گۆڤاری کوردستانیی بۆ لێکۆڵینەوەی ستراتیجیی

# The Role of Investment on Economic Growth; An Empirical Case of Iraq for the Period of 2004 to 2020

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## Abstract

This paper employs time series techniques to analyse the effect of foreign direct investment and national investment on economic growth in Iraq. The study uses secondary annual data over the period 2004-2020. The gross domestic product (GDP) is the dependent variable, and foreign direct investment (FDI) and national Investment (NI) are the explanatory variables. The empirical analysis starts with run ordinary least square (OLS). The result of Augmented Dickey Fuller (ADF) and Phillips Perron (PP) test illustrates that the series are non-stationary in the level form, however stationary in the first difference. The study further utilises the Johansen cointegration test whereby it finds the variables are cointegrated and there is a long run relationship between dependent and independent variables. The results demonstrates that foreign direct investment has statistically significant positive impact on gross domestic product by almost 0.1013, meanwhile, national investment has positive impact on Iraqi gross domestic product with 0.0555.

**Keywords: foreign direct investment, national investment, gross domestic product, OLS, Iraq.**

## Introduction

Researchers in economics and finance are eager to comprehend the elements that influence corporate investment. Investment plays a vital function in the business operations of any corporation. According to the investment, economic and financial activities are enhanced for the development of economic growth rate and employment, resulting in an increase in wage rate, labour productivity, and living standards [1].

The biggest problems facing developing countries are, first, how to increase gross domestic product (GDP), second, setting limits to reduce unemployment and increase jobs by paying attention to foreign direct investment, and finally, trying to attract investments including foreign and national investors to create and increase domestic [2] [3].

Foreign direct investment (FDI) is considered one of the main pillars of economic development and increase in gross domestic product (GDP), especially in developing countries. The presence of foreign companies encourages domestic production. It also encourages better and easier use of available resources through the use of new technologies and the skills of foreign experts [4]. Foreign direct investment (FDI) helps developing countries to reduce unemployment, increase jobs and increase domestic products [5]. As it is known, foreign direct investment (FDI) is one of the main components of the overall economy and has a major contribution to increasing domestic products in developing countries, which has a direct impact on increasing domestic and international trade. It also plays a crucial role in creating new markets, increasing job opportunities and efforts to sell these products in the market [6] and [7].

### 1.1. Research Importance

Advanced technology and economic growth in recent years have led developing countries to attract foreign investors to their countries through facilitation and new laws. This had a great impact on reducing the problems caused by the incompetence and inexperience of local workers and the lack of capital for investment. Meanwhile, this attraction enhances local investors to keep their capital and invest it inside the country, which create a competitiveness environment.

### 1.1. Research Objectives

The main aim of this research is to investigate and comprehend the role of both foreign direct investment and national investment on Iraqi economic gross via its gross domestic product (GDP) between 2004 and 2020. In addition, illustrating the amount of capital inflows by foreigners in parallel to national investment money.

### 1.1. Research Problems

Iraq suffers from a number of internal problems and wars that affect the country's economy. On top of that, the lack of confidence in the security of Iraq by foreign institutions and companies is another huge issue that

.faces Iraqi economy

In light of the importance of investment on economic growth, which was addressed earlier, understanding the effect of FDI and national investment on Iraqi economic growth is a key question. Moreover, knowing the significant of these relationships would be another important point to stay on for further investigations in a .future

## 1.1.    Research Hypotheses

•        H0: null hypothesis, there is no nexus relationship between investment and gross domestic product.

•        H1: alternative hypothesis, there is a strong and positive relationship between foreign direct investment and gross domestic product.

•        H2: alternative hypothesis, there is a strong and positive relationship between national investment and gross domestic product.

## 2. Literature review

Nowadays, one of the main rigorous research areas for economics became the assessing correlation between foreign direct investment inflows into host countries and their growth around the world. Theoretically, the relationship between FDI and GDP could run in both directions. In one hand, due to the "FDI led growth hypothesis", FDI is going to create job opportunities, transferring skills and technology and also increase capital stock inside host countries [4], [8], [9]. However, "market size hypothesis", illustrates the opposite as having growth in host countries GDP would encourage more and more FDI inflows in order to make more profits [10], [11]. [12] discussed there is universal belief among policymakers that one of the main factors that enhance host countries productivity is FDI. For that purpose, several studies done on the relationship between .[FDI and economic growth or testing causality between variables [13

in 2010 [14] has investigated on the relationship between foreign direct investment and economic growth. It is recognized that there was a positive relation among export and gross domestic product due to the significant influences that FDI has on GDP. A prevalence investigation was done globally as a result of an empirical study as both developing and developed countries are willing to motivate foreign investment in their countries. This is also supported by; [15], [16] due to their empirical studies when they have found the positive impact of FDI on Economic growth. Meanwhile, in 2021 the study in Vietnam has been done on the impact of investment on economic growth for 63 Vietnamese provinces. The result demonstrated that in long run, private investment .[(local investment) and foreign direct investment in a long run have a positive effect on economic growth [17

In 2015 [12] has evaluated the causal interactions between FDI and economic growth for 65 countries using dynamic panel cointegration. The study revealed the great different relationship between FDI and GDP. How-ever, it was emphasized that foreign capitals play a significant role in boosting economic growth as it could decrease the gap between capital requirements and national saving, increase skills and transferring advanced .technology especially for developing countries

studied on the impact of FDI and export on Pakistan economic growth for the period of 1990 – 2010 after  [1]

collecting data from IMF and World Bank official website. In their research energy, telecommunication and IT were selected as the most contributors' sectors that affected positively on Pakistan economic growth. In addition, the impact of industry FDI on Indian economic growth were evaluated by [18]. Granger causalities were used and found that in the long run manufacturing sector caused to increase the GDP. Similarly, the impact of FDI on some European countries economic growth assessed by [19]. The findings of the panel data analysis recognized a positive significant relationship between FDI and economic growth. Also, in [19] found that FDI affect positively on economic growth. [20] have studied on the effect of FDI on economic growth of Sudan from 1970 to 2014 using time series data. The results of the cointegration test provide the evidence that FDI leads to better economic performance.

Arisoy in 2012 [21] investigated on the impact of FDI un factor productivities and economic growth of Turkey from 1960 to 2005. The empirical findings illustrated that economic growth was increased due to raise in the FDI. Meanwhile, in (2014) [2] has studied in the impact of FDI on Turkish economic growth between 1980 and 2012. The result demonstrated that there is a statistically insignificant positive impact of FDI on economic growth, however domestic investment had a positive impact on economic growth.

Phetsavong and Ichihashi [22] revealed that national investment positively and significantly affected economic growth in 15 Asian developing countries. In addition, Yuliana, Bashir, and Rohima evaluated the influences of investment on economic growth of South Sumatera Province in Indonesia. The results showed a positive and significant impact of national investment and foreign direct investment on economic growth [23]. Meanwhile, an International Monetary Fund working paper in 1997 by Ghura explored the increase in national investment of Cameroon from 1963 to 1996 caused economic growth to rose significantly [24].

Regarding Iraq, in 2021 an investigation indicated a positive impact of dFDI on dGDP after using ordinary least square (OLS) regression [25]. Also, another study examined the impact of public investment and national investment on Iraqi economic growth. The results revealed that both public and national investments have a positive and significant impact on economic growth in a long run[26]. Furthermore, [27], [28] examined the relationship between foreign direct investment on economic growth in Iraq. Both studies illustrated that there is a positive impact of FDI on gross domestic product.

## 3. Methodology

In this chapter, research methodology will be explained in detail. The focus is going to be on the types of the collected data and their sources. Moreover, the relationship between the data would be illustrated. Then, the process of analysing the collected data will demonstrated with the ways of their measurement.

### 3.1. Participants and procedures

In order to achieve research objectives, secondary data is collected via official websites such as; Central Bank of Iraq (CBI) and world bank. Evaluating the impact of national and foreign direct investment on economic growth required the amount of capital invested by national and multinational companies inside Iraq with real gross domestic product, which represents the value of right amount of production by all of the compa-

nies. Both national and FDI considered as the independent variables that influences on the economic growth through producing goods and services.

Also, it provides job opportunities for local workers, which leads to increase their income then economic activities would be more activated. Real GDP is the variable that is affected by the amount of FDI inside the country, which means any extra currency of foreign companies inside a country is contributing to producing more products.

In this article, the impact of both FDI and national investments would be investigated on economic growth for the period of 2004 to 2020 separately, as it is noticed that each of them has their weight and cause on the movement of real gross domestic product.

### 3.2. Measures

In this section, these tools and methods would be clarified that are needed and used for the sake of achieving research aims. OLS model would be implemented in order to assess and illustrate the impact of national investments and foreign direct investment on Iraqi economic growth via the coefficient. This is because it includes testing long-run relationship among the variables [29]. Moreover, it is significant to check causality test between FDI and national investment because these two might have encouraged and motivated each other during the research time period.

For that purpose, the following equations were created:

$$Y_i = \alpha_i + \beta_1 X_1 + \beta_2 X_2 + \varepsilon_i$$

Where, (Y) represents the Real GDP for the country (i), ($\alpha_i$) is a constant variable for Iraq, (X1) denotes the foreign direct investment in Iraq, (X2) represent national investment, ($\beta_1$ and $\beta_2$) represents the coefficient impact of FDI and national investment respectively on Iraqi economic growth, and ($\varepsilon$) represent the error.

### 3.3. Data Description

First of all, before analysing the collected data and figuring out the level of investment influences on Iraqi economic growth for the period of study. The data would be illustrated in the following charts and showing their trend.

Bellow chart 1; represents the movement in foreign direct investment and national investment in Iraqi from 2004 to 2020. It is obvious that Iraq total investment in 2019 reached the pick for nearly 228,339,692,893.40 American Dollars, however the lowest point was recorded in 2004 for nearly more that 17,800 American dollars. This illustrates that the general direction of capital invested has been directed to increase, even though there were fluctuations.

Chart 1: Investment volume in Iraq from 2004 to 2020

*The numbers are in million*

The most two obvious declines in total investment were started after 2007 and 2010. Comparing 2008 and 2009 by 2007 demonstrates that there was a slight fell in total investment, then after 2010 the level of decreases was most obvious.

Chart 2: Investments and GDP in Iraq from 2004 to 2020

**The numbers are in million**

Adding real GDP within investment in chart (2) illustrates that Iraqi economic growth from 2004 to 2018 was almost above total investment, however one year later real GDP and total investment crossed each other and continued. It is noticeable that, the rise in real GDP were steady for the whole period, which was not going to be parallel with investment amount trend for the study's period.

## 4. Data Analysis

After collecting available data and describing them in chapter three, their analysis, and the level of investment coefficient on Iraqi economic growth would be the target in this section.

## 1.1.    Stationarity Test

The unit root test is considered one of the important tests for revealing the data and where they are stationary or not. To do so, both Augmented Dickey-Fuller test and Phillips-Perron test are used to determine the stationary of the data, we test the null hypothesis which say there is a unit root (the series is non-stationary). And the hypothesis is stated as:

H0: Series is stationary

H1: Series contains a unit root (non-stationary)

The results of the unit root tests are presented in the following table.

Table 1: Unit Root Tests Result

| Variables | ADF: Augmented Dickey –Fuller | | PP: Phillips-Perron | |
|---|---|---|---|---|
| | First Difference | | First Difference | |
| | Intercept | Intercept & Trend | Intercept | Intercept & Trend |
| (Gross Domestic Product (GDP | -3.0147 (0.0578) | -4.1486 (0.0337) | -3.0286 (0.0565) | -7.7665 (0.0001) |
| (Foreign Direct Investment (FDI | -3.1270 (0.0476) | -2.8718 (0.2043) | -2.9913 (0.0602) | -5.3165 (0.0045) |
| (National Investment (NI | -4.3452 (0.0055) | -4.2530 (0.0240) | -5.8917 (0.0004) | -6.3767 (0.0009) |

Source: Author's using E-views12

Table 1 shows the ADF and PP test results for all variables, which are GDP, FDI and NI, with intercept as well as intercept and trend. The three series at level contain unit root, therefore we fail to reject the null hypothesis so the variables are non-stationary but when we take the first difference for the three variables, all the series become stationary and the trend is being removed from the data. It can be seen that majority of the P-values of the ADF test, and the PP tests are less than 5% and the series are integrated of order I.

## 1.2.    Co-Integration Test

After performing the stationary test, implementing co-integration test is necessary to establish a long-run relationship between variables. Co-integration is one of the vital tests to determine the level of integration between the variables of the research. In order to allow the model to be estimated, it is necessary to have at least one relationship between one of the independent variables and the dependent variable. There are several different indicators that can be used to show the level of integration between the variables. In this paper, Johansen Cointegration Test, which include Rank Test (Trace test) and Eigen value Test, is applied to find out co-integration between the variables.

The hypothesis is stated as:

H0: there is no cointegration between variables

H1: Cointegration exist

The test results are shown in table 2:

Table 2: Co-integration Tests Results

| Variables | Critical Value ((0.05 Trace | Probability | (Critical Value (0.05 Maximum Eigenvalue | Probabil-ity |
|---|---|---|---|---|
| Gross Domestic Product | 29.7970 | 0.0000 | 21.1316 | 0.0000 |
| Foreign Direct Investment | 15.4947 | 0.0436 | 14.2646 | 0.1307 |
| National Investment | 3.8414 | 0.0362 | 3.8414 | 0.0362 |

*Source: Author's using E-views12*

The first part of table 2 demonstrates the results for the trace statistic. It is noticeable that almost all p-values of trace test and maximum eigenvalue are less than 5%. Thus, the null hypothesis of no co-integrating vectors is rejected. It means that the variables are co-integrated and there is a long-run relationship between dependent and independent variables.

As our series are integrated of different orders and it is a combination of both level and first difference station-ary, so we need to test the following hypothesis test:

H0: there is no co-integration equation

H1: co-integra equation exist

Table 3: F-Bounds Tests Results

| | I (1) Upper | I (0) Lower | Significant Level | Value |
|---|---|---|---|---|
| **F-Bounds Test** | 4.02 | 3.38 | 10% | **13.5061** |
| | 4.61 | 3.88 | 5% | Much bigger than upper value |
| | 5.85 | 4.99 | 1% | |

*Source: Author's using E-views12*

It's clear that the calculated F-statistics is greater than the critical value for the upper bound I (1) for all sig-nificant levels (10%,5% and 1%). So, we can conclude that there is cointegration. That is there is a long-run relationship. We can reject the null hypothesis.

## 1.3.    Regression

The results of stability and co-integration support the support the correct estimation of the proposed model, and to measure and analyze the effect of (Foreign Direct Investment and National Investment) on (GDP as an indicator of economic growth) using secondary data for the period (2004 - 2020), the Ordinary Least Square (OLS) model was selected, and the outcomes are presented in table 4 bellow.

**Table4: The Result an Ordinary Least Square**

| Dependent Variable | Independent Variables | | Coefficient | Probability |
|---|---|---|---|---|
| **GDP** | **FDI** | | 0.1013 | 0.0456 |
| | **NI** | | 0.0555 | 0.0732 |
| **R-squared** | 0.9945 | | **F-statistic** | 68.3968 |
| **Adjusted R-squared** | 0.9800 | | **(Prob (F-statistic** | 0.0026 |
| **S.E. of regression** | 0.0289 | | **Akaike information criterion** | -4.1336 |
| **Sum squared residuals** | 0.0025 | | **CointEq(-1) Coefficient** | -0.1914 |
| | | | **CointEq(-1) Probability** | 0.0029 |

*Source: Author's using E-views12*

Table 4 showed the Regression Analysis between Independent Variable (FDI and NI) and Dependent Variable (GDP). The formula for the result of the analysis of regression between Dependent Variable (GDP) and independent variables (FDI and NI) is represented through the below equation:

The model is appropriate based on F=68.3968 and P-Value =0.0026. In one hand, the coefficient of FDI is 0.1013 which means one unit change in FDI will lead to increase of GDP by 0.1013 unit by holding NI. On the other hand, the coefficient of NI is 0.0555 which means one unit change in NI will lead to increase of GDP by 0.0555 unite by holding FDI. This result show that the GDP has a positive relation with both independent variables. Hence, it can be noticed that investment in Iraq have contributed to increase Iraqi gross domestic product, which means promoting foreign investors to invest their money in Iraq should be considered because it leads to boost domestic outputs, having more exports and create more jobs for unemployed people. Meanwhile, national investors should be motivated and supported to invest their money inside the country rather than investing outside to keep national currency inside Iraq and building a competitive market.

The Multiple Coefficient of determination R Square explains how much variation in the GDP explained by independent variables, reflects that 99.45 % of the variation of GDP is determined by FDI and NI as independent variables in which the value for Adjusted Multiple Coefficient of Determination (Adjusted R-squared) is 98% the remaining variation is turning to other factors that effect on GDP as dependent variable. Moreover, both Standard error of the estimate (0.0289) and Sum of squared residuals (0.0025) are very low which show how well the regression works.

## 4. Conclusion and Recommendation

## 4.1. Conclusion

This paper has attempted to explore a relationship between foreign direct investment and domestic investment with economic growth (GDP) of Iraq. It has applied OLS regression, based on the data from Iraqi Central Bank for the period 2004-2020. The empirical results reveal that investment in general positively contribute and boost Iraqi economic growth. Precisely, foreign direct investment inflows due to its significant role in Iraq, as one of the developing countries, has shown the great impact on increasing gross domestic product. Meanwhile, national investments increased Iraqi GDP, but slightly less than the FDI influences.

## 4.2. Recommendation

Based on the revealed findings, the following points could be recommended to motivate and encourage both foreign and national investors to inflows their money and invest it in Iraq:

1.  Providing a secure and safe environment for foreign investors to persuade them invest in Iraq.

2.  Implementing less tax burden on foreign investors, which might motivate them more to select Iraq for their investment.

3.  Supporting national investors to stay and invest their money inside the country rather than investing abroad via providing more facilities, such as subsides, paying less tax especially when the business is launched.

4.  Providing a secure and trusted banking system to make money transactions easier.

## پوختە

لەم توێژینەوەیەدا تەکنیکەکانی زنجیرە کات بەکاردەهێنرێت بۆ شیکردنەوەی کاریگەری وەبەرهێنانی ڕاستەوخۆی بیانی و وەبەرهێنانی نیشتمانی لەسەر گەشەی ئابووری لە عێراقدا. لە توێژینەوەکەدا داتای لاوەکی ساڵانە لە ماوەی ٢٠٠٤-٢٠٢٠ بەکارهێنراوە. بەرهەمی ناوخۆیی گشتی (GDP) گۆڕاوی وابەستەیە و وە وەبەرهێنانی ڕاستەوخۆی بیانی (FDI) و وەبەرهێنانی نیشتمانی (NI) گۆڕاوە سەربەخۆکانن. شیکاری سەرەتایی (OLS) دەست پێدەکات. ئەنجامی تاقیکردنەوەی جێگیری زنجیرەکان کە لە تاقیکردنەوەی دیکی فۆڵەر (ADF) و فیلیپس پێرۆن (PP) پێکهاتوون نیشان دەدات کە زنجیرەکان لە ئاستی ئاسایدا جێگیر نین، بەڵام پاش وەرگرتنی جیاوازی یەکەم سەرجەم زنجیرەکان جێگیر دەبن. و هەروەها لەم توێژنوەیەدا تاقیکردنەوەی هاوبەشی یۆهانسن بەکارهێنراوە کە تێیدا دەرکەوتووە کە گۆڕاوەکان هاوبەشن و پەیوەندییەکی درێژخایەن لە نێوان گۆڕاوە وابەستە و سەربەخۆکاندا هەیە. لەکۆتایشدا ئەنجامەکان دەریدەخەن کە وەبەرهێنانی ڕاستەوخۆی بیانی کاریگەری بەرچاوی ئەرێنی لەسەر کۆی بەرهەمی ناوخۆیی بە نزیکەی ٠,١٠١٣ یەکە هەیە، هاوکات وەبەرهێنانی نیشتمانی کاریگەری ئەرێنی لەسەر بەرهەمی ناوخۆیی گشتی عێراق هەیە بە ٠,٠٥٥٥ یەکە.

## الملخص

يستخدم هذا البحث تقنيات السلاسل الزمنية لتحليل تأثير الاستثمار الأجنبي المباشر والاستثمار الوطني على النمو الاقتصادي في العراق. تستخدم الدراسة بيانات ثانوية سنوية خلال الفترة ٢٠٠٤-٢٠٢٠. الناتج المحلي الإجمالي (GDP) هو المتغير التابع، والاستثمار الأجنبي المباشر (FDI) والاستثمار القومي (NI) هما المتغيرات التفسيرية. يبدأ التحليل التجريبي بتشغيل المربعات الصغرى العادية (OLS). توضح نتيجة اختبار ديكي فولر المعزز (ADF) وفيليبس بيرون (PP) أن السلسلة غير ثابتة في شكل المستوى، ولكنها ثابتة في الاختلاف الأول. تستخدم الدراسة أيضًا اختبار جوهانسن للتكامل المشترك حيث تجد أن المتغيرات مدمجة معًا وأن هناك علاقة طويلة المدى بين المتغيرات التابعة والمستقلة. تظهر النتائج أن الاستثمار الأجنبي المباشر له تأثير إيجابي ذي دلالة إحصائية على الناتج المحلي الإجمالي بنحو ٠,١٠١٣، وفي ناحية اخرى، كان للاستثمار الوطني تأثير إيجابي على الناتج المحلي الإجمالي العراقي بنسبة ٠,٠٥٥٥.

## References

[1]     R. M. S. Yaqub, S. Ali, and I. Haq, "Impact of Foreign Direct Investment and Exports on Economic Growth of Pakistan," *Developing Country Studies*, vol. 6, no. 1, pp. 78–86, 2016, [Online]. Available: www.iiste.org

[2]     A. A. Khder Aga, "The Impact of Foreign Direct Investment on Economic Growth: A Case Study of Turkey 1980–2012," *Int J Econ Finance*, vol. 6, no. 7, pp. 71–84, Jun. 2014, doi: 10.5539/ijef.v6n7p71.

[3]     P. Nistor, "FDI and Economic Growth, the Case of Romania," *Procedia Economics and Finance*, vol. 15, pp. 577–582, 2014, doi: 10.1016/s2212-5671(14)00514-0.

[4]     L. R. de Mello, "Foreign direct investment-led growth: evidence from time series and panel data," *Oxf Econ Pap*, vol. 51, no. 1, pp. 133–151, Jan. 1999, doi: 10.1093/OEP/51.1.133.

[5]     V. Denisia, "Foreign Direct Investment Theories: An Overview of the Main FDI Theories," *European Journal of Interdisciplinary Studies*, no. 3, pp. 53–59, Apr. 2011, Accessed: Jul. 20, 2022. [Online]. Available: http://ssrn.com/abstract=1804514

[6]     M. J. Osei and J. Kim, "Foreign direct investment and economic growth: Is more financial development better?," *Econ Model*, vol. 93, pp. 154–161, Dec. 2020, doi: 10.1016/J.ECONMOD.2020.07.009.

[7]     C. Cicea and C. Marinescu, "Bibliometric analysis of foreign direct investment and economic growth relationship. A research agenda," *Journal of Business Economics and Management*, vol. 22, no. 2, pp. 445–466, Feb. 2021, doi: 10.3846/JBEM.2020.14018.

[8]     E. Borensztein *et al.*, "How does foreign direct investment affect economic 1 growth? We are grateful for comments from," *J Int Econ*, vol. 45, pp. 115–135, 1998.

[9]     H. Pham and M. Vu, "Investment Motives of MNES, FDI in Specific Sectors and Economic Growth," *https://doi.org/10.5465/AMBPP.2022.18273abstract*, vol. 2022, no. 1, Jul. 2022, doi: 10.5465/AMBPP.2022.18273ABSTRACT.

[10]     J. S. Mah and S. C. Yoon, "Determinants of FDI Flows into Indonesia and Singapore:," *http://dx.doi.org/10.1177/223386591001300104*, vol. 13, no. 1, pp. 63–73, Mar. 2010, doi: 10.1177/223386591001300104.

[11]     D. Rodrik, "Where Did All the Growth Go? External Shocks, Social Conflict, and Growth Collapses," *Journal of Economic Growth 1999 4:4*, vol. 4, no. 4, pp. 385–412, 1999, doi: 10.1023/A:1009863208706.

[12]     S. M. Abbes, B. Mostéfa, G. Seghir, and G. Y. Zakarya, "Causal Interactions between FDI, and Economic Growth: Evidence from Dynamic Panel Co-integration," *Procedia Economics and Finance*, vol. 23, pp. 276–290, 2015, doi: 10.1016/s2212-5671(15)00541-9.

[13]     H. Wai Mun, U. Tunku Abdul Rahman, T. Kai Lin, U. Tunku Abdul Rahman Bander Sungai Long, and M. Yee Kar Man, "FDI and Economic Growth Relationship: An Empirical Study on Malaysia," 2008. [Online]. Available: http://ssrn.com/abstract=1398282

[14]     O. Anyamele, "Infant and Child Mortality in Sub-saharan Africa View project Racial Ethnic Differences in Household Loan Delinquency Rate View project," 2010, Accessed: Jul. 20, 2022. [Online]. Available:

https://www.researchgate.net/publication/260226432

[15]     P. Flora and G. Agrawal, "A Co-integration and Causality Analysis of Highest FDI Recipient Asian Economies," *Journal of the Knowledge Economy 2013 6:4*, vol. 6, no. 4, pp. 1078–1089, Nov. 2013, doi: 10.1007/ S13132-013-0177-0.

[16]     H. Sala and P. Trivín, "Openness, Investment and Growth in Sub-Saharan Africa," *J Afr Econ*, vol. 23, no. 2, pp. 257–289, Mar. 2014, doi: 10.1093/JAE/EJT027.

[17]     N. Khang The and H. T. Nguyen, "The Impact of Investments on Economic Growth: Evidence from Vietnam," *The Journal of Asian Finance, Economics and Business*, vol. 8, no. 8, pp. 345–353, 2021, doi: 10.13106/ JAFEB.2021.VOL8.NO8.0345.

[18]     C. Chakraborty and P. Nunnenkamp, "Economic Reforms, FDI, and Economic Growth in India: A Sector Level Analysis," *World Dev*, vol. 36, no. 7, pp. 1192–1212, Jul. 2008, doi: 10.1016/J.WORLD-DEV.2007.06.014.

[19]     P. Pegkas, "The impact of FDI on economic growth in Eurozone countries," *The Journal of Economic Asymmetries*, vol. 12, no. 2, pp. 124–132, Nov. 2015, doi: 10.1016/J.JECA.2015.05.001.

[20]     A. Sirag, S. SidAhmed, and H. S. Ali, "Financial development, FDI and economic growth: evidence from Sudan," *Int J Soc Econ*, vol. 45, no. 8, pp. 1236–1249, Aug. 2018, doi: 10.1108/IJSE-10-2017-0476/FULL/ XML.

[21]     I. Arisoy, "THE IMPACT OF FOREIGN DIRECT INVESTMENT ON TOTAL FACTOR PRODUC-TIVITY AND ECONOMIC GROWTH IN TURKEY," *J Dev Areas*, vol. 46, no. 1, pp. 17–29, 2012, Accessed: Jul. 22, 2022. [Online]. Available: https://www.jstor.org/stable/23215420

[22]     K. Phetsavong and M. Ichihashi, "The Impact of Public and Private Investment on Economic Growth: Evidence from Developing Asian Countries".

[23]     S. Yuliana, A. Bashir, and S. Rohima, "The Effect of Investment Toward Economic Growth in The Local Economy," *jurnal ekonomi dan studi pembangunan*, vol. 11, no. 1, pp. 28–39, Mar. 2019, doi: 10.17977/ um002v11i12019p028.

[24]     D. Ghura, "Private Investment and Endogenous Growth: Evidence From Cameroon," *IMF Working Papers*, vol. 97, no. 165, p. 1, 1997, doi: 10.5089/9781451980004.001.

[25]     S. Hadi Ali and S. Abdulrahman Jameel, "The Impact of Foreign Direct Investment on Gross Domestic Product in Iraq During the Period (2006 - 2015)," *Academic Journal of Nawroz University*, vol. 10, no. 1, pp. 382–397, Apr. 2021, doi: 10.25007/AJNU.V10N1A1122.

[26]     J. Hussein and J. Benhin, "Public and Private Investment and Economic Development in Iraq (1970-2010)," *International Journal of Social Science and Humanity*, vol. 5, no. 9, pp. 743–751, 2015, doi: 10.7763/ ijssh.2015.v5.550.

[27]     Z. A. Asaad, H. M. Mustafa, and A. M. Saleem, "The Impact of FDI Inflows on GDP Growth in Iraq for the period (2004-2017): An applied study," *TANMIYAT AL-RAFIDAIN*, vol. 39, no. 128, pp. 56–86, Dec.

2020, doi: 10.33899/TANRA.2020.167369.

[28]    S. Abdulkhaleq and Z. Abdulqadir, "The Effect of Foreign Direct Investment on Economic Growth: Evidence from Iraq," *International Journal of Social Sciences & Educational Studies*, vol. 3, no. 4, pp. 89–97, 2017, doi: 10.23918/IJSSES.V3I3P89.

[29]    M. H. Pesaran, Y. Shin, and R. J. Smith, "Bounds testing approaches to the analysis of level relation-ships," *Journal of Applied Econometrics*, vol. 16, no. 3, pp. 289–326, May 2001, doi: 10.1002/JAE.616.

## Appendixes

### Variance Inflationary Factors

Variance Inflation Factors
Date: 07/24/22   Time: 14:27
Sample: 2004 2019
Included observations: 12

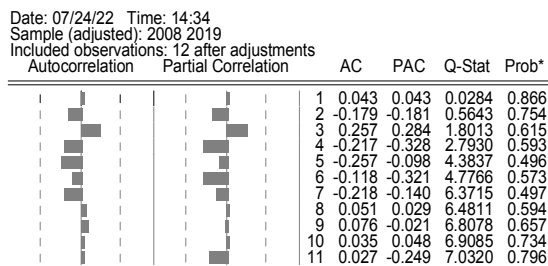| Variable | Coefficient Variance | Uncentered VIF | Centered VIF |
|---|---|---|---|
| LGDP(-1) | 0.003213 | 469811.8 | 29.25782 |
| LFDI(-1) | 0.000942 | 119376.4 | 34.12434 |
| LFDI(-2) | 0.000422 | 52610.76 | 6.292820 |
| LFDI(-3) | 0.000418 | 52721.41 | 13.85394 |
| LFDI(-4) | 0.000610 | 74343.72 | 12.44962 |
| LNI(-1) | 0.000290 | 40963.71 | 22.31541 |
| LNI(-2) | 0.000420 | 57763.91 | 28.76427 |
| LNI(-3) | 0.000281 | 38025.49 | 24.72107 |
| C | 1.358862 | 299200.2 | NA |

### Correlogram Q-statistic

Date: 07/24/22   Time: 14:34
Sample (adjusted): 2008 2019
Q-statistic probabilities adjusted for 1 dynamic regressor

| Autocorrelation | Partial Correlation | | AC | PAC | Q-Stat | Prob* |
|---|---|---|---|---|---|---|
| | | 1 | -0.538 | -0.538 | 4.4174 | 0.036 |
| | | 2 | -0.107 | -0.558 | 4.6100 | 0.100 |
| | | 3 | 0.214 | -0.359 | 5.4620 | 0.141 |
| | | 4 | 0.010 | -0.126 | 5.4640 | 0.243 |
| | | 5 | -0.043 | 0.128 | 5.5086 | 0.357 |
| | | 6 | -0.140 | -0.069 | 6.0540 | 0.417 |
| | | 7 | 0.165 | -0.095 | 6.9633 | 0.433 |
| | | 8 | -0.016 | -0.110 | 6.9739 | 0.539 |
| | | 9 | -0.046 | 0.011 | 7.0899 | 0.628 |
| | | 10 | -0.029 | -0.006 | 7.1601 | 0.710 |
| | | 11 | 0.030 | -0.083 | 7.3118 | 0.773 |

*Probabilities may not be valid for this equation specification.

## Correlogram squared residuals

Date: 07/24/22   Time: 14:34
Sample (adjusted): 2008 2019
Included observations: 12 after adjustments

| Autocorrelation | Partial Correlation | | AC | PAC | Q-Stat | Prob* |
|---|---|---|---|---|---|---|
| | | 1 | 0.043 | 0.043 | 0.0284 | 0.866 |
| | | 2 | -0.179 | -0.181 | 0.5643 | 0.754 |
| | | 3 | 0.257 | 0.284 | 1.8013 | 0.615 |
| | | 4 | -0.217 | -0.328 | 2.7930 | 0.593 |
| | | 5 | -0.257 | -0.098 | 4.3837 | 0.496 |
| | | 6 | -0.118 | -0.321 | 4.7766 | 0.573 |
| | | 7 | -0.218 | -0.140 | 6.3715 | 0.497 |
| | | 8 | 0.051 | 0.029 | 6.4811 | 0.594 |
| | | 9 | 0.076 | -0.021 | 6.8078 | 0.657 |
| | | 10 | 0.035 | 0.048 | 6.9085 | 0.734 |
| | | 11 | 0.027 | -0.249 | 7.0320 | 0.796 |

*Probabilities may not be valid for this equation specification.

## Normality
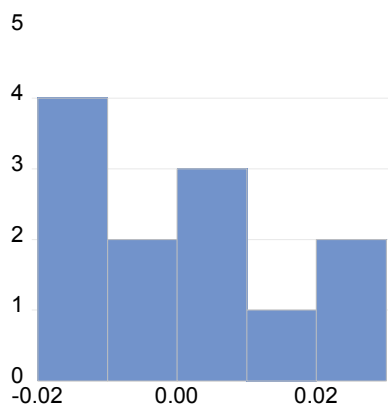


## Breusch-Godfrey serial correlation LM

Breusch-Godfrey Serial Correlation LM Test:
Null hypothesis: No serial correlation at up to 2 lags

| F-statistic | 0.515255 | Prob. F(2,9) | 0.6140 |
|---|---|---|---|
| Obs*R-squared | 1.541064 | Prob. Chi-Square(2) | 0.4628 |

Test Equation:
Dependent Variable: RESID

## Breusch-Pagan-Godfrey Heteroskedasticity

Date: 07/24/22   Time: 14:36
Sample: 2005 2019
Included observations: 15
No d.f. adjustment for standard errors & covariance
Presample missing value lagged residuals set to zero.

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| LGDP(-1) | 0.013241 | 0.104827 | 0.126316 | 0.9023 |
| LFDI(-1) | 0.001866 | 0.055105 | 0.033865 | 0.9737 |
| LNI(-1) | -0.007448 | 0.031668 | -0.235202 | 0.8193 |
| C | -0.199415 | 1.575861 | -0.126544 | 0.9021 |
| RESID(-1) | 0.323069 | 0.274167 | 1.178367 | 0.2689 |
| RESID(-2) | -0.204385 | 0.407690 | -0.501325 | 0.6282 |

| R-squared | 0.102738 | Mean dependent var | -1.06E-15 |
|---|---|---|---|
| Adjusted R-squared | -0.395742 | S.D. dependent var | 0.045385 |
| S.E. of regression | 0.053619 | Akaike info criterion | -2.724648 |
| Sum squared resid | 0.025875 | Schwarz criterion | -2.441428 |
| Log likelihood | 26.43486 | Hannan-Quinn criter. | -2.727665 |
| F-statistic | 0.206102 | Durbin-Watson stat | 1.761092 |
| Prob(F-statistic) | 0.951622 | | |

Heteroskedasticity Test: Breusch-Pagan-Godfrey
Null hypothesis: Homoskedasticity

| F-statistic | 0.074866 | Prob. F(3,11) | 0.9723 |
|---|---|---|---|
| Obs*R-squared | 0.300141 | Prob. Chi-Square(3) | 0.9600 |
| Scaled explained SS | 0.097691 | Prob. Chi-Square(3) | 0.9921 |

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 07/24/22   Time: 14:37
Sample: 2005 2019
Included observations: 15
Huber-White (HC0) heteroskedasticity consistent standard errors and
    covariance
No d.f. adjustment for standard errors & covariance

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | 0.020457 | 0.058440 | 0.350058 | 0.7329 |
| LGDP(-1) | -4.62E-05 | 0.002909 | -0.015892 | 0.9876 |
| LFDI(-1) | -0.001018 | 0.001690 | -0.602386 | 0.5591 |
| LNI(-1) | 0.000272 | 0.001404 | 0.193523 | 0.8501 |

| | | | |
|---|---|---|---|
| R-squared | 0.020009 | Mean dependent var | 0.001923 |
| Adjusted R-squared | -0.247261 | S.D. dependent var | 0.002189 |
| S.E. of regression | 0.002445 | Akaike info criterion | -8.966227 |
| Sum squared resid | 6.58E-05 | Schwarz criterion | -8.777414 |
| Log likelihood | 71.24670 | Hannan-Quinn criter. | -8.968238 |
| F-statistic | 0.074866 | Durbin-Watson stat | 2.032764 |
| Prob(F-statistic) | 0.972255 | | |

## Ramsey Test

Ramsey RESET Test
Equation: UNTITLED
Omitted Variables: Squares of fitted values
Specification: LGDP LGDP(-1) LFDI(-1) LFDI(-2) LNI(-1) C

| | Value | df | Probability |
|---|---|---|---|
| t-statistic | 1.741157 | 8 | 0.1198 |
| F-statistic | 3.031628 | (1, 8) | 0.1198 |
| Likelihood ratio | 4.498548 | 1 | 0.0339 |

F-test summary:

| | Sum of Sq. | df | Mean Squares |
|---|---|---|---|
| Test SSR | 0.005441 | 1 | 0.005441 |
| Restricted SSR | 0.019799 | 9 | 0.002200 |
| Unrestricted SSR | 0.014358 | 8 | 0.001795 |

LR test summary:

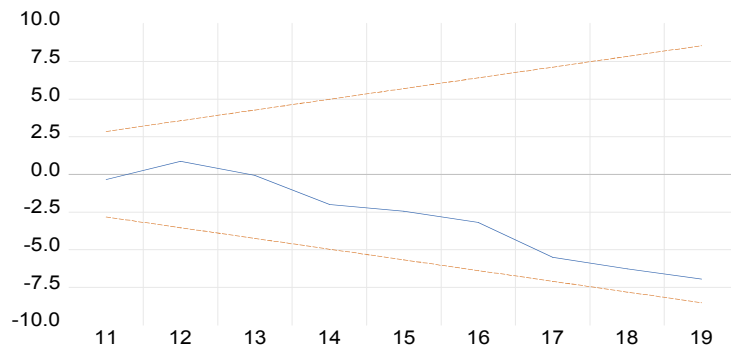| | Value |
|---|---|
| Restricted LogL | 26.06322 |
| Unrestricted LogL | 28.31249 |

Unrestricted Test Equation:
Dependent Variable: LGDP
Method: Least Squares
Date: 07/24/22   Time: 14:39
Sample: 2006 2019
Included observations: 14
Huber-White (HC0) heteroskedasticity consistent standard errors and
    covariance
No d.f. adjustment for standard errors & covariance

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| LGDP(-1) | 22.22388 | 9.047460 | 2.456367 | 0.0395 |
| LFDI(-1) | 1.441952 | 0.576846 | 2.499719 | 0.0370 |
| LFDI(-2) | -1.845562 | 0.739748 | -2.494853 | 0.0372 |
| LNI(-1) | 0.686375 | 0.284581 | 2.411879 | 0.0424 |
| C | -229.0637 | 98.52895 | -2.324836 | 0.0486 |
| FITTED^2 | -0.488727 | 0.207004 | -2.360956 | 0.0459 |

| | | | |
|---|---|---|---|
| R-squared | 0.985821 | Mean dependent var | 25.60187 |
| Adjusted R-squared | 0.976959 | S.D. dependent var | 0.279093 |
| S.E. of regression | 0.042364 | Akaike info criterion | -3.187499 |
| Sum squared resid | 0.014358 | Schwarz criterion | -3.913617 |
| Log likelihood | 28.31249 | Hannan-Quinn criter. | -3.212852 |
| F-statistic | 111.2429 | Durbin-Watson stat | