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The Impact of Private Sector Investment in the Manufacturing Industry on Growth and Unemployment in Iraq for the Period 2004-2021

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Abstract: The research aims to measure the impact of private sector investment in the manufacturing industry on economic growth and unemployment in Iraq for the period 2004-2021. One of the most important reasons for conducting the research is to know the results that can be achieved by the participation of the private sector in the manufacturing industry, and were these results positive or negative? Therefore, decision-making will depend on these results. The use of econometric models and tests to clarify the effect, and the autoregressive distributed lag time (ARDL) model was applied. The results indicate that there is a co-integration relationship between private sector investment in the manufacturing industry ((PSI), gross domestic product (GDP) and unemployment (UN), Besides, there is a balancing relationship in the long run between the output of the manufacturing industry and GDP, and it has a significant effect at the probability level (1%), and it is associated with a direct relationship with it in the long term, an increase in the output of the manufacturing industry by 1% leads to an increase in the gross domestic product of about 0.210207, and it has been shown that there is a long-term equilibrium relationship between the variable output of the manufacturing industry and the unemployment rate, and this effect was significant at the probability level of 1%, but towards Reversible in the long run, as an increase in output in manufacturing industries by 1% leads to a decrease in the unemployment rate by (2.29383).

Keywords: Private Investment, Manufacturing, Growth, Workforce

1. Introduction

Schools of economic thought, with their different orientations, emphasizing that the private sector will be an important engine for the economic development process, but on the condition that the conditions that support its activity are available, and among these conditions is the process of investment and capital accumulation. In view of the costs incurred in light of the prevailing competition in the market, efficiency in performance and work on renewal and innovation dynamically are the only way to achieve profit and then maintain its position in the market, which will reflect positively on the process of economic growth. The private sector is defined as the activity of the local economy that is not directly subject to government control. It is also the private sector that organizes economic activity, as private ownership is an important factor, especially in light of competitive markets that are the engine of production through investment in the industrial sector, employment and attempt to create businesses and inventions as well as the transfer of knowledge in addition to the accumulated or multiplying effects of operations and activities associated with it [2]. The private sector is known as the second party affecting economic growth in various countries after the public sector, and it is considered one of the elements of balance in the national economy as it affects employment, because the private sector aims to create job opportunities for those who have sufficient ability to do business or jobs that would contribute to achieving the main goals, because the main companies aim to develop the labor market as well as increase efficiency in order to achieve economic goals [17].

The manufacturing sector is of great importance in the process of economic growth. This importance comes from its interdependence with the local economic sectors, because it

has a positive role in increasing production as well as creating new job opportunities, which will reduce unemployment rates, in addition to its effective role in the trade balance through the development of exports, the substitution of national products for imports and the provision of cash the foreigner to provide commodity and service requirements and production requirements. Therefore, the industrialization process can be defined as an economic development process through which part of the local resources is directed towards establishing a local economic structure with a degree of diversity and development. This will contribute to achieving a high rate of economic growth and remarkable social progress. Therefore, the essence of the manufacturing process is the establishment of manufacturing industries that focus on converting raw materials and raw materials into manufactured and semi-manufactured commodities. Human needs and desires are consistent with his demands and tastes [7].

The classification of manufacturing industries in Iraq includes: food, beverage and tobacco industries, wood products and furniture industry, textile, clothing and leather industries, paper and printing industries, chemical industries, construction industries, basic metal industries, metal products industry, and other manufacturing industries. In 2021, private sector investment in the manufacturing industry was responsible for 0.4% of the composition of the gross domestic product which is calculated at constant prices (meaning choosing a base year, which is usually a stable base year) in Iraq, and this percentage is low if compared with another economy with the same available ingredients [16].

The manufacturing industry affects the employment of the workforce and the provision of jobs in the economy, which is reflected in the reduction of the unemployment rate. The manufacturing sector is one of the most important sectors that employ all levels, whether those with intermediate or higher education, and it is an important source of employment for those who do not have university degrees, and in return they get a good wage. Although jobs in the manufacturing sector do not require higher education, at the same time it employs those with university degrees but with wages higher than average [6]. The structure of the labor force in Iraq is characterized by imbalance, as a result of the concentration of the labor force in the services sector, and the weak absorptive capacity of the production sectors, especially the manufacturing sector, whose contribution to workers reached 9.2% for the year 2021, so the labor force headed towards low-productivity sectors, especially government jobs [10].

