
AN ECONOMIC ANALYSIS OF THE MACROECONOMIC INDICATORS IMPACT ON THE WAGE PRODUCT OF THE INDUSTRIAL SECTOR (2004-2020)

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Abstract

This study focused on the importance achieved by productivity in all economic, social and cultural aspects. The positive contributions to increase an macroeconomic growth rate, which is the goal that all countries seek to, achieve the extent of industrial sector growth or exploitation in the country's economy. The industrial sector is considered one of the most important macroeconomic sectors. It enjoys a prominent importance at the level of developed and developing countries. The issue of that forced the decision-maker to make it a priority for his macroeconomic interests to develop this sector in any country in a sustainable manner in the present and the future.

In this study, macroeconomic indicators on wage productivity in the manufacturing sector in Iraq are studied and analyzed through several indicators, including average per capita GDP, inflation and unemployment. The research problem indicates the deterioration or decline of the industrial sector in Iraq. In particular, the manufacturing industry due to the exposure of this sector to sabotage operations and damages resulting from wars. These industries continued to reduce negatively in the quantities of production and the destruction of a large part of the production lines. The relationship is soft between GDP and wage productivity according to macroeconomic term, and the relationship is inverse between unemployment and wage productivity according to macroeconomic term, and the relationship is inverse between inflation and wage productivity according to macroeconomic. Therefore, the research recommends paying attention to studying the productivity of wages permanently and working to increase the level of productivity in the industrial establishment by solving problems and obstacles with making structural change to the organization of work.

In order to advance the status of the industrial sector in Iraq, it is necessary to study the indicators of the development of the manufacturing industry in Iraq, to know the reasons that lead to its decline, and to analyze the obstacles to its development.

Keywords: macroeconomic analysis, total economic, wage product, industrial.

Introduction

The world has attended many indicators in the economy that have contributed widely to bringing about a fundamental change in economic frameworks and concepts. The most important of these indicators is the emergence of modern and international methods aimed at increasing the level of productivity of wages. It participates in improving the performance of workers and increasing their productivity. Thus, it is one of the means by which the industrial sector can motivate workers. It is the main means to satisfy their various desires, especially material ones, and that the size of wages is reflected in the gross domestic product, as well as, reflects the expansion and stability of conditions and social and economic relations. In addition, the productivity of wages is the means of life for all members of society as a compensation for the labor force, and with this importance that characterizes the productivity of wages, all other variables are affected by it and affect it including unemployment, inflation and productivity.

Therefore, macroeconomic indicators have a significant impact on the manufacturing sector. This necessitates the existence of a correct system for productivity and wages based on studied scientific foundations, so that this system helps to achieve the objectives of the manufacturing sector, individuals and workers together. It helps in the development and advancement of the industrial sector in line with the expansions. Productivity is one of the most important indicators and criteria on the basis of which the extension of development in the industrial sector can be measured, and its importance increases depending on this productivity indicator in the field of manufacturing industries, because it is related in terms of dimensions and content to the productivity of workers' wages in the short and long term.

In this study, it will be analyzed the impact of economic indicators on the level of wage productivity in the manufacturing industry sector on production in the Iraqi economy. It also reviews the specific economic indicators and explanations for wages, as well as the levels of wage productivity that have occurred in the Iraqi economy in the manufacturing sector. The problem lies in many developmental capabilities in Iraq that contribute to the development of wage productivity in the manufacturing sector. However, it decreased after 2004 because of the political, security and economic conditions that played a negative role in the country and because of the poor conditions of the industrial sector in the Iraqi economy and its weak contribution to the gross domestic product and its impact on inflation and unemployment rates.

The importance of the study stems from the productivity of wages, which is one of the most important indicators used to measure many economic activities in the manufacturing sector. The productivity of wages is one of the important indicators that are relied upon in supporting economic and industrial activity and the importance and role of the manufacturing industry

in advancing the macroeconomic reality of developing countries. The research hypothesis stems from the productivity of wages is affected by many and complex elements of a different nature. The change of these elements and their instability according to the macroeconomic and social changes, it can touch the trends of impact and its measurement of these trials on the productivity of wages in the Iraqi industrial sector.

In Iraq, the research relied on the analysis that combines the analytical and descriptive approach, showing the importance of wage productivity, and analyzing the capabilities and capabilities of the manufacturing sector using some economic indicators using the (Eviews 12) program. The time period of the study represented the period from 2004 to 2020, and the spatial represented Iraq.

Research structure

The research was divided into three topics. The first topic includes analysis of economic indicators and deals with average per capita GDP, the value of industrial output and its contribution to the GDP at current prices for the period 2004-2020. The second topic includes analysis of unemployment rates in the Iraqi economy for the period 2004 -2020, analysis of inflation rates in Iraq for the period 2004-2020 and the value of wages in the manufacturing sector in Iraq for the period 2004-2020. The third topic includes analysis and estimation of the standard model.

