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IMPACT OF SOME DEVELOPMENTAL VARIABLES ON GDP FOR SELECTED COUNTRIES: A PANEL DATA METHODOLOGY

Adel Salam Kashcool
Department of Economics, College of Administration and economics, Wasit University, Wasit, Iraq
Corresponding author: akashkool@uowasit.edu.iq

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Abstract:

The gross domestic product (GDP) variable is considered one of the basic variables that measure the economic growth rates of developing or developed countries. These countries are interested in this variable. The research focused on analyzing the relationship between some development variables, which include the foreign direct investment variable and the foreign trade variable, and their impact on the GDP variable for a number of countries including Iraq, Iran, the United Arab Emirates, Saudi Arabia, Kuwait and Malaysia. The sample consists of six countries for a time series extending from 2003 to 2022. The longitudinal section reached 120 observations for the countries subject of the study for the purpose of merging the cross-sectional data with the time series data.

The panel data methodology was adopted in the analysis process. It is known that the longitudinal data methodology focuses on three types of models, such as aggregate models, fixed effect models and random effect models as a preliminary testing stage. The other stage includes subjecting the variables to partial tests to determine the truth of these models in terms of their preference and suitability to the circumstances of the variables studied and the nature of the study. This is done through the Hausman test, which in turn nominated the fixed effect model as the best model. Then, moved to the Wald test, which shows the superiority of the aggregate model or the fixed effect model, and the series was tested and subjected to homogeneity tests as well as unit root tests. It clear that some of the data studied suffer from stability problems. These countries were chosen because they carry the same advantage, and because these countries are oil based and initially relied on the oil resource, some of them relied on the rentier resource as an initial starting point and were able. After that, employing this resource in various real development fields has achieved clear developmental leaps in the pace of progress, such as the Kingdom of Saudi Arabia, the United Arab Emirates, and others. Some of them are still investing these revenues in consumer sectors that cannot achieve real growth rates or advance real productive sectors to change the economic.

Keywords: GDP, foreign trade variable, panel data, time series, homoscedasticity, unit root

INTRODUCTION

All countries focus on increase economic growth and achieve economic prosperity without exception. This economic growth is measured by annual rates of change in the GDP, which is ranked at the top of the leading variables as it is considered the inferential compass for the nature and activity of the economy to be evaluated. As well as, some other variables in the context of the research, which are net foreign direct investment and net foreign trade. The sample was taken for the group of oil-producing countries that have a rentier nature including Iraq, Iran, the United Arab Emirates, Saudi Arabia, Kuwait and Malaysia. These countries were chosen because the characteristics of their economies are similar to some extent. This allows overcoming the problem of lack of homogeneity for longitudinal variables (Panel Data) (1).

The rentier nature of these countries is due to their dependence on the oil resource to finance their economic activities as well as their budget. However, the fundamental difference between these countries is embodied in the fact that some of them were able to utilize these revenues well to move to advanced steps towards economic prosperity. These revenues were invested in real productive sectors such as the industrial, agricultural, services and infrastructure sectors, as well as the education and other extractive sectors. There are some of these countries that did not

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exit the rentier cycle and employ and use these resources according to prepared and studied scientific economic foundations. These activities were limited to some consumer activities that do not contribute to increasing the rates of gross domestic product in the required manner.

The problem of the research lies in the management of rentier resources. The goal of the study is to measure the impact of the variables of net foreign direct investment and net foreign trade on the GDP variable using the longitudinal panel data methodology. The research is based on the assumption that net investment and net trade affect the GDP variable for the oil countries studied.

The data

The data was collected from the official website of the World Bank. This data included selected countries such as Iraq, Iran, the United Arab Emirates, Saudi Arabia, Kuwait and Malaysia for the period 2003 - 2022. This sample was chosen as a result of the convergence of the economic capabilities and characteristics of the studied countries, especially since they are considered oil producing countries meaning that they previously relied on the revenues of the rentier sector (2) or still depend on it. It must be noted here that some of the countries under study were able to achieve clear development leaps because they invested oil sector revenues to develop other economic sectors including in the areas of trade, exports, imports and investment. Many areas that research cannot address and this research shedding light on both the variables of net foreign trade and foreign direct investment to influence the GDP of those countries measured in the US dollar currency. It was done on preparing and preparing the data, not subject to the analytical and measurement aspects. It was sorted and arranged longitudinally for later use within the longitudinal data methodology, which is characterized by merging cross-sectional data (3) with time series (4) for six different countries and for the time series mentioned above. The main goal is based is to identify the impact of the independent variables, which are both foreign direct investment and net foreign trade, on the GDP of the countries studied. The variables of these countries are able to influence the GDP through analysis of the aggregate regression model or the fixed or random effect model. The methodology of longitudinal data to choose the appropriate model for the nature of the variables and study conditions, the data were as follows:

Table (1) Data on net foreign direct investment, net foreign trade and GDP (US) dollar

YEAR	GDP(y)	FDI(x1)	TRADE(x2)	YEAR	GDP(y)	FDI(x1)	TRADE(x2)
_IRQ-2003	219000000000.00	1000000000.00	154.23	_SUD-2003	216000000000.00	-590000000.00	69.83
_IRQ-2004	366000000000.00	300000000.00	120.23	_SUD-2004	259000000000.00	-330000000.00	75.08
_IRQ-2005	500000000000.00	515000000.00	115.74	_SUD-2005	328000000000.00	12100000000.00	81.95
_IRQ-2006	651000000000.00	383000000.00	89.65	_SUD-2006	377000000000.00	18300000000.00	89.94
_IRQ-2007	888000000000.00	972000000.00	74.09	_SUD-2007	416000000000.00	24300000000.00	94.86
_IRQ-2008	1320000000000.00	1860000000.00	81.06	_SUD-2008	520000000000.00	39500000000.00	96.10
_IRQ-2009	1120000000000.00	1600000000.00	78.69	_SUD-2009	429000000000.00	36500000000.00	84.86
_IRQ-2010	1390000000000.00	1400000000.00	73.50	_SUD-2010	528000000000.00	29200000000.00	82.55
_IRQ-2011	1860000000000.00	2080000000.00	72.17	_SUD-2011	677000000000.00	16300000000.00	84.86
_IRQ-2012	2180000000000.00	3400000000.00	73.61	_SUD-2012	742000000000.00	12200000000.00	82.85
_IRQ-2013	2350000000000.00	-2300000000.00	67.41	_SUD-2013	754000000000.00	8860000000.00	81.92

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_IRQ-2014	228000000000.00	-10000000000.00	68.98	_SUD-2014	767000000000.00	8010000000.00	79.56
_IRQ-2015	167000000000.00	-7600000000.00	69.59	_SUD-2015	669000000000.00	8140000000.00	69.50
_IRQ-2016	167000000000.00	-6300000000.00	54.59	_SUD-2016	666000000000.00	7450000000.00	59.91
_IRQ-2017	187000000000.00	-5000000000.00	59.78	_SUD-2017	715000000000.00	1420000000.00	61.81
_IRQ-2018	227000000000.00	-4900000000.00	65.80	_SUD-2018	847000000000.00	4250000000.00	61.96
_IRQ-2019	234000000000.00	-3100000000.00	68.99	_SUD-2019	839000000000.00	4560000000.00	60.20
_IRQ-2020	181000000000.00	-2900000000.00	57.74	_SUD-2020	734000000000.00	5400000000.00	49.71
_IRQ-2021	208000000000.00	-2600000000.00	62.10	_SUD-2021	869000000000.00	19300000000.00	57.51
_IRQ-2022	264000000000.00	..	..	_SUD-2022	1110000000000.00	7890000000.00	63.13
_IRN-2003	154000000000.00	2880000000.00	50.68	_KWT-2003	47900000000.00	-67000000.00	86.56
_IRN-2004	190000000000.00	3040000000.00	51.31	_KWT-2004	59400000000.00	23752969.00	89.30
_IRN-2005	226000000000.00	2890000000.00	54.44	_KWT-2005	80800000000.00	234000000.00	92.24
_IRN-2006	266000000000.00	2320000000.00	53.17	_KWT-2006	102000000000.00	121000000.00	89.71
_IRN-2007	350000000000.00	2020000000.00	49.89	_KWT-2007	115000000000.00	112000000.00	91.73
_IRN-2008	412000000000.00	1980000000.00	48.23	_KWT-2008	147000000000.00	-5951753.00	92.68
_IRN-2009	416000000000.00	2980000000.00	43.70	_KWT-2009	106000000000.00	1110000000.00	88.81
_IRN-2010	487000000000.00	3650000000.00	43.77	_KWT-2010	115000000000.00	1300000000.00	97.03
_IRN-2011	626000000000.00	4280000000.00	41.22	_KWT-2011	154000000000.00	3260000000.00	99.09
_IRN-2012	644000000000.00	4660000000.00	44.09	_KWT-2012	174000000000.00	2870000000.00	101.01
_IRN-2013	493000000000.00	3050000000.00	47.09	_KWT-2013	174000000000.00	1430000000.00	97.61
_IRN-2014	460000000000.00	2110000000.00	45.35	_KWT-2014	163000000000.00	486000000.00	100.04