The great importance that the manufacturing industry occupies in the economies of countries has become a concern for economic policy makers due to the features and advantages that this sector enjoys in achieving sustainable development and in laying the foundations for the production base that contributes to filling the needs of domestic consumption, replacing imports and improving the trade balance by Through export activity, and then reflected in the diversification of sources of income [14]. As the percentage of exports of manufactured goods reached 0.2% of total exports for the year 2021, this percentage is very low for limited products, so that the impact of the decrease in the productivity of the manufacturing industry of the private sector combined with the public sector on the trade balance through increasing imports to finance the needs of the Iraqi economy [8].

It is not possible to neglect the impact of political instability on the aspects of life in Iraq, including spreading chaos and administrative corruption, and at the same time feeding economic instability through the decline in the process of growth and development. Hibbs revealed a close correlation between the rise in GDP rates and the decline in The pace of political violence and instability [1]. And because of what Iraq suffered from great rates of corruption that appeared after the year 2003, all of this has negatively affected the aspects of economic life in Iraq, including the low economic development index as well as the low rates of both domestic and foreign investment, the increasing inflation and the persistence of the budget deficit due to the high operational spending compared to investment expenditures, the continued dependence on oil revenues as a founder of the state's general budget, and when looking at the volume of imports, it becomes clear to us the size of the deficit in the gross domestic product [12].

2. Literature Review

The research adopted a set of studies and literature that dealt with or touched on the same subject of the research, including the study [14], which aimed to show the reality of the Arab manufacturing industry, its structural composition, and the extent of its contribution to influencing some macroeconomic indicators such as value added, gross domestic product, and exports. The research indicates the importance and status of the manufacturing industry (although this contribution was modest) in the Arab economies through its contribution to increasing the added value and gross domestic product, supporting export capacity and attracting labor. As for the study [13]: one of the most important things that the study tried to investigate was the extent of the relationship between industrialization and gross domestic product for the purpose of linking it with the results of our research, and whether this relationship had a positive or negative effect, where the results indicate that the manufacturing sector has a cyclical behavior in most countries of the European Union, and this behavior changes and is reflected in production and sales directly and in turn affects the growth or decline of the gross domestic product.

Al-Maktouf analyzed the role of the manufacturing industry in economic growth in the Kingdom of Saudi Arabia during a period of time that extended about 26 years for the period 1990-2015, and it was found through this study that there is a positive impact of the manufacturing industry on economic growth in the Kingdom [5]. As for Michael, he studied the impact of the manufacturing sector in Nigeria on the same previous variable, which is economic growth, for a

period of time spanning more than three decades, and he reached the same previous results, with a positive relationship between the manufacturing sector and the gross domestic product. As well as a positive relationship between capital, labor, exchange rate and GDP, although management of the exchange rate in Nigeria has been substandard [15].

The study of Ismail focused on clarifying the impact of the manufacturing sector on economic growth, during the time period 2004-2018, using the cross sectional time series methodology for fourteen Arab countries (UAE, Bahrain, Algeria, Saudi Arabia, Iraq, Oman, Qatar, Kuwait, Jordan). Tunisia, Lebanon, Egypt, Morocco, Yemen), The study concluded that there is a direct relationship between the worker's productivity in the manufacturing sector and the share of exports of the manufacturing sector's products out of the total commodity exports and economic growth rates in the Arab countries. The study recommended the necessity of adopting a national strategy that supports these industries in the long term, attracting foreign investments, ensuring the appropriate legal and regulatory environment for the activity of the manufacturing sector and providing the necessary credit for it in order to increase the level of production and competition [11].

The study of Al-Ikabi aimed at analyzing the production function of the manufacturing industry sector in Iraq for the period 1970-2011, and important results were reached, the most prominent of which was that the manufacturing industries in Iraq are labor-intensive, and this matter is an obstacle to the development of the strategic manufacturing industries necessary to build the national economy and the issue of entry Technological developments that require large capital in exchange for the sufficiency of a small number of working individuals, which results in greater production [3].