Analysis of the reality of the manufacturing sector in Iraq (2004-2020)

In Iraq, the reality of the manufacturing sector represents the composition of the gross domestic product. It is an important indicator in the economy as it shows the contribution of each sector to the output and its role in the use of existing resources, the operation of production means and the extent of its contribution to economic growth, as well as the knowledge of obstacles. The reality of the manufacturing industry in the formation of the gross domestic product is an important indicator in the overall economy. A sector means increasing economic growth, high production and the use of material and human resources. The investment determinants expenditures on these sectors play an important role in providing them. Those expenditures are taken with high efficiency. Study the structure of the economic sectors helps the economic planner to know the size and progress of these sectors and knowing their degree of flexibility. In addition, to changes in the structure of Iraqi exports and imports, which led to weak growth in the productive sector and weak participation in the gross domestic product. The country was exposed to many conditions that led to the decline of its economy including political and security conditions.

The manufacturing industry has an important role in moving the economic development process through reforming the structural imbalances in the national economy. It is not possible to envisage laying the foundations and the material base for economic development without this leading at the same time to the development of the industrial sector. In fact, there is a constant endeavor by some countries to increase the contribution of this sector in activating similar economies, especially since the possibilities of developing and equipping this sector are the highest among other sectors.

In addition, this sector has multiple entanglements and links with the rest of the second sectors. As it is a sector qualified to attract and absorb modern technology, which leads as a result to increasing the level of productivity of this sector and then increasing its participation in economic growth. The development of this sector contributes to the creation of new job opportunities and works at the same time to participate in the development of the technical capabilities of the workers, and to open new and renewable horizons for them.

The first topic

1- Analysis of economic indicators

First: the average of GDP

This indicator is one of the valuable indicators to indicate the level of economic well-being of the society. It represents the per capita share of the annual output. It represents the amount of goods and services that the individual receive during the year. It is a criterion for sustainable development, but it does not measure it comprehensively. However, it represents an important component of the quality of life. It achieves a continuous increase in per capita GDP, which is a necessary insufficient, condition for supporting the level of sustainable development.

The average per capita gross domestic product is one of the important indicators of the driving force for economic growth, as well as an indicator of the expansion and progress of the country economically. It is one of the most important indicators indicating the level that society has reached and that the goal of sustainable development is to secure a decent standard of living by increasing the level of income. In fact, the low level of income has negative effects on employment and, as a final result, leads to an increase in unemployment rates.

Table (1) indicates an increase in the average per capita GDP in 2005 to (2629.6) million dinars, as it was in 2004 (1961.5) million dinars, with an annual growth rate of (34.05%). The level of per capita GDP progressed continuously during the period 2006-2013, as it increased from (3317.8) million dinars in 2006 to (7795.4) million dinars in 2013. The per capita share of output is high despite the conditions the country is going through, and this is attributed to the achievement of economic growth rates, but it may not reflect an improvement in the individual's standard of living in light of the deterioration of social services and infrastructure.

In 2014, the average per capita GDP decreased, as the average per capita GDP has reached (7399.5) million dinars, with a negative growth rate that reached (-5.07%). The oil prices decreased and quantities due to the political crisis. It is noted from the data that the increases in the average per capita GDP were fluctuating due to the instability of global oil prices, followed by a rise in the per capita share of the GDP to reach in 2017 (5968.3) million dinars, achieving positive growth that reached (9.62%) (5444.5) (Table 1). The period from 2019-2020 indicate a decrease in the average per capita GDP, reaching (4937.8) million dinars, with a negative growth rate of (-26.51%) in 2020 compared to 2021, when it reached (6719.4) and a negative growth rate of (-4.74).

According to this decreased in the average per capita share of output, there is a decreased in oil prices, which constitutes the largest percentage in the composition of the gross domestic

product, as well as the state of economic contraction as a result of the impact of the Corona pandemic. The reasons for the fluctuation in the average per capita gross domestic product at current prices during the study period are due to the decline in oil revenues and the deterioration of the economic conditions of the country and the impact of the deterioration of the security situation.

Table (1) the development of average GDP per capita at current prices for the period (2004-2020)

year	Population (1000)	GDP (2 millions)	average GDP per capita (3 thousand)	Development rate (4%)
2004	27139	5323538.7	1961.5	-
2005	27963	73533598.6	2629.6	34.05
2006	28810	95587954.8	3317.8	26.17
2007	29682	111455813	3754.9	13.17
2008	31895	157026062	4923.2	31.11
2009	31664	130642187	4125.8	-16.19
2010	32490	162064566	4988.1	20.89
2011	33338	217327107	6518.9	30.68
2012	34208	254225491	3431.7	14
2013	35096	273587529	7759.4	4.89
2014	36005	266420385	7399.5	-5.07
2015	35213	194680972	5528.9	-25.28
2016	36169	196924142	5444.5	-1.52
2017	37140	221665710	5968.3	9.62
2018	38124	268918874	7053.7	18.18
2019	39128	262917150	6719.4	-4.74
2020	40255	198774325	4937.8	-26.51

Source: the data of the Iraqi Ministry of Planning / Statistical Group / National Accounts for different years

Second: Economic Indicators

1- The value of industrial output and its contribution to the GDP at prices (2003-2004).

The industrial sector is considered one of the most important economic sectors and affects the national economy significantly by increasing the level of productivity, securing job opportunities, generating income and working to stimulate savings and investment. The developments that the industrial sector went through and its contribution to the GDP at current prices will be clarified through the study period.