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_IRN-2015	408000000000.00	2050000000.00	39.42	_KWT-2015	115000000000.00	285000000.00	98.70
_IRN-2016	458000000000.00	3370000000.00	40.39	_KWT-2016	109000000000.00	292000000.00	96.16
_IRN-2017	487000000000.00	5020000000.00	44.74	_KWT-2017	121000000000.00	113000000.00	97.84
_IRN-2018	328000000000.00	2370000000.00	58.38	_KWT-2018	138000000000.00	-21000000.00	103.12
_IRN-2019	284000000000.00	1510000000.00	50.75	_KWT-2019	136000000000.00	516000000.00	98.18
_IRN-2020	240000000000.00	1340000000.00	43.81	_KWT-2020	106000000000.00	-560000000.00	..
_IRN-2021	359000000000.00	1430000000.00	44.37	_KWT-2021	137000000000.00	-270000000.00	..
_IRN-2022	389000000000.00	..	37.67	_KWT-2022	185000000000.00	752000000.00	..
_AMR-2003	124000000000.00	4260000000.00	102.30	_MAL-2003	110000000000.00	3220000000.00	194.20
_AMR-2004	148000000000.00	10000000000.00	116.62	_MAL-2004	125000000000.00	4380000000.00	210.37
_AMR-2005	181000000000.00	10900000000.00	119.55	_MAL-2005	144000000000.00	3920000000.00	203.85
_AMR-2006	222000000000.00	12800000000.00	119.47	_MAL-2006	163000000000.00	7690000000.00	202.58
_AMR-2007	258000000000.00	14200000000.00	136.80	_MAL-2007	194000000000.00	9070000000.00	192.47
_AMR-2008	315000000000.00	5060000000.00	148.51	_MAL-2008	231000000000.00	7570000000.00	176.67
_AMR-2009	254000000000.00	1130000000.00	153.46	_MAL-2009	202000000000.00	115000000.00	162.56
_AMR-2010	290000000000.00	8800000000.00	143.88	_MAL-2010	255000000000.00	10900000000.00	157.94
_AMR-2011	351000000000.00	7150000000.00	151.67	_MAL-2011	298000000000.00	15100000000.00	154.94
_AMR-2012	385000000000.00	9570000000.00	159.97	_MAL-2012	314000000000.00	8900000000.00	147.84
_AMR-2013	400000000000.00	9760000000.00	161.10	_MAL-2013	323000000000.00	11300000000.00	142.72
_AMR-2014	414000000000.00	11100000000.00	164.03	_MAL-2014	338000000000.00	10600000000.00	138.31
_AMR-2015	370000000000.00	8550000000.00	169.48	_MAL-2015	301000000000.00	9860000000.00	131.37
_AMR-2016	369000000000.00	9600000000.00	170.90	_MAL-2016	301000000000.00	13500000000.00	126.90
_AMR-2017	391000000000.00	10400000000.00	172.80	_MAL-2017	319000000000.00	9370000000.00	133.16
_AMR-2018	427000000000.00	10400000000.00	157.92	_MAL-2018	359000000000.00	8300000000.00	130.40
_AMR-2019	418000000000.00	17900000000.00	167.38	_MAL-2019	365000000000.00	9150000000.00	123.03

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_AMR-2020	349000000000.00	19900000000.00	166.57	_MAL-2020	337000000000.00	4060000000.00	116.83
_AMR-2021	415000000000.00	20700000000.00	..	_MAL-2021	373000000000.00	18600000000.00	130.57
_AMR-2022	508000000000.00	..	..	_MAL-2022	406000000000.00	15100000000.00	140.75

Source: World Bank data www.albankaldawli.org

METHODOLOGY

The multiplicity of countries studied, the variables, as well as the time series that constitutes 20 observations for each country, the aggregate, fixed, and random effect is measured. The longitudinal data methodology was used to combine the aforementioned data into one model only. The variables consisted of net foreign trade and net foreign direct investment, as well as the GDP variable for the mentioned countries. The longitudinal data methodology is based on analyzing these variables through three main models. The first is called the aggregate model, the second is the fixed effect model, and the third is the random effect model.