For his part, Cigdem Borke explained that there is a causal relationship between each of the manufacturing and services sectors, and the following variables were studied, which are savings, fixed capital formation, and economic growth in Turkey. The study aimed to find out that the manufacturing sector has a causal relationship with the above variables. The study concluded that there is no causal relationship between the manufacturing sector and services, while there is a one-sided causal relationship between manufacturing and gross capital formation [9].

3. Material and Methods

In this research, the impact of private sector investment in the manufacturing industry was tested on some economic variables in Iraq, during the time period 2004-2021. The variable of private sector investment in the manufacturing industry was taken, which was represented by real fixed capital at constant prices of the private sector in the manufacturing industry (PSI). The economic variables included: the economic growth rate, which was represented by the gross domestic product at constant prices (GDP), the unemployment rate, which represented the percentage of the number of unemployed from the labor force in the economy (UN). Data was collected from various sources, such as the Iraqi Ministry of Planning and the Central Bank of Iraq. Table 1 includes the volume of private sector investments in the manufacturing industry, the gross domestic product at constant prices, and the unemployment rate for the period 2004-2021 in the Iraqi economy.

Table 1. *Private sector investment in the manufacturing industry, gross domestic product at constant prices for a base year (2007=100), and the unemployment rate in Iraq for the period 2004-2021 million dinars.*

Year	Private sector investment in the manufacturing industry PSI	Percentage of private sector investment in the manufacturing industry in the gross domestic product (GDP)	gross domestic product	The unemployment %
			GDP	UN
2004	640287	0.6	101845000	26.8
2005	232926	0.2	103551403	17.9
2006	399369	0.3	109389941	17.5
2007	296474	0.2	111455813	19.2
2008	699378	0.5	120626517	15.3
2009	1046695	0.8	124702847	14.9
2010	256760	0.1	132687028	12.8
2011	783857	0.5	142700217	17.4
2012	317413	0.1	162587533	14.3
2013	228988	0.1	174990175	8.8
2014	410716	0.2	178951406	10.5
2015	444430	0.2	183616252	16.8
2016	1149090	0.5	208932109	10.8
2017	413046	0.2	205130066	14.4
2018	612903	0.2	210532887	13.5
2019	211042	0.09	222141229	13.5
2020	1079783	0.5	196985514	15.7
2021	942048	0.4	202468281	19.9

Source: Ministry of Planning (2004-2021), Central Statistical Organization, National Accounts Unit.

Central Bank of Iraq (2004-2021), General Directorate of Statistics and Research, Balance of Payments Statistics Department.

To obtain the effect of the output of private sector investment in the manufacturing industry on some economic variables, we converted time series data from annual data to quarterly data to apply the standard model and its tests that give more accuracy in the analysis, so that the number of observations is (72). The natural logarithm of two variables was taken, which is the manufacturing industry ((PSI) is an independent variable, Gross Domestic Product (GDP) is a dependent variable, in order for the units to homogenize, because its data are absolute numbers, unemployment (UN) is a dependent variable, a percentage.

3.1. ARDL Model

The econometric Autoregressive Distributed Lag Model (ARDL) was used, which helps to reach the impact of economic variables on some of them. The (ARDL) model is characterized by several characteristics that made it preferable to other well-known tests of cointegration. This test can be applied regardless of whether the variables under study are integral of zero order [(0) I], or of order one integer [(1) I], or integral of the same order, or a mixture of the two, but neither of them must be variables integrated of the second order [(2) I] [4].

The economic model used will be expressed as follows:

$$GDP_t = B_0 + B_1 PSI_{1t} + u_t \quad (1)$$

$$GDP_t = B_0 + B_2 PSI_{2t} + u_t \quad (2)$$

To apply the econometric model above, we first used the unit root tests, the extended Dickey-Fuller test (ADF) and the Phillips-Perron test (PP), to find out the stability of the time series, and the optimal slowing period for the late time periods was determined, and then the presence of cointegration was tested according to the initial estimate, and the test Limits of the relationship between variables, estimation of long and short term parameters and error correction parameter. The integrity of the model was tested through the consistency homogeneity (ARCH) test and serial autocorrelation test to ensure that the model does not have the issue of heterogeneity of variance. LM to verify that autocorrelation is not an issue with the model.

3.2. Tests of Unit Root

Unit root tests utilizing the Extended Dickey-Fuller test (ADF) and the Phillips-Peron test (PP) are displayed in Tables 2 and 3 for the level and first difference time series of variables with constant, constant & trend, and without a constant & trend, respectively.

Table 2. *(ADF) Augment test.*

UNIT ROOT TEST TABLE (ADF)					
At Level					
		LPSI	**LGDP**	**UN**	**LNTB**
With Constant	t-Statistic	-1.6329	-1.0178	-1.8356	1.4811
	Prob.	0.4600	0.7428	0.3603	0.999
		no	no	no	no
With Constant & Trend	t-Statistic	-0.9909	-1.519	-0.76	1.2552
	Prob.	0.9377	0.8139	0.9636	0.9999
		no	no	no	no
Without Constant & Trend	t-Statistic	-0.6284	1.7792	-0.5061	2.7308
	Prob.	0.4412	0.9811	0.4933	0.9981
		no	no	no	no
At First Difference					
		d(LPSI)	d(LGDP)	d(UN)	d(LNTB)
With Constant	t-Statistic	-5.1237	-0.5972	-4.8164	-5.9802
	Prob.	0.0001	0.8629	0.0002	0.0000
		***	no	***	***
With Constant & Trend	t-Statistic	-5.3382	-0.8328	-5.3678	-5.6906
	Prob.	0.0002	0.9563	0.0002	0.0001
		***	no	***	***
Without Constant & Trend	t-Statistic	-5.1663	-0.7163	-4.8713	-5.2296
	Prob.	0.0000	0.4022	0.0000	0.0000
		***	no	***	***

Source: Eviews program version nine.

Table 3 of the Phillips-Peron test confirms what we already know from a table 2 of the enlarged Ducky-Fuller test (ADF): that none of the variables are fixed at the level where the data originated.

Table 3. *Phillips-Peron (PP) test.*

UNIT ROOT TEST TABLE (PP)					
At Level					
		LPSI	**LGDP**	**UN**	**LNTB**
With Constant	t-Statistic	0.1109	0.7454	0.0341	0.5366
	Prob.	no	no	**	no
		-2.5042	-1.5028	-2.557	-1.7358
With Constant & Trend	t-Statistic	0.3254	0.8196	0.3009	0.7241
	Prob.	no	no	no	no
		-1.5837	1.9594	-1.1273	-0.4566
Without Constant & Trend	t-Statistic	0.106	0.9875	0.2338	0.5136
	Prob.	no	no	no	no
		0.1109	0.7454	0.0341	0.5366
At First Difference					
		d(LPSI)	d(LGDP)	d(UN)	d(LNTB)
With Constant	t-Statistic	-8.2463	-8.8466	-8.2665	-8.0354
	Prob.	0.0000	0.0000	0.0000	0.0000
		***	***	***	***
With Constant & Trend	t-Statistic	-8.2255	-8.8897	-8.5727	-7.9873
	Prob.	0.0000	0.0000	0.0000	0.0000
		***	***	***	***
Without Constant & Trend	t-Statistic	-8.3066	-8.3066	-8.3066	-7.9373
	Prob.	0.0000	0.0000	0.0000	0.0000
		***	***	***	***

Source: Eviews program version nine

Since the variables under study contain the unit root, that is, they are not static at the original level of the data, to determine whether they became static at the level of Significant (1%), it was decided to take their first difference, as shown in Tables 2 and 3. This means that the alternative hypothesis ((H1)) that the time series is static at the first difference was accepted, and the null hypothesis (H0) that the time series is not static at the first difference was rejected.

4. Estimating the Relationship Between Private Sector Investment in the Manufacturing Industry and GDP

4.1. Initial Estimation According to (ARDL) Model

The findings of the initial estimation of the (ARDL) model for the correlation between industrial production and GDP are presented in Table 4.