Table (1) indicates that successive increases in the value of industrial output, which amounted to (3223565.2) dinars for the year 2004. It constituted (60.25%) of the gross domestic product, which is the highest percentage of contribution during the research period, and the pace of increase began to continue until 2012, when its value amounted to (13858574.1) million dinars. With fluctuating annual rates, up and down, it recorded the highest rate of annual change in 2012, it has reached (65.66%), and its average contribution during the period was (54.93%). This increase in the value of industrial output is due to many reasons, including the increase in the production of electric power, which amounted to (3737)

megawatts in (2005). Compared to previous years, when its production was less than (3320) MW. The production of electrical energy continued to rise, reaching (4548.8) MW in 2008, as well as the increase in the processing of industrial projects after (2003). As well as, increase the production of some industries belonging to the government sector through the availability of products in the local markets. In addition, to the production of industries in the private sector, and among the important reasons is the openness of the Iraqi economy to global markets, either to obtain raw materials for the industrial sector or to export the surplus from that sector.

After that, the value of industrial output decreased (2013, 2014 and 2015). The annual rate of change reached, respectively, (0.69%), (-6.85%), and (-40.91%). With regard to the percentage contribution of the value of industrial output, it has constituted 50.10%, 49.34 and 39.37% of the GDP at current prices. This is attributed to the shutdown of much of the industrial facility, as well as the outage of some electric power stations, in addition to the political instability, the failure to approve the general budget in 2014. The security instability in the governorates that were subjected to terrorist raids and the result was the destruction of their infrastructure.

For 2016, the value of industrial output increased to reach (78683979.3) million dinars, with a positive annual rate of change that amounted to (3.87%). The increase continued until it reached (13114233.8) million dinars in 2018, at an annual rate (29.63%). This is because of the security and political stability, which was the result of returning many industrial facilities and power stations to work, especially in the aforementioned provinces. The value of industrial output decreased again to (127335191) million dinars in 2019 and 2020, when it amounted to (7483065.7) million dinars, with a negative annual change rate of (37.18%). This is due to the triple crisis that Iraq went through, health, represented by the Corona pandemic and political, and represented by the demonstrations, in addition to the economic crisis, which is the drop in global oil prices.

Table (2) the value of industrial output and its contribution to the GDP of the industrial sector in Iraq (2004-2020)

Year	industrial output value	Annual change	Local gross domestic product	Annual change	contribution industrial AND GDP percentage
2004	32235265.2	-	53499238.6	-	60.25
2005	44088536.2	36.77	73911088.3	38.15	59.65
2006	55283502.8	25.39	960067160.6	29.98	57.55
2007	62065067.5	12.27	111961230.2	16.54	55.43
2008	92009052.3	48.25	156670089	39.93	58.73
2009	62287413.6	-32.30	131632210	-15.98	47.23
2010	80158334.5	28.69	163104739.2	23.91	49.15
2011	125575291.7	56.66	219671834.8	34.04	57.55
2012	138585714.1	10.36	255727068.5	16.97	54.19
2013	137635247.8	-0.69	274745875	7.44	50.10
2014	128204171.9	-6.85	259830765.8	-5.43	49.34
2015	75754149.6	-40.91	192403827.9	-25.95	39.37

2016	78683979.3	3.87	205678503.5	6.90	38.26
2017	100371360.8	27.56	224363323.2	9.22	44.58
2018	1301142233.8	29.63	258035199.6	14.87	50.42
2019	127335191	-2.14	266290571.3	3.16	47.84
2020	74830675.8	-41.23	201249143.6	-24.40	37.18

Source: Column (1-3) based on the data of the Iraqi Ministry of Planning, Statistical Group, National Accounts for different years. Column (2-4-5) prepared by the researcher based on the table data

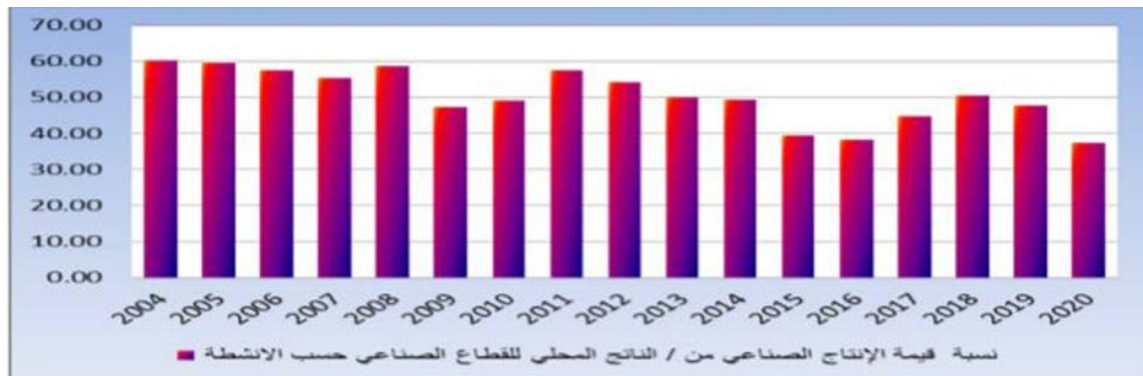


Figure (1) the value of industrial output - gross domestic product" at current prices.