After testing these models, one of them must be chosen according to partial tests from within the model, such as the Husman Test and the Wald Test. One of these three models can be nominated, which can describe as appropriate to the study data. Also, the two statistical hypotheses (zero and alternative), and before enter into the process of standard analysis. The data must be subjected to a graph to know the behavior of the variables studied as in the Figures (1, 2, 3).

1. Variable Y

It is clear by tracking the behavior of the GDP variable for the six countries in the chart below that the Saudi GDP in red exceeds all variables corresponding to other countries. It can attribute this to the fact that it is a major exporter of oil, in addition to being among the active OPEC countries. This supports its economy and gives it an additional advantage and high flexibility to expand productive activities, followed by the Iranian GDP in orange. It becomes clear that the starting point for the variable was rising. This is clear and uninterruptable. There was a great convergence in 2009 between Saudi Arabia and Iran in terms of GDP. For the years 2010 and 2011 until 2012, the curve began to decline continuously until the year 2020.

This can be explained for several reasons, including political and economic ones, the most important of which are the economic sanctions imposed by the United States of America on the Iranian economy. However, after the year 2020, the situation began to improve gradually, and the figure reinforces, and with regard to the United Arab Emirates, and when examining the curve in general, which is characterized by a continuous increase. The fact that the Emirates are among the countries that are interested in the sources of diversification of its economy, this is also observed through the behavior of the aforementioned variable. After 2020, the resumption of production activities is halt due to the Corona pandemic, and that the year 2020 represents an escalation point for all the economies studied.

The low point was in 2009 for all countries except for the Iranian economy, which is the only one that was not clearly affected as happened with the rest of the economies. It can attribute this to economic closure or isolation in dealing with capitalist countries such as the United States of America and the countries that partner with it. For the fourth economy, which is the Malaysian economy, Malaysia is considered one of the emerging economies. It is moving rapidly towards rapid developments to keep pace with the economic progress of developed countries and major countries. This is what observe in the behavior of its variables including Iraq and Kuwait compete, as Kuwait leads Iraq at the beginning of the series 2003, 2004, 2005, and 2006 until 2008, and then Iraq exceeds the Kuwaiti GDP. This can be explained by the fact that the change of the political regime in Iraq and the entry of the American occupation at the beginning of the studied series from 2003 to 2008. The country was still floundering economically. However, the country was able to overcome these obstacles recording a significant increase in GDP rates over its Kuwaiti counterpart. Iraq's GDP appears in blue, while Kuwait's GDP appears in black (Figure 1).

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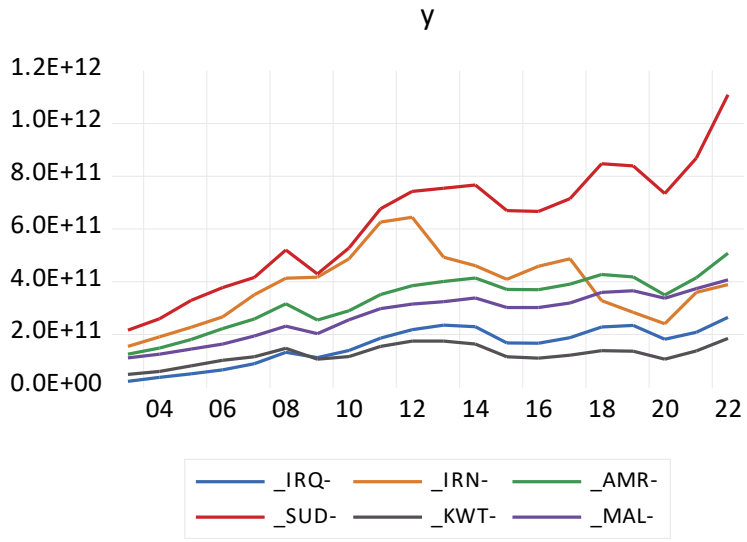

