUSE	Reciprocal
HEC→ TR	8.42573	0.00450	* CAUSE	
Rl→HEC	0.53196	0.60432	No CAUSE	No Relation
HEC→Rl	1.64005	0.23167	No CAUSE	
M1→HEC	1.56541	0.24596	* CAUSE	Reciprocal--------
HEC→M1--------------	0.46842-------	0.63616------	* CAUSE-----	--------------
------------EC UN	-----------	------------	----------	unilateral
UN HEC	2.75401	0.0445	CAUSE	
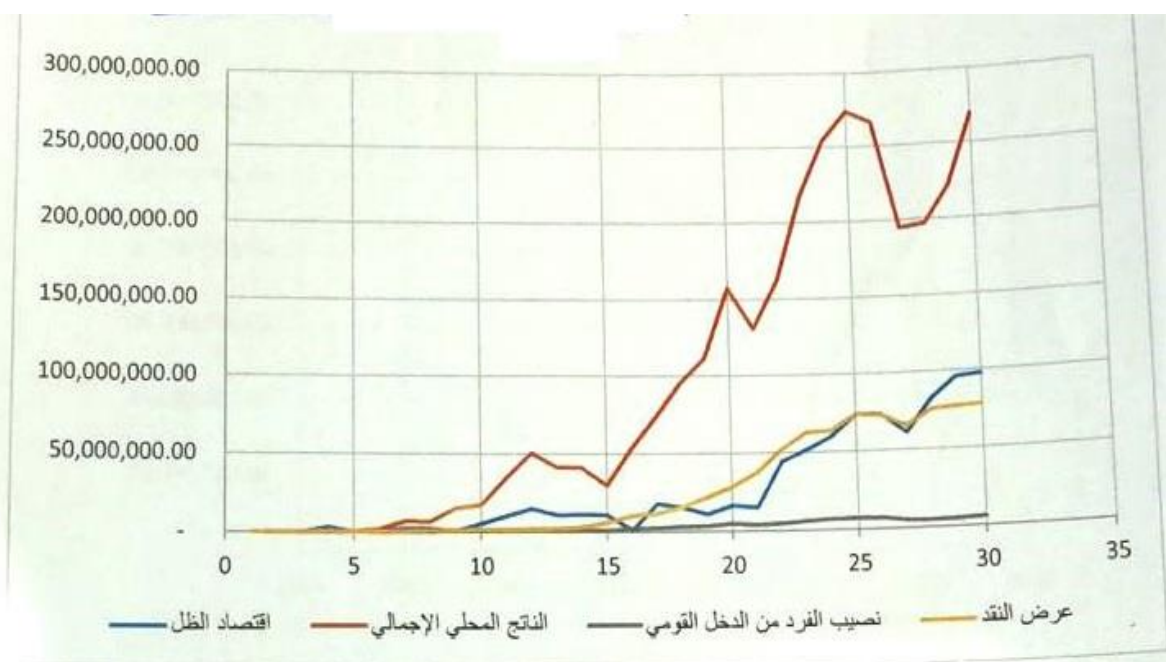
Figure (2): The relationship between the shadow economy and economic variables

Source: From the work of researchers based on the results of the statistician (Eview)

The first model: measuring the impact of the shadow economy on the gross domestic product (GDP)
3-1: The causal relationship
Results of the causal relationship between HEC and GDP using Granger's method were:
1- Null Hypothesis (HEC does not Granger Cause GDP) with lags 1, F-Statistic = 3.83888. Prob = 0, 0618.
2- - Null Hypothesis (GDP does not Granger Cause HEC) with Lags 1. F-Statistic = 1.38687. Prob = 0.2505).

It appears from Table (3) that the relationship between the shadow economy and the GDP is reciprocal, as the growth of the shadow economy affects the GDP as it gives a distorted indicator of the growth and decline of GDP. Also, the impact of the shadow economy on the size of the gross domestic product reflects the size of the structural imbalances in the economy and the backwardness of the commodity sectors and their inability to satisfy the needs of society and dependence on the outside to bridge the gap between demand and domestic production.

3-2: Estimating the regression of the polymorphic integration according to the (ARDL) model

Table (4) *Estimation of the counteraction regression HEC&GDP using the ARDL model*

Variables	Coefficients	t-statistic	p-value
GDP (-1(	-0.085805	-0.405522	0.6887
HEC	6.704844	2.268833	0.0513
C	36537127	0.325553	0.7476
R-Squared		0.161326	
Adjusted R-Squared		0.091437	
F- Statistic		2.308306	
Prob (F-statistic)		0.121092	
Durbin –Watson stat		1.977235	

Residual Diagnostic Tests
Histogram- Normality Tests P-Value =486 .8046
Serial Correlation LM Test P- Value = 0.7981
Heteroscedastictiy Test P- Value =0.0008
Result of Bounds Test: Test statistic (F-statistic) value = 8.621015, K 1

(Critical Value Bounds)

Significance	0Bound (Min)	(Max) Bound1
10%	3.02	3.51
5%	3.62	4.16
2.5%	4.18	4.79
1%	4.94	5.58

(Estimated Short Run Coefficients)

Variable	Coefficient	t-statistic	Prob
D(HEC)	7.993190	0.664568	0.5127
CointEq(-1)	-1.088729	-5.226658	0.0000

(Estimated Long Run Coefficients)

Variable	Coefficients	t- statistic	P –Value
HEC	6.174998	2.319570	0.0292
C	33649803	0.324850	0.7481
Counted = GDP- (6.1750*HEC +33649803.2430)			

Source: Prepared by researchers based on the results of the statistical program (Eview)

As shown in table (4), the model was also able to pass the statistical tests where the average R^2 is (0.98) as well as the (F-static) value of (169.5), as well as passing the standard tests and after estimating the model (ARDL), a Bound Test was done to ensure the presence or absence of the model. The existence of co-integration (a long-term equilibrium relationship) between the variables, as the tests indicated the existence of co-integration between the variables. The results of the co-integration test a table of the relationship between the shadow economy and GDP. The co-integration test showed us that the calculated values of the (F-Static) test (14.89) are greater than the tabular upper limits of the F-statistic values. This indicates the existence of co-integration between the variable. The model also showed us that the sign is positive between the variables, that is, an increase in the size of the informal economy by one unit leads to an increase (GDP) by (0.52) units. The GDP and the shadow economy (GDP) have a one-way relationship, meaning that the GDP is affected by the shadow economy and does not affect it, because the shadow economy is affected by factors other than GDP, while the presence or growth of the shadow economy affects (GDP) as it gives a distorted indicator of the growth or decline of the (GDP) may increase and the reason for the increase may be unreal due to the increase in the productivity of shadow economy activities and vice versa.

The second model: Measuring the impact of the shadow economy on inflation rates (IR)
2-1: The causal relationship
Results of the causal relationship between HEC&IR using Granger's method:

Null Hypothesis (HEC does not Granger Cause INR) Lags 2, F-Statistic = 0.53288,

Prob = 0.5946. Null Hypothesis (IR does not Granger Cause HEC) Lags 2, F-Statistic = 0.17109, Prob = 0.8439

Estimates showed that there is no relationship between inflation and the shadow economy, because the workers in the shadow economy activities are low-income people. The increase in their purchasing power will not lead to an increase in demand for goods and services in the market, which leads to an increase in prices with the existence of an inflexible production apparatus in Iraq rather, their incomes will tend to meet their essential needs, and therefore the flow of cash does not constitute an inflationary force in the economy.

2-2 Estimating the regression of the polymorphic integration according to the (ARDL) model.

Table (5). *The polymorphic integration HEC&IR (ARDL) model*

Variables	Coefficients	t-statistic	p-value
IR (1-)	0.762288	3.950354	0.0007
IR (-2)	- 0.344781	-1.775856	0.0896
HEC	-6.9207	1.092638	0.2864
C	46.19717	1.587624	0.1266
R-Squared		0.486322	
Adjusted R-Squared		0.416275	
F- Statistic		6.942793	
Prob (F-statistic)		0.001848	
Durbin –Watson stat		1.623913	

Residual Diagnostic Tests:
Histogram- Normality Tests P-Value =61.99525
Serial Correlation LM Test P- Value =0.0038
Heteroscedastictiy Test P- Value =0.0057
Test statistic- F-statistic value = 3.354090   K1 **Bounds Test**

Critical Value Bounds

Significance	0Bound (Min.)	(Max.) Bound1
10%	3.02	3.51
5%	3.62	4.16
2.5%	4.18	4.79
1%	4.94	5.58

(Estimated Short Run Coefficients)

Variable	Coefficient	t-statistic	Prob
D (IR (-1)	0.344748	1.822456	0.0820
D(HEC)	- 0.000001	- 0.374301	0.7118
CointEq(-1)	-0.582519	- 3.267620	0.0035

(Estimated Long Run Coefficients)

Variable	Coefficients	t- statistic	P –Value
HEC	-0.000001	0.000001	0.2435
C	79.309391	1.997965	0.0582
counted =IR -(-0.000001*HEC +79.3094)			

Source: Prepared by researchers based on the results of the statistical program (Eview).

As shown in table (5),the established (ARDL) model is built on the basis that the dependent variable is the consumer price index and has passed the statistical tests of the model through the R2 coefficient of (98%) as well as the (F) value of (258.37), as well as the standard tests, and it has been shown that the calculated values for the (F-Static) test, which is (3.65), it is greater than the tabular upper bounds of statistical values (F), and this indicates the existence of a co-integration between the variables, and that the direction of the relationship is in the size of the shadow economy to the value of inflation rates. As an increase in the shadow economy by one unit leads to an increase in inflation rates by (0.63) units, and this shows us the significant impact of the size of the shadow economy on inflation rates. As an increase in the shadow economy by one unit leads to an increase in inflation rates by (0.63) units, and this shows us the significant impact of the size of the shadow economy on inflation rates. The relationship between the shadow economy and inflation rates (IR) is a one-way relationship, meaning that the shadow economy affects (IR) and is not affected by it. The activities of the shadow economy are unproductive, and because the production system in Iraq is not flexible, and here the money flow will be in the form of an inflationary force.

The third model: the effect of the shadow economy on the unemployment rate UR
3-1: The causal relationship
Results of the causal relationship between HEC and UN using Granger's method
Null Hypothesis HEC does not Granger Cause UR, Lags 2, F-Statistic 3.95144 Prob 0.0349

Null Hypothesis UR does not Granger Cause HEC, Lags 2, F-Statistic 0.33240 Prob 0.7209
It appears from Table (3) that the relationship between the shadow economy and the unemployment rate is unilateral. This can be explained by the fact that the high number of the

unemployed and the lack of accurate data about them in Iraq due to a survey of employment for spaced periods of time, so it is an estimate and is not In addition, the size of the shadow economy may affect unemployment rates, but this is not included in the actual number of workers because the number of workers in shadow economy activities is not officially registered.

3-2: Estimation of the regression co-integration HEC & UN according to the ARDL model
Table (6). *The regression co-integration HEC & UN - ARDL*

Variables	Coefficients	t-statistic	p-value
UR	0.191790	1.483435	0.1510
HEC	-9.0208	-4.818805	0.0001
C	15.96531	6.348324	0.0000
R-Squared		0.690408	
Adjusted R-Squared		0.664609	
F- Statistic		26.76069	
Prob (F-statistic)		0.000001	
Durbin –Watson stat		1.603350	

Residual Diagnostic Tests: Histogram- Normality Tests P-Value =11.91410
Serial Correlation LM Test P- Value =0.4193
Heteroscedastictiy Test P- Value =0.6090

Bounds Test: F-statistic value 10.51446   K1

Critical Value Bounds

Significance	0Bound (Min>)	(Max.) Bound1
10%	3.02	3.51
5%	3.62	4.16
2.5%	4.18	4.79
1%	4.94	5.58

)Estimated Short Run Coefficients(

Variable	Coefficient	t-statistic	Prob
D(HEC)	- 0.000000	-2.410715	0.0239
CointEq(-1)	-0.791889	-6.444171	0.0000