The second topic

First: Analysis of unemployment rates in the Iraqi economy (2004-2020)

In Iraq, unemployment indicates high rates at the beginning of this period because the Iraqi economy started a new phase after 2004, which is the phase of seeking to transition towards a market economy by means of the structural adjustment programs adopted with the International Monetary Fund. Iraq has agreed to a set of conditions, including the privatization of public production institutions, which caused this condition to lay off many workers in public companies, in addition to the dissolution of the former Iraqi army and those affiliated with the security and military system, the modernity of the state and limited employment.

The decrease in unemployment rates began after this year. In 2004, it reached (26.8%), and the population was (27,139,000) people, with an annual growth rate of (3%). This decline in unemployment rates continued until 2013, when the unemployment rate has reached (16%). The population for this year was (35,095,772) people, and this decrease in unemployment rates was not due to the development of the economic situation and some of the employed workers, or were they absorbed by the economic sectors, but were absorbed by the security services, which are not considered a real indicator in revitalizing the Iraqi economy to absorb the unemployed (1).

The reason for this decrease in unemployment rates indicates that the Iraqi government, through its economic policy tried to reduce the rates of this phenomenon by hiring large numbers of unemployed workers and opening volunteers in the security queues, and it partially succeeded in that. In 2014-2015, unemployment rates increased significantly wide to reach (28%) and (36.4%). The population at that time reached (36004552) and (36933684)

people, with a growth rate of (2.5%) and (2.6%). In the (2016-2019) also indicate a specific gradual decline in the unemployment rate, which amounted to (22.7%) in 2016, (1.6%) in 2017, (20.5%) in 2018, (20.3%) in 2019, and (20.2%) in 2019. This decrease is due to the improvement in oil prices and security stability in the country.

Table (3) the unemployment and population rates development in Iraq (2004-2020)

Year	Unemployment rate-1	Population rate-2	population growth rate-3
2004	26.8	27139000	***
2005	17.9	27963000	3
2006	17.5	28810000	3
2007	15.3	29682000	3
2008	15.8	31895000	7.5
2009	15	32105000	0.7
2010	14.5	32481000	1.2
2011	15.2	33338757	2.6
2012	15.1	34207248	2.6
2013	16	35095772	2.6
2014	28	36004552	2.5
2015	36.4	36933684	2.6
2016	22.7	37140232	0.6
2017	21.6	38124312	2.6
2018	20.5	39128323	2.6
2019	20.3	40134446	2.5
2020	20.2	41138523	2.5

Source: prepared by the researcher based on column (1) data of the Ministry of Planning.

Second: Analysis of inflation rates in Iraq (2004-2020)

The increase in the prices of oil derivatives leads to an increase in inflation rates during 2004, which amounted (75.3), and the increase in rates in 2005-2006 was for two reasons:

1. Supply bottlenecks in the real sector, which was concentrated in the weakness of the fuel and energy sector. This negative effect was reflected in the costs of transport, communications and production.
2. The other is the expansion of the phenomenon of current government expenditures due to the increase in wages, salaries and transfer payments relative to the non-oil GDP to (35%) in 2005-2008, which contributed to the increase in aggregate demand and the increase in inflation rates.

It began to decrease after 2006, due to the presence of oil derivatives and the decrease in their prices. This decrease is due to the advancement of the exchange rate against the dollar, as well as the absence of customs restrictions on imported goods, which led to a decrease in inflation rates until it reached (1.82) in 2012 and it continued Inflation rates increased in the 2015-2016, which was (5.4). In 2017-2018, the unemployment rates reached (5.4), and in 2019-2020. Thus, the unemployment rates increased (5.2), which reached the price index shown in the following table (104.5).

Table (4) the inflation average in Iraq 2004-2020

Year	Standard price	Inflation average
2004	230184.1	75.3
2005	315259	36.85
2006	483074.4	53.23
2007	632028.8	30.83
2008	648891.2	7.66
2009	360713.1	6.8
2010	646207.5	6.45
2011	682366	5.59
2012	723890.2	6.08
2013	737120.6	8.82
2014	753650.3	5.54
2015	743526.2	6.43
2016	104.1	4.5
2017	104.3	5.2
2018	104.7	5.4
2019	104.6	5.2
2020	104.5	5.4

Source: Central Bank of Iraq, General Directorate of Statistics and Research.

Third: The value of wages in the manufacturing sector

It is one of the basic indicators that represent the income that the worker takes as compensation for the time and effort that the worker expends in his work, for the desire to increase the standard of living. The prevailing wage in the industrial sector in any country plays an important role in providing a basic idea about labor relations in that sector, through its participation in the costs of industrial production (1).

Wages are considered due to the labor component, which is the necessary productive element in any production process, regardless of its degree of technology and expansion. The study of the wage index is one of the most important indicators in the manufacturing sector. It was found that the wages of workers in the case of a rise in the manufacturing sector in the first years of study (Table 4). In 2005, it became on the rise, as the value of wages amounted to (611127.4) million dinars, and the annual rate of change was (14.71). In 2009, the annual rate of change of wages recorded positive growth due to the increase in oil prices.

The government policy continued to increase employee wages, and the percentage of wages amounted to (1928188.1) million dinars, at an annual rate of change of (41.33%). Wages continued to rise even in 2011, when the value of wages reached (2230691.2) million dinars. The annual rate of change was (17.78%). In 2016, 2015 and 2014, it indicates a fluctuation in the value of wages. In 2014, the value of wages was (1594315) million dinars, with an annual rate of change of (-76.55%) in the negative. In 2015, the value of wages amounted to (1568938) million dinars, with a negative annual rate of change of (1.59-1.59).