Figure (1) gross domestic product

2. Variable X1

Figure (2) represents the net flows of foreign direct investment into the research sample shows the behavior of the foreign direct investment variable during the period studied. However, it is clear that there are some distinguishing points that can be exposed through the chart, starting with the values of the variable in Saudi Arabia. It is noted that the peak of the curve increase in 2009. This can be say that the period that preceded the global financial crisis or the global collapse in conjunction with the year 2009, which affected, in one way or another. The direction of most Saudi investments inward and investment in economic activities were at home out of the belief that it would be safe from harm. The global financial crisis or its effects shows that could affect the Saudi economy, which is why the plan appeared in this way.

Then, the behavior of the Saudi investment plan began to gradually decline until it reached its lowest point in the year 2017, and in view of the same changing behavior of the Malaysian economy. It becomes clear that there is a common point between the UAE economy and its Malaysian counterpart in terms of the decline in net investment flows in 2009. The reason is due to the repercussions of the global financial crisis. After this point, the two economies begin to compete in recording high values for the index. For the Iranian economy, this can be described as stable and not affected by the global financial crisis. It is a closed economy; there are slight increases that may be justified as being due to slight increases in global oil prices, in addition to its export of quantities of gas to many countries. For Iraq, it can be said that the investment variable is almost limited to the oil sector, except for some activities. But, it decreased directly in 2014 due to the deterioration of the security situation and the entry of the terrorist organization. As for the Kuwaiti economy, it is somewhat similar to the Iranian economy (Figure 2).

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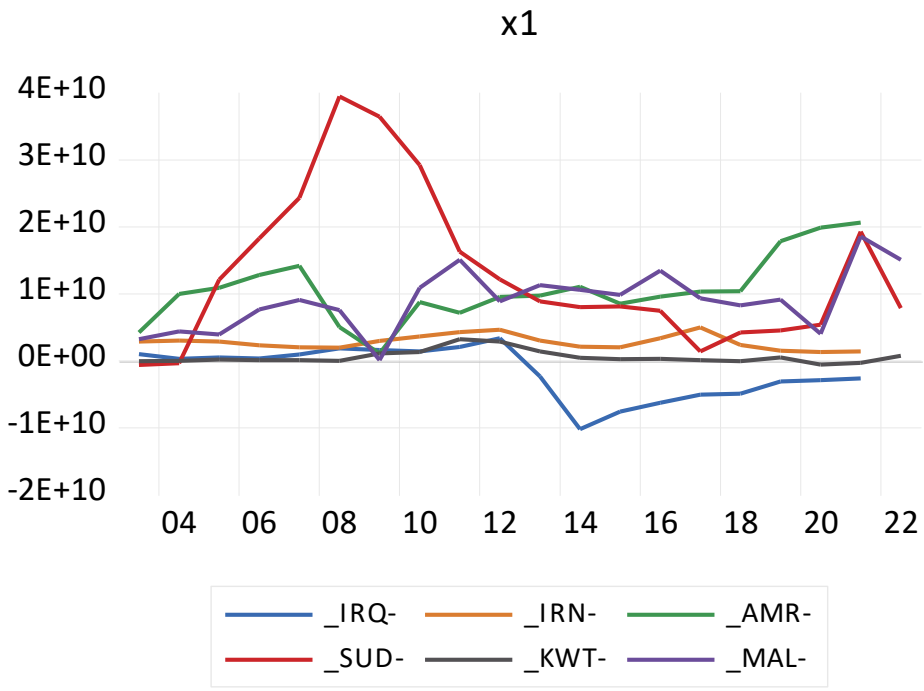

Figure (2) Net foreign direct investment

3. Variable X2

The results have been showed that the results divided into two categories of countries. The first category is emerging economies, including the UAE economy, which is observed to be constantly increasing and achieving in the net foreign trade index, as is the case with the Kuwaiti economy.

The second category are those that recorded low rates, led by the Malaysian economy, as it is noted that its recording is slow, and its transition can be distinguished by a difference represented by the Iranian economy after the year 2020. It was able to achieve clear leaps in the field of net foreign trade, and achieve large savings. It is increasing exports at the expense of imports to a number of countries and the most important of which are neighboring Arab countries. For Iraq, it is classified within the second group, and it recorded low values due to the deficit of the production system and the compensation for this deficit with imports, which causes a sustainable deficit in net foreign trade (Figure 3).

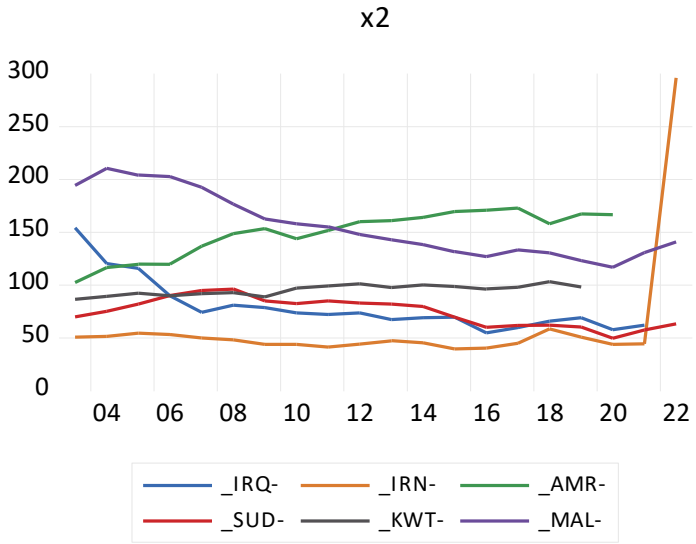

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Figure (3) Net Foreign Trade

Stability tests

It is clear that the results indicate different levels of rest that ranged between the level and the first difference. The probability value exceeded 5%, and it stabilized at the first difference, as the probability value reached the level of 1%, based on the Levin, Lin and Chu t* test (Table 2).

Table (2) Static tests for variable Y

Panel unit root test: Summary Series								
Variable	Y				D(Y)			
Method	*Statistic*	*Prob.*	*Cross-sections*	*Obs*	*Statistic*	*Prob.*	*Cross-sections*	*Obs*
Levin, Lin & Chu t*	-1.60165	0.0546	6	108	-5.96252	0.0000	6	102
Im, Pesaran and Shin W-stat	-0.03362	0.4866	6	108	-4.98050	0.0000	6	102
ADF – Fisher Chi-square	10.5064	0.5716	6	108	46.6233	0.0000	6	102
PP – Fisher Chi-square	7.92711	0.7908	6	114	38.9573	0.0001	6	108

In a related of the analysis of the Static tests of the studied variables, the Static tests of the foreign direct investment variable. The first difference, the probability level at the level reached 0.0505. It is more than 5%, but it beyond that to take the first difference, and the probability value reached 5% (Table 3).

Table (3) Static tests for variable X1

Panel unit root test: Summary Series								
Variable	X1				D(X1)			
Method	*Statistic*	*Prob.*	*Cross-sections*	*Obs*	*Statistic*	*Prob.*	*Cross-sections*	*Obs*
Levin, Lin & Chu t*	-1.64019	0.0505	6	105	-5.18334	0.0000	6	99
Im, Pesaran and Shin W-stat	-1.53233	0.0627	6	105	-1.53233	0.0627	6	105
ADF – Fisher Chi-square	18.6008	0.0986	6	105	18.6008	0.0986	6	105
PP – Fisher Chi-square	16.6420	0.1636	6	111	16.6420	0.1636	6	111

The static analysis of longitudinal data continues. The variable X2 stabilized below the level and the probability value reached 0.0007 (Table 4).

Table (4) Static tests for variable X2

Panel unit root test: Summary Series				
Variable	X2			
Method	*Statistic*	*Prob.*	*Cross-sections*	*Obs*
Levin, Lin & Chu t*	-3.20433	0.0007	6	102
Im, Pesaran and Shin W-stat	-1.21932	0.1114	6	102
ADF - Fisher Chi-square	18.3026	0.1068	6	102
PP - Fisher Chi-square	52.3919	0.0000	6	108

In a related topic, Table (5) shows the correlation and covariance matrices. It has been showed the differences between the study factors.

Table (5) the correlation and covariance matrices

	Covariance	Correlation

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	Y	X2	X1	Y	X2	X1
Y	4.38E+22			1.000000		
X2	-2.39E+12	1957.421		-0.258686	1.000000	
X1	6.64E+20	1.04E+11	6.05E+19	0.407782	0.302984	1.000000

Results require testing the significance of the estimated features and models. The model data must be subjected to the necessary standard and statistical tests to determine the nature of the estimated models. These models are compatible with the research variables and data. The structure of this analysis begins with Panel Data and the general form is as follows:

$$y_{it} = \alpha_{(i)} + \sum_{j=i}^{k} \beta j \; xj_{(it)} + U_{(it)} \quad i = {}_{1,\ 2,\ldots\ldots,N} \quad t = {}_{1,\ 2,\ldots\ldots,T}$$

Since Y_{it} represents the dependent variable i, at the time period t, $\alpha_{(i)}$ represents the plots for observation i, β_j, $xj_{(it)}$, the independent variable and its value j for observation i, and that $U_{(it)}$ The error term for observation I for duration t.
In addition to the topic-related aspect, the general form can be divided into sub-models, starting from the aggregate model, and the coefficients $\alpha_{(i)}$ and βj are characterized by stability for all time periods. The time element = zero

$$= \alpha_{\square} + \sum_{j=i}^{k} \beta j \; xj_{(it)} + U_{(it)} \quad i = {}_{1,\ 2,\ldots\ldots,N} \quad t = {}_{1,\ 2,\ldots\ldots,T}$$

Sample size N*T and $var(\varepsilon_{it}) = \sigma_{\varepsilon}^2 \qquad E(\varepsilon_{it}) = 0$

Using the least squares method for each of the independent variables, which are both net foreign direct investment and net foreign trade (Table 6).

Table (6) Method: Panel Least Squares (Pooled)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	4.32E+11	4.05E+10	10.67697	0.0000
X1	14.39188	2.206425	6.522715	0.0000
X2	-1.99E+09	3.88E+08	-5.128404	0.0000

After the parameters of the variables listed in Table (7) were estimated, this turned out to be significant according to the probability value t-Statistic. Now, the model must be estimated again using the agency fixed effect model.

Table (7) Method: Panel Least Squares (Fixed)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	5.04E+11	6.30E+10	8.002816	0.0000
X1	-0.014019	2.114675	-0.006630	0.9947
X2	-1.87E+09	6.25E+08	-2.996463	0.0034

After the model was estimated using the fixed effect, it became clear that the coefficients of the variables were also significant, except for the net foreign direct investment variable, as its probability value was more than 5%. Therefore, the model must continue to be estimated using the random effect model, and in the end a comparison is made between the fixed and random effect models. This is done through the Hausman Test and based on the t-Statistic probability value. The random effect model can be formulated according to the following form:

$$\alpha_i = \mu + v_i \quad i = {}_{1,\ 2,\ldots\ldots,N}$$

$$y_{it} = \mu + \sum_{j=i}^{k} \beta j \; xj_{(it)} + v_i + \varepsilon_{it} \quad i = {}_{1,\ 2,\ldots\ldots,N} \quad t = {}_{1,\ 2,\ldots\ldots,T}$$

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Table (8) Method: Panel Least Squares (Random)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	5.04E+11	6.30E+10	8.002816	0.0000
X1	-0.014019	2.114675	-0.006630	0.9947
X2	-1.87E+09	6.25E+08	-2.996463	0.0034

It became clear that the coefficients of the variables were also significant, except for the net foreign direct investment variable, as its probability value was more than 5%. Therefore, the model must continue to be estimated using the random effect model, and in the end a comparison is made between the fixed and random effect models. This is done through the Hausman Test and based on the t-Statistic probability value. The random effect model can be formulated (Table 9).

$$\alpha_i = \mu + v_i \qquad i =_{1,\ 2,\ldots\ldots,N}$$

$$y_{it} = \mu + \sum_{j=i}^{k} \beta j\ xj_{(it)} + v_i + \varepsilon_{it} \qquad i =_{1,\ 2,\ldots\ldots,N} \qquad t =_{1,\ 2,\ldots\ldots,T}$$

Table (9) Method: Panel Least Squares (Random)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	4.32E+11	2.90E+10	14.88482	0.0000
X1	14.39188	1.582683	9.093348	0.0000
X2	-1.99E+09	2.78E+08	-7.149532	0.0000

Depending on the probability value t-Statistic, Table (10) Hausman Test (5) shows that the probability value Chi-Sq. Statistic is 0.00. Therefore, the null hypothesis must be rejected, which states that if the probability value is less than 5%. The null hypothesis is rejected and the alternative hypothesis is accepted, which states that the fixed effect model is inappropriate and that the appropriate model is the random effect model.

Table (10) Hausman test

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	105.895451	2	0.0000

Now, in order to obtain accurate results for estimating the aggregate model and then the fixed effect model and the random effect, dummy variables were added to the model structure, represented by C(1)- C(8). Table (11) shows the coefficients of the variables, and the probability value of the estimated results according to t-Statistic. The following table shows the significance of all parameters of the variables except C(2) and C(7). These variables are usually equal to the number of countries, which numbered (6) countries. Another test must be conducted, which is the Wald Test, so that can differentiate between the aggregate model or the random-effect model:

Table (11) Method: Panel Least Squares (Pooled with Dummy Variables)

Y=C(1)+C(2)*X1+C(3)*X2+C(4)*D2+C(5)*D3+C(6)*D4+C(7)*D5+C(8)*D6				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	3.00E+11	5.78E+10	5.193020	0.0000
C(2)	-0.014019	2.114675	-0.006630	0.9947
C(3)	-1.87E+09	6.25E+08	-2.996463	0.0034
C(4)	1.72E+11	4.68E+10	3.667125	0.0004
C(5)	2.94E+11	6.22E+10	4.720538	0.0000
C(6)	4.62E+11	5.11E+10	9.042019	0.0000

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C(7)	-8.02E+08	4.29E+10	-0.018689	0.9851
C(8)	2.65E+11	6.38E+10	4.148468	0.0001

In order to complete the necessary standard tests, the model variables must be subjected to the Wald Test (6). This test is based on the value of the dummy variables, which are either equal to zero or not equal to zero. If the value of the dummy variables is equal to zero, it accepts the null hypothesis, which states that the combined model is the appropriate model for the study variables in comparison with the random effect model. However, if the values of the dummy variables are not equal to zero, it accepts the alternative hypothesis, which is that the random effect model is the appropriate agency model.

Table (13) Wald test

Test Statistic	Value	df	Probability
F-statistic	21.75762	(5, 105)	0.0000
Chi-square	108.7881	5	0.0000

The Wald Test confirms that the fixed effects model is the most appropriate for the research sample because the F-statistic and Chi-square have a probability value of 0.000, which is less than 5%.

DISCUSSION

Stability tests were applied for the research variables, and since the cross-sectional data are measured for the same time periods, they are classified as longitudinal data balanced (Data Panel Balanced) (8). The results showed a variance in stability that ranged between the level and the first difference according to Levin, Lin & Chu t*(9). In addition, select the research sample consisting of (6) countries and (3) variables.

The selection of the sample and variables was consistent with homogeneity of variance, which is one of the basic conditions for the selected sample since the selected countries are oil countries, as was mentioned earlier. The longitudinal panel data methodology was used as a standard analysis method, and the data were then subjected to three models in successive and interagency mode:

1- Panel Least Squares (Pooled)(10).
2- Panel Least Squares (Fixed)(11).
3- Panel Least Squares (Random) (12)

In addition, to improve the properties of the model with a random effect, Panel Least Squares (Pooled with Dummy Variables) (13), dummy variables methodology was employed as a hybrid method. The purpose is to obtain a coherent model in terms of standard and statistical tests, as dummy variables were added in the number of countries in the sample. It achieved significant results for most of the parameters except C(2) and C(7). The estimated models were tested and the best one was selected according to a methodology based on scientific foundations. Thus, obtain realistic results using sub-tests Hausman Test and Wald Test to select the most appropriate model as well. The variance and covariance matrix as well as the correlation matrix (14) between the variables were included.

CONCLUSION

The study concludes that the panel data methodology was adopted in the analysis process. The longitudinal data methodology focuses on three types of models, such as aggregate models, fixed effect models and random effect models as a preliminary testing stage. The other stage includes the variables to partial tests to determine the truth of these models in terms of their preference and suitability to the circumstances of the variables studied and the nature of the study. This is done through the Hausman test, which in turn nominated the fixed effect model as the best model.

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