Table 4. *Initial Estimation According to (ARDL) Model.*

Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.***
LGDP (-1)	3.255382	0.092747	35.09953	0.0000
LGDP (-2)	-4.25915	0.248653	-17.1289	0.0000
LGDP (-3)	2.641729	0.246736	10.70672	0.0000
LGDP (-4)	-0.6421	0.090084	-7.12772	0.0000
LPSI	0.000869	0.000313	2.776662	0.0073
C	0.064617	0.020459	3.158423	0.0025
R-squared	0.999959	Mean dependent var		18.88936
Adjusted R-squared	0.999955	S. D. dependent var		0.25118
S. E. of regression	0.00168	Akaike info criterion		-9.85197
Sum squared resid	0.000167	Schwarz criterion		-9.65126
Log likelihood	326.189	Hannan-Quinn criter.		-9.77278
F-statistic	286027.5	Durbin-Watson stat		1.755494
Prob(F-statistic)	0.00000			

Source: Eviews program version nine

The Table clearly shows that the coefficient of determination (R2) and adjusted coefficient of determination (R-2) were both (99%), giving the model an explanatory capacity and indicating the importance of the computed coefficients within the generally recognized statistical limits.

4.2. Test the Optimal Lag Period

Table 5 shows the results of the optimal lag period test of the (ARDL) model for the relationship between private sector investment in the manufacturing industry and GDP.

Table 5. *Test the optimal lag period.*

Model	LogL	AIC*	BIC	HQ	Adj. R-sq	Specification
5	326.189	-9.85197	-9.65126	-9.77277	0.999955	ARDL (4, 0)
1	330.0521	-9.84776	-9.51324	-9.71577	0.999957	ARDL (4, 4)
4	326.874	-9.84228	-9.60811	-9.74988	0.999955	ARDL (4, 1)
3	326.8959	-9.81218	-9.54456	-9.70659	0.999955	ARDL (4, 2)
2	327.3788	-9.79627	-9.4952	-9.67748	0.999955	ARDL (4, 3)
8	308.4536	-9.2755	-9.04133	-9.1831	0.999921	ARDL (3, 2)
7	309.4246	-9.2746	-9.00699	-9.16901	0.999922	ARDL (3, 3)
9	307.205	-9.26785	-9.06714	-9.18865	0.99992	ARDL (3, 1)
10	306.0012	-9.26158	-9.09431	-9.19558	0.999918	ARDL (3, 0)
6	309.432	-9.24406	-8.94299	-9.12527	0.999921	ARDL (3, 4)
13	239.0272	-7.17007	-6.96936	-7.09087	0.999346	ARDL (2, 2)
12	239.2574	-7.14638	-6.91222	-7.05399	0.99934	ARDL (2, 3)
14	236.8848	-7.13492	-6.96766	-7.06892	0.999313	ARDL (2, 1)
11	239.4435	-7.12134	-6.85372	-7.01575	0.999332	ARDL (2, 4)
15	234.5594	-7.09414	-6.96033	-7.04134	0.999274	ARDL (2, 0)
18	198.1465	-5.94297	-5.77571	-5.87698	0.997738	ARDL (1, 2)
19	196.512	-5.92345	-5.78964	-5.87065	0.99766	ARDL (1, 1)
17	198.4453	-5.92139	-5.72068	-5.8422	0.997721	ARDL (1, 3)
16	198.6017	-5.89544	-5.66127	-5.80304	0.997692	ARDL (1, 4)
20	188.5467	-5.70913	-5.60877	-5.66953	0.997059	ARDL (1, 0)

Source: Eviews program version nine

It is noted that the optimal delay periods that were chosen according to the (ARDL) model are of the order (0, 4), according to the criteria used in the model, and then picking the lag time that yields the minimum value for those standards.

4.3. Bounds Test for the Relationship Between the Variables

Table 6 shows that the computed value of the (F) statistic is (6.259638), which is larger than the critical value of (F) at its upper limit at the level of (5%) which is equal to (5.730), and then we reject the null hypothesis that states that there is no Cointegration, and accept the alternative hypothesis, which states that there is cointegration between the variables. This indicates that the variables were cointegrated across the study's time frame.

Table 6. *Bounds Test.*

Test Statistic	Value	K
F-statistic	6.259638	1
Critical Value Bounds		
Significance	I0 Bound	I1 Bound
10%	4.040	4.780
5%	4.940	5.730
2.50%	5.770	6.680
1%	6.840	7.840

Source: Eviews, program version nine

4.4. Estimating the Short-Term and Long-Term Parameters and the Error Correction Parameter

After confirming the existence of a cointegration relationship between the variables, the short and long term Table 7 shows the model parameter estimators and the error correction coefficient.

Table 7. *Estimation of short-term and long-term parameters and error correction parameter.*

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D (LGDP (-1))	2.259518	0.09208	24.53873	0.0000
D (LGDP (-2))	-1.99963	0.157716	-12.6787	0.0000
D (LGDP (-3))	0.642097	0.090084	7.127722	0.0000
D (LPSI)	0.000869	0.000313	2.776662	0.0073
CointEq (-1)	-0.00414	0.001259	-3.28607	0.0017
Cointeq = LGDP - (0.2102*LPSI + 15.6216)				
Long Run Coefficients				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LPSI	0.210207	0.05305	3.962454	0.0002
C	15.62162	0.868199	17.99314	0.0000

Source: Eviews program version nine

The results indicate that there is a co-integration relationship between the investment of the private sector in the manufacturing industry and the gross domestic product, Since the error correction (ECM) parameter value (-0.00414) was statistically significant at the 1% level and that (0.00414) of the short-term errors caused by the shocks of the variable the independent variable can correct it during the unit time.

The short and long term relationship between industrial output and GDP can be explained as follows:

A. Relationship in the Short Term

Table 7 shows that there is a positive short-run relationship between the variables, meaning that private sector manufacturing output increased by 1%. This is because there is a positive significant effect of manufacturing output on GDP in the short run at a significant level of (5%). Assuming no other changes, a 1% rise in GDP results in a 0.000869% gain in GDP, and a 1% fall in GDP results in a 0.000869% decrease in GDP**.**

B. Long-Run Relationship

The results of table 7 for the long-term relationship show that the output of the manufacturing industry has a significant effect at the probability level (1%), and it is associated with a direct relationship with the gross domestic product in the long term, as an increase in the output of the manufacturing industry by (1%) leads to an increase in the gross domestic product Total by (0.210207), and conversely, a reduction of 1% results in GDP decreasing by 0.210207, assuming that other factors remain constant. This result is identical to the economic theory.

4.5. Econometric Model Goodness Tests

After the (ARDL) model has been estimated, the following tests may be used to guarantee the model's performance quality and freedom from econometric issues.

Heteroskedasticity Test: ARCH

According to Table 8, the estimated model is free of The problem of heteroskedasticity because the calculated value of (F) was (2.258679) at the level of probability (0.1133), which is not significant at the level (5%).

Table 8. *Heteroskedasticity test.*

Heteroskedasticity Test: ARCH			
F-statistic	2.258679	Prob. F (1,68)	0.1133
Obs*R-squared	4.411117	Prob. Chi-Square (1)	0.1102

Source: Eviews program version nine

Autocorrelation Test LM

It is evident from the results of table 9 that the model is free from the autocorrelation problem.

Table 9. *Autocorrelation LM Test.*

Breusch-Godfrey Autocorrelation LM Test:			
F-statistic	0.821976	Prob. F (2,61)	0.4447
Obs*R-squared	1.822129	Prob. Chi-Square (2)	0.4021

Source: Eviews program version nine

5. Private Sector Investment in the Manufacturing Industry and the Unemployment Rate

5.1. Initial Estimation According to (ARDL) Model

The preliminary estimates of the (ARDL) model for the correlation between manufacturing production and the unemployment rate are displayed in Table 10.

Table 10. *Initial Estimation According to (ARDL) Model.*

Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.***
UN (-1)	3.267805	0.087394	37.39161	0.0000
UN (-2)	-4.37157	0.22732	-19.2309	0.0000
UN (-3)	2.821719	0.223599	12.61955	0.0000
UN (-4)	-0.74309	0.081679	-9.0976	0.0000
LPSI	0.494673	0.284504	1.738722	0.0877
LPSI (-1)	-1.9216	0.807046	-2.38103	0.0208
LPSI (-2)	2.879822	1.069112	2.693659	0.0094
LPSI (-3)	-2.09413	0.797155	-2.627	0.0111
LPSI (-4)	0.583483	0.271795	2.146779	0.0362
C	1.345064	0.60241	2.232807	0.0297
R-squared	0.998369	Mean dependent var		14.66334
Adjusted R-squared	0.998102	S. D. dependent var		2.783026
S. E. of regression	0.121239	Akaike info criterion		-1.24146
Sum squared resid	0.808446	Schwarz criterion		-0.90694
Log likelihood	50.34744	Hannan-Quinn criter.		-1.10947
F-statistic	3740.891	Durbin-Watson stat		1.613733
Prob (F-statistic)	0.00000			

Source: Prepared by the authors based on the econometrics program Eviews, version nine

It is clear from the Table that value of R^2 was (99%), the computed coefficients were statistically significant, and the value of R(-2) was (99%), indicating that the model was adequately explanatory.

5.2. Test the Optimal Lag Period

Table 11 shows the results of the optimal lag period test of the (ARDL) model for the relationship between private sector investment in the manufacturing industry and the unemployment rate.

Table 11. *Optimal lag period test.*

Model	LogL	AIC*	BIC	HQ	Adj. R-sq	Specification
1	50.34744	-1.24146	-0.90694	-1.10947	0.998102	ARDL (4, 4)
5	44.8687	-1.19596	-0.99525	-1.11677	0.997906	ARDL (4, 0)
2	47.73224	-1.19176	-0.89069	-1.07297	0.99798	ARDL (4, 3)
4	45.26652	-1.17743	-0.94327	-1.08504	0.997896	ARDL (4, 1)
3	45.66247	-1.15885	-0.89123	-1.05325	0.997885	ARDL (4, 2)
10	18.83887	-0.42581	-0.25855	-0.35982	0.995413	ARDL (3, 0)
9	18.88046	-0.39632	-0.19561	-0.31713	0.995341	ARDL (3, 1)
7	20.49215	-0.38437	-0.11676	-0.27878	0.995411	ARDL (3, 3)
8	19.11848	-0.37288	-0.13871	-0.28048	0.995296	ARDL (3, 2)
6	20.50513	-0.354	-0.05294	-0.23521	0.995331	ARDL (3, 4)
14	-20.615	0.788154	0.955415	0.854149	0.984557	ARDL (2, 1)
13	-20.4436	0.813648	1.01436	0.892842	0.984378	ARDL (2, 2)
12	-20.4306	0.844019	1.078184	0.936412	0.984115	ARDL (2, 3)
15	-23.8389	0.856582	0.99039	0.909378	0.983226	ARDL (2, 0)
11	-20.4239	0.874581	1.142198	0.980173	0.98384	ARDL (2, 4)
18	-82.3111	2.686496	2.853757	2.752491	0.896921	ARDL (1, 2)
19	-84.1904	2.713551	2.847359	2.766347	0.892576	ARDL (1, 1)
17	-82.2963	2.71681	2.917522	2.796004	0.895222	ARDL (1, 3)
16	-82.2472	2.746068	2.980233	2.838461	0.893576	ARDL (1, 4)
20	-89.1789	2.836274	2.93663	2.875871	0.876774	ARDL (1, 0)

Source: Prepared by the authors based on the econometrics program Eviews, version nine

It is noted that the optimal lag times that were chosen according to the (ARDL) model are of the order (4, 4), according to the criteria used in the model, and the lag time that minimizes these metrics is selected as the ideal.

5.3. Bounds Test for the Relationship Between the Variables

Table 12. *Bound Test.*

Test Statistic	Value	K
F-statistic	5.147076	1
Critical Value Bounds		
Significance	I0 Bound	I1 Bound
10%	4.040	4.780
5%	4.940	5.730
2.50%	5.770	6.680
1%	6.840	7.840

Source: Prepared by the authors based on the econometrics program Eviews, version nine

The projected value of the (F) statistic is (5.140776), which is more than the critical (F) value at the (10%) level as shown in Table 12, which is equal to (4.780), and then we reject the null hypothesis that states that there is no Cointegration We accept the alternative hypothesis, which states that there is a cointegration between the variables, and this indicates the presence of a cointegration connection between the variables studied.

5.4. Error Correction Parameter and Short-Run and Long-Run Parameter Estimation

Once a cointegration relationship is established, the estimated model and error correction parameters may be calculated using the short-run and long-run estimators presented in Table 13.

Table 13. *Estimation of short-run and long-run parameters and error correction parameter.*

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D (UN (-1))	2.29293	0.08454	27.12257	0.0000
D (UN (-2))	-2.07864	0.144461	-14.3889	0.0000
D (UN (-3))	0.743085	0.081679	9.097595	0.0000
D (LPSI)	0.494673-	0.284504	1.738722	0.0877
D (LPSI (-1))	-2.87982	1.069112	-2.69366	0.0094
D (LPSI (-2))	2.094126	0.797155	2.626998	0.0111
D (LPSI (-3))	-0.58348	0.271795	-2.14678	0.0362
CointEq (-1)	-0.02513	0.01002	-2.50759	0.0151
Cointeq = UN - (-2.2984*LPSI + 53.5332)				
Long Run Coefficients				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LPSI	-2.29838	0.712658	-3.22507	0.0021
C	53.53324	11.9236	4.489686	0.0000

Source: Prepared by the authors based on the econometrics program Eviews, version nine

The results of the table indicate that there is a co-integration relationship between the private sector investment in the manufacturing industry and the unemployment rate, as the value of the error correction parameter (-0.02513) was negative and statistically significant at the level of (1%), and that (0.02513) of the short-term errors caused by the shocks of the variable The independent variable can correct it during the unit time.

The short and long term relationship between private sector investment in the manufacturing industry and the unemployment rate can be explained as follows:

5.4.1. Short-Run Relationship

According to the data in the Table above, manufacturing production has a statistically significant (10%) short-term inverse influence on the unemployment rate, which means that an increase in the output of the manufacturing industry by (1%) leads to a decrease in The unemployment rate by (0.494673), and conversely, a decrease by (1%) leads to an increase in the unemployment rate by (0.494673), assuming that other factors remain constant.

5.4.2. Long-Run Relationship

The long-term results show that the output of the manufacturing industry has a significant effect at the probability level (1%), and it is associated with an inverse relationship with the unemployment rate in the long term, as an increase in industrial output by (1%) leads to a decrease in the unemployment rate by (2.29838), Conversely, a decrease in industrial output by (1%) leads to an increase in the unemployment rate by (2.29838), assuming that other factors remain constant. The above results are identical to the economic theory, that is, the existence of a manufacturing industry that absorbs part of the labor force and reduces the unemployment rate.

5.4.3. Goodness Tests for the Econometric Model

Following the estimation of the ARDL model, a series of tests can be run to guarantee the reliability of the model's results and protect it from common errors:

5.4.4. Heteroskedasticity Test

Since the computed (F) value of (2.293027) at the probability level (0.1350) is not significant at the (5%), it may be concluded that the estimated model is devoid of heteroskedasticity, as shown in Table 14. Heteroskedasticity, a statistical conundrum.

Table 14. *Heteroskedasticity test.*

Heteroskedasticity Test: ARCH			
F-statistic	2.293027	Prob. F(1,68)	0.1350
Obs*R-squared	2.282576	Prob. Chi-Square(1)	0.1308

Source: Prepared by the authors based on the econometrics program Eviews, version nine

5.4.5. Autocorrelation Test (LM)

The test results are displayed in Table 15, demonstrating the reliability and accuracy of the calculated model. The estimated model is free of autocorrelation since the value of (F) was computed to be (2.18136) at the level of probability (0.1229), which was not significant at the level of (5%).

Table 15. *Autocorrelation Test.*

Breusch-Godfrey autocorrelation LM Test:			
F-statistic	2.18136	Prob. F(2,61)	0.1229
Obs*R-squared	4.943572	Prob. Chi-Square(2)	0.0844

Source: Prepared by the authors based on the econometrics program Eviews, version nine

6. Conclusions

The private sector has great importance in the economies of countries through its contribution to the growth of the economy, whether in the field of the manufacturing sector or any other field. The manufacturing industry provides jobs in the economy, which is reflected in reducing the unemployment rate. concern of economic policy makers. The contribution of the private sector to the production of the manufacturing industry is low in Iraq if it is compared with another economy with the same available ingredients, as the proportion of exports of manufactured goods reached 0.2% of total exports for the year 2021. This percentage is very low for limited products, to be the effect of the decline in industry productivity. Transformation of the private sector combined with the public sector on the trade balance by increasing imports to finance the needs of the Iraqi economy. In 2021, private sector investment in the manufacturing industry was responsible for 0.4% of the composition of GDP at constant prices in Iraq, which is very low. Standard tests and models were used, such as the Autoregressive Distributed Lagging Time (ARDL) model, to show the impact of the manufacturing industry output on economic growth and the unemployment rate for the period 2004-2021. With economic theory, based on these results, this paper recommends activating the role of the Iraqi government in supporting the private sector to increase and diversify production through economic policies.

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