In 2016, the value of wages amounted to (15534546.6) million dinars. The annual rate of change was negative (0.98100753-%). The reason for this was due to the drop in oil prices. In 2018, the value of wages increased to reach (1605009) million dinars, at an annual rate of change of (2.91%). This increase was due to the inflationary effects of the local currency, in

addition to the relative decline in the number of workers during this period, and in 2020 the value of wages decreased to reach (1407895) million dinars, and the annual rate of change was negative (-9.92%). The reason for this decrease during that period is due to the outbreak of the (Covid 19) epidemic, and the growth rate of the value of wages amounted to (5.88%).

Table (5) the value of wages in the manufacturing sector in Iraq (2004-2020).

years	The value of wages at current prices	annual change %
2004	532712.7	0
2005	611127.4	14.17
2006	135415.3	77.84-
2007	833189.4	515.28
2008	1364225.9	63.73
2009	1928188.1	41.33
2010	1893839.4	1.78-
2011	2230691.2	17.78
2012	6833831.8	206.35
2013	6800539	0.48-
2014	1594315	76.55-
2015	1568938	1.59-
216	1553546.6	0.98-
2017	1559522	0.38
2018	1605009	2.91
2019	1563024	2.61-
2020	1407895	9.92-

Source: Prepared by the researcher based on the data of the Ministry of Planning, Central Statistical Organization, statistical groups for separate years (2004-2020)

The first requirement: the results of static tests for the time series of the studied variables.

Quarterly data were used for the variables under study (2004-2020) in order to measure the impact of the explanatory variables represented by each of the gross domestic product at current prices (X1). The unemployment rate (X2), and the inflation rate represented by the consumer price index (X3) on the wage productivity index in the industrial sector of the Iraqi economy.

Table (6) Results of the extended Dickey Fuller test for time series data

Stillness status	without	Stable+ direction	stable	Test	Variables
Stillness	1.7570-	-2.8422	2.9241-	ADF	Y level
	0.0750	0.1784	0.0482	possibility	
Non- Stillness	0.6981-	-1.7593	2.1101-	ADF	X ₁ level
	0.4105	0.7125	0.2415	possibility	
Stillness	2.264-	2.5086-	2.1386-	ADF	X ₁ in the first compare
	0.0221	0.3232	0.2306	possibility	
Stillness	0.963-	3.1665-	2.9306-	ADF	X ₂ level
	0.2960	0.1006	0.0475	possibility	
Non- Stillness	1.0629-	2.0645-	1.7271-	ADF	X ₃ level
	0.2571	0.5550	0.4219	possibility	
Stillness	2.8246-	3.0375-	2.8094-	ADF	X ₃ in the first compare
	0.0054	0.1306	0.0627	possibility	

Source: the researcher's work based on the outputs of the statistical program (Eviews: 12)

Based on the unit root tests above, and because the dependent variable (Y) rests at the level, while the explanatory variables (X₁, X₂, X₃) rest at the original level and the first difference. The results found that it appropriate to apply the self-regressive test for slow distributed gaps (ARDL), which gives us the possibility analysis of relationships according to the long and short term.

Second: the practical application of the autoregressive decelerated distributed gaps (ARDL) model.

We have used quarterly data amounting to (68) observations in order to measure macroeconomic indicators on wage productivity in the Iraqi economy, and we estimate the first as follows:

Dependent Variable: Y
 Method: ARDL
 Date: 02/19/23 Time: 13:58
 Sample (adjusted): 2004Q3 2020Q1
 Included observations: 63 after adjustments
 Maximum dependent lags: 4 (Automatic selection)
 Model selection method: Akaike info criterion (AIC)
 Dynamic regressors (4 lags, automatic): X1 X2 X3
 Fixed regressors: C
 Number of models evaluated: 500
 Selected Model: ARDL(2, 0, 0, 0)
 Note: final equation sample is larger than selection sample

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
Y(-1)	1.702081	0.077143	22.06398	0.0000
Y(-2)	-0.833122	0.078663	-10.59100	0.0000
X1	0.001715	0.000748	2.294094	0.0255
X2	-9356.645	6589.000	-1.420040	0.1610
X3	0.281857	0.141489	1.992080	0.0512
C	4301.176	190157.6	0.022619	0.9820
R-squared	0.978733	Mean dependent var		2096319.
Adjusted R-squared	0.976868	S.D. dependent var		1747339.
S.E. of regression	265758.5	Akaike info criterion		27.90896
Sum squared resid	4.03E+12	Schwarz criterion		28.11306
Log likelihood	-873.1321	Hannan-Quinn criter.		27.98923
F-statistic	524.6459	Durbin-Watson stat		2.212472
Prob(F-statistic)	0.000000			

Source: the researcher's work based on the outputs of the statistical program (Eviews: 12)

Table (7) were showed that the results of the initial estimation of the (ARDL) model for the relationship between wage productivity (Y), gross domestic product (X₁), unemployment rate (X₂), and inflation (X₃). The estimated model has a high explanatory power, and the value of the coefficient of determination was (R²=0.97), which gives explanatory power to the model. The corrected coefficient of determination was (Adjusted R- squared =0.97). Also, the model is significant as indicated by the calculated (F) value if it was (524.645) and at a significant level (1%), so we accept the alternative hypothesis and reject the null hypothesis, and accordingly there is a relationship between the dependent variable and the explanatory variables.

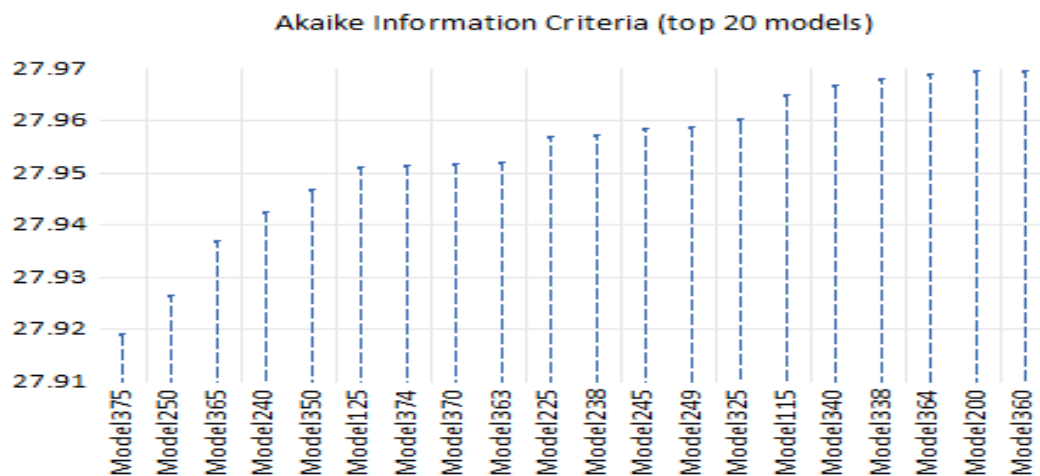


Chart (1) the optimal lengths between economic indicators and wage productivity based on the AIC criterion.

The (AIC) test is one of the most used tests in studies and research when estimating the distributed lag model (limits approach), as a result of its distinction in giving the best (20) lag time, so the first model (2,0,0,0) was relied upon, as in chart (1).

Table (8) the limits between economic indicators and wage productivity results

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	3.479013	10%	2.37	3.2
k	3	5%	2.79	3.67
		2.5%	3.15	4.08
		1%	3.65	4.66
Actual Sample Size	63		Finite Sample: n=65	
		10%	2.492	3.35
		5%	2.976	3.896
		1%	4.056	5.158
			Finite Sample: n=60	
		10%	2.496	3.346
		5%	2.962	3.91
		1%	4.068	5.25

Source: the researcher's work based on the outputs of the statistical program (Eviews: 12)

Table (8) showed that the results of the cointegration test according to the method of testing the limits between each of the dependent variable (Y) and the explanatory variables (X₁, X₂, X₃) during the period (2004-2020) in the Iraqi economy, and a statistical value (F) equals (3.479). It is greater than the critical values at its minimum level (2.5%, 5%, 10%), as it means acceptance of the alternative hypothesis, and then the existence of a long-term balance between the dependent variable (Y) and the explanatory variables (X₁, X₂, X₃) during the study period.

Table (9) Short-term estimates and error correction between economic indicators and wage productivity

ARDL Error Correction Regression
 Dependent Variable: D(Y)
 Selected Model: ARDL(2, 0, 0, 0)
 Case 2: Restricted Constant and No Trend
 Date: 02/19/23 Time: 14:03
 Sample: 2004Q1 2020Q4
 Included observations: 63

ECM Regression Case 2: Restricted Constant and No Trend				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(Y(-1))	0.833122	0.074787	11.13997	0.0000
CoIntEq(-1)*	-0.131041	0.030371	-4.314599	0.0001
R-squared	0.676057	Mean dependent var		13580.61
Adjusted R-squared	0.670746	S.D. dependent var		447707.5
S.E. of regression	256897.4	Akaike info criterion		27.78197
Sum squared resid	4.03E+12	Schwarz criterion		27.85001
Log likelihood	-873.1321	Hannan-Quinn criter.		27.80873
Durbin-Watson stat	2.212472			

Source: the researcher's work based on the outputs of the statistical program (Eviews: 12)

In order to determine the long-term and short-term complementary relationship, Table (9) showed that the results of the short-term parameters between the dependent variable (Y) and the explanatory variables (X₁, X₂, X₃), there is a short-term complementary relationship between the dependent variable and the explanatory variables. In addition, the error correction coefficient (Conit Eq -1) is negative and is significant and statistically significant at the level (10%, 15%), which reveals the correction of the imbalances that occurred in the short term towards rebalancing in the long term, and this indicates that the value of (13%) of the short-term imbalance or deviation in the explanatory variables in the previous year was corrected to the current year.