(Estimated Long Run Coefficients)

Variable	Coefficients	t- statistic	P –Value
HEC	-0.000000	-5.912698	0.0000
C	19.753922	26.989434	0.0000
	Cointeq =UR -(-0.0000*HEC +19.7539)		

Source: Prepared by researchers based on the results of the statistical program (Eview

The model was estimated on the basis that the dependent variable is unemployment rates, and this model, like previous models, was able to complete the statistical and standard tests, but it was found that there is no joint integration between the variables, as the calculated variables (F) amounting to (1.05) were less than the tabular upper limits of statistical values (F) According to the sample size. Here, we accept the null hypothesis, which indicates the absence of a long-term equilibrium relationship, and this can be explained by the fact that the unemployment data in Iraq are inaccurate and the reason for this is due to a survey of employment for separate periods of time, so it is estimated and not accurate, in addition to the

fact that the number of workers in the informal economy Not officially registered, see table (11).

The fourth model: measuring the impact of the shadow economy on the average per capita income (ACI)

A reciprocal relationship between the shadow economy and the (ACI) as it is affected by it and affects it. When the (ACI) decreases, individuals tend to increase their incomes to work in the activities of the shadow economy, and accordingly, the greater the number of individuals working in the shadow economy, the higher their average income. The second model is between the shadow economy and the average per capita income. The relationship between the average per capita income (Ac1) and the shadow economy, which is a one-sided relationship whereby the decrease in (Ac1) leads to individuals tending to work in shadow economy activities with the aim of increasing their income and accordingly, as the number of individuals working in the shadow economy increased, their average income. (Table 12)

The fifth model: measuring the impact of the shadow economy on the money supply (M1)

Where the results of the Granger tests showed that the relationship between the shadow economy and the money supply is reciprocal, the greater the money supply in both parts (currency in circulation and current deposits), this indicates an increase in the activities of the shadow economy because these activities prefer high-liquid money and vice versa, that is, the more activities the shadow economy increases. Money supply because the income of workers in shadow economy activities goes in the form of cash in the market (Table 12).

The sixth model: measuring the impact of the shadow economy on tax revenues TR

The reciprocal relationship between the shadow economy and tax revenues, that is, the shadow economy is affected by (TR) through that the more taxes, the greater the incentive for individuals to evade them and go to shadow economy activities, and the same, where the more shadow economy activities, the lower the (TR).

Conclusion and Recommendation

The percentage of the shadow economy in Iraq has increased since the nineties, and it has increased even more after 2003 as a result of the radical changes that Iraq has witnessed in all fields, its openness to global markets, and the deterioration of the security and political conditions. The increase in the proportion of the shadow economy within the Iraqi economy has economic, social and political effects that affect the overall economic activity in the country, expressed in several macroeconomic indicators. The study run the Granger test in order to determine the direction of causation between the variables and shadow economy in Iraq, and whether they are singular or mutual, meaning that each of the variables causes the other and there is no causal relationship. Estimates showed that there is no relationship between inflation and the shadow economy, but the relationship between the shadow economy and the unemployment rate is unilateral. On other hand the reciprocal relationship appeared between the shadow economy and the GDP, tax revenues, average per capita income, as well as money supply.

The growth of the shadow economy phenomenon in Iraq led to double the national income, monetary instability, poor income distribution among the population, tax evasion, and the depletion of hard currencies by smuggling capital Sond machinery, which led to the disruption of the industrial sector and its production capacity, which is already low, as well as the weakness of other productive sectors due to weakness of saving and investment. All of the above, led to high costs for the government to maintain and sustain national and societal

security in the face of the spread of economic crimes, smuggling and money laundering. The study recommend that the government should great a stable and secure economic climate to reduce the shadow economy, activate the laws that limit all economic activity outside the limits of illegal transactions, besides activating the work of economic control over all transactions that take place within the national economy, and controlling the external borders and the accompanying smuggling operations, and setting penalties, activating laws to combat economic crime, and limiting illegal business activities.

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