Table (10) Long-term estimates between economic indicators and wage productivity

Levels Equation Case 2: Restricted Constant and No Trend				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
X1	0.013087	0.004084	3.204475	0.0022
X2	-71402.69	47387.89	-1.506771	0.1374
X3	2.150918	0.929038	2.315210	0.0242
C	32823.25	1452191.	0.022603	0.9820

EC = Y - (0.0131*X1 - 71402.6857*X2 + 2.1509*X3 + 32823.2528)

Source: the researcher's work based on the outputs of the statistical program (Eviews: 12)

Table (10) indicate that the results of the long-term relationship between the dependent variable (Y) and the explanatory variables (X_1 , X_2 , X_3). It was found that the model parameters (X_1 , X_3) were statistically significant in the long term. The existence of a long-term balance between GDP (X_1) and inflation (X_3) towards wage productivity (Y), as a significant (X_1, X_3) parameter appeared at the level of (15%, 10%).

This is due to the growth of government investments to compensate and cover the effects of physical destruction and the technical decline of production capacities after the events of 2003, as many projects suffered from looting and looting, and this is due to the interest in oil production by the government and the increase in investments in it. The model parameter (X_2) appeared to be statistically insignificant in the long term. There was no long-term balance between unemployment (X_2) towards wage productivity (Y), as the (X_2) parameter appeared to be no significant at the level of (15%, 10%). This corresponds to the reality of the Iraqi economy, and this is due to the fact that most industrialists and businessmen in Iraq prefer to work within the trade profession, especially import after 2003. This desire stems from the fact that trade is more profitable and does not require large capital compared to industrial investments (1).

Table (11) the results of the (ARCH) test, the heterogeneity of the residual variance between economic indicators and wage productivity

Heteroskedasticity Test: ARCH

F-statistic	0.552954	Prob. F(1,60)	0.9600
Obs*R-squared	0.566168	Prob. Chi-Square(1)	0.9517

Source: the researcher's work based on the outputs of the statistical program (Eviews: 12)
 Table (11) was showed that the results of the (ARCH) test to detect the problem of heterogeneity of the residual variance. The results of the conditional variance of the residuals of the estimated model appeared heterogeneous, based on the value of each of its (Chi-Square) statistic, which is equal to (0.9517), which was more than (5%). This indicates the rejection of the alternative hypothesis and the possibility of accepting the null hypothesis, which states that the variance of the residuals is not homogeneous.

Table (12) the results of the self-correlation test (LM) between economic indicators and wage productivity

Breusch-Godfrey Serial Correlation LM Test:

Null hypothesis: No serial correlation at up to 2 lags

F-statistic	0.744434	Prob. F(2,55)	0.9797
Obs*R-squared	1.660481	Prob. Chi-Square(2)	0.9359

Source: the researcher's work based on the outputs of the statistical program (Eviews: 12)

Table (12) has showed that the results of the (LM) test for the autocorrelation of errors for the explanatory variables including GDP, unemployment rate, inflation and the dependent

variable, wage productivity. There is no autocorrelation problem, through the value of (2) Chi-square, which was equal to (0.9359), and it was more than (5%) (Table 12). Therefore, we reject the alternative hypothesis that there is a serial autocorrelation between the residuals of the estimated model, and we accept the null hypothesis which states that the errors are independent, which means that there is no autocorrelation problem.

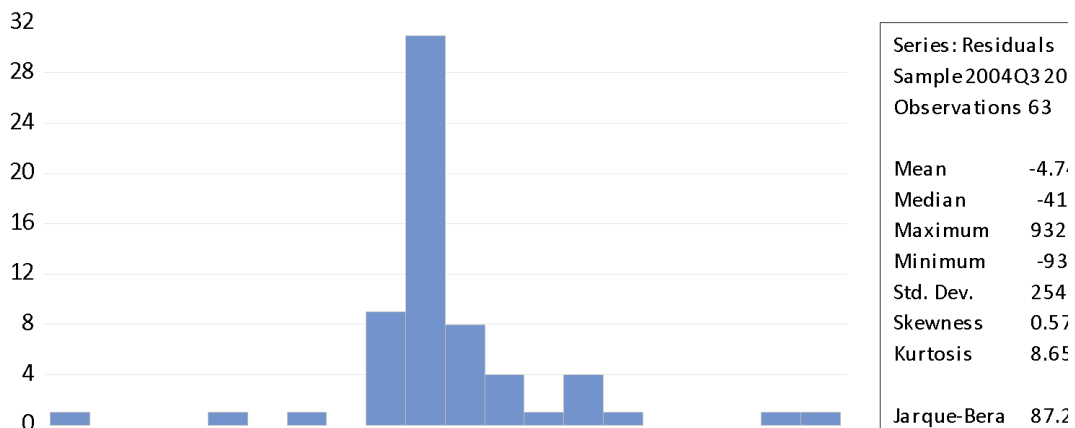


Figure (2) the results of the normal distribution test for the residuals of the estimated model

The standard tests that related to the problems with the measurement method that should be free of problems after conducting the partial significance tests of the estimated model (Student test) or the total significance (Fisher test). The condition of the normal distribution of the residuals must be met. The Jarck-Pera test was used for the normal distribution of the residuals (Figure 2). The structural stillness of the ARDL model should be tested for the long- and short-term relationship to ensure that there are no structural changes in the data used under study.

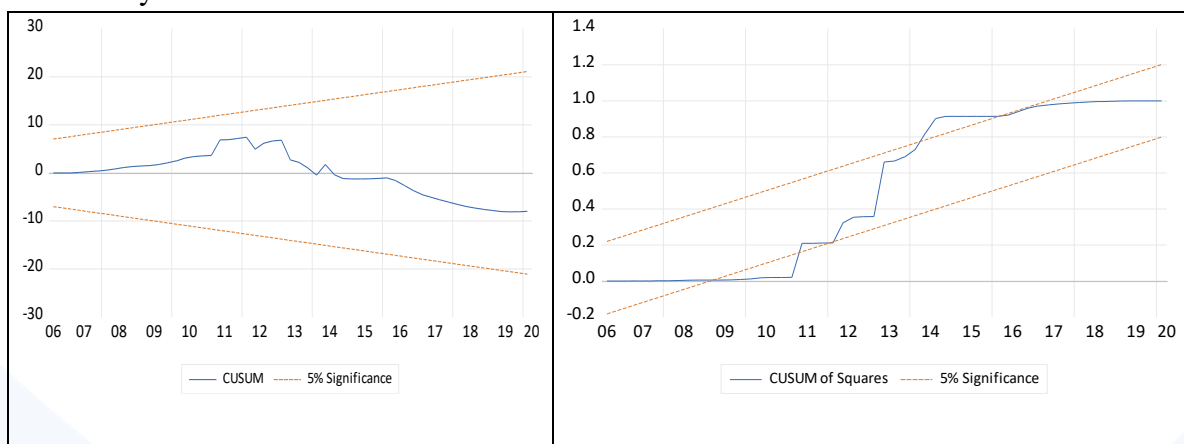


Figure (3) the cumulative sum of the follow-up residuals (CUSUM) and SUSUMSQ) between economic indicators and wage productivity

Figure (3) has been showed that the possibility of achieving the structural stillness of the estimated model through the test line that occurred within the critical limits at a significant level (5%). This confirms the stability of the estimated short-term and long-term model parameters (ARDL) structurally over time.

Economic analysis

In general, the results confirm that effect of GDP on wage productivity, as the relationship is direct between GDP (X_1) and wage productivity (Y) according to economic logic. However, the parameter sign appeared positive and statistically significant, consistent with economic term. The existence of a long-term was equilibrium between wage productivity (Y) and gross domestic product (X_1). The relationship was inverses between unemployment (X_2) and wage productivity (Y) according to economic logic, except that a negative parameter sign appears. It is consistent with economic logic, but is not statistically significant.

There is no long-term equilibrium between wage productivity (Y) and the unemployment rate (X_2), and the relationship is inverses between inflation (X_3) and wage productivity (Y) according to economic term. However, the parameter sign appeared to be negative and statistically significant. The existence of a long-term balance was between wage productivity (Y) and inflation (X_3).

Table (13) the relationship between economic indicators and wage productivity

Variables	Wage productivity (Y)	P.V less than 5%
GDP (X_1)	Positive	Significant
Unemployment average (X_2)	negative	Non- significant
Inflation (X_3)	negative	Significant

Conclusions

The study concludes that wage productivity is the most important source of economic growth in the world and is associated with many economic variables. The human has a major role in improving the level of productivity by making important decisions aimed at improving the level of productivity. They consider the Gross Domestic Product as one of the most important economic indicators that used in economic analysis. This indicator measures the efficiency of economic performance, as well as the development in the level of return to wage productivity and thus expresses the level of economic prosperity for any individual in society. The results of the standard analysis showed that there is a direct correlation between gross domestic product (X_1) and wage productivity (y) according to economic term, except that the parameter sign appeared positive and statistically significant. There is a long-term balance between wage productivity (y and GDP (X_1)).

The results of the standard analysis showed that there is an inverse relationship between unemployment (X_2) and wage productivity (y) according to economic term, except that the parameter sign appears negative, but it is statistically insignificant. There is no long-term balance between wage productivity (y) and the unemployment rate (X_2). The economic analysis showed that there is an inverse relationship between inflation (X_3) and wage productivity (y) according to economic term, except that the parameter sign appeared negative and statistically significant. There is a long-term balance between wage productivity (y) and inflation (X_3).

References

1. Ahmed O. Al-Rawi, *Studies in the Iraqi Economy after 2003 (Reality and Challenges)*, first edition, General Cultural Affairs House for Printing, Baghdad, 2013, p. 155.
2. Asmaa K. Yas, *Analysis of Inflation Rates in Iraq for the Period 2000-2010*, *Journal of Baghdad University College of Economic Sciences*, Issue Thirty-six, 2013, p. 55.
3. The Central Bank of Iraq, Directorate of Statistics and Research, *Economic Report*, 2008, p. 20.
4. Republic of Iraq, *National Employment Policy (First Draft)*, 2010, p7.
5. Abdel-Khalek, Nasr A. Qassem, *Analysis of Production and Productivity Functions in the Palestinian Industry*, published thesis, College of Graduate Studies, An-Najah National University, Nablus, Palestine. 2004.
6. Mazhar M. Salih, *Monetary Policy of the Central Bank and the Requirements for Stability and Economic Growth*, for the Central Bank of Iraq, Baghdad, July 2008, p. 2.
7. Hadi H. Alwan, *Investment Policies in the Private Industrial Sector*, *Studies in the Iraqi Economy*, January, 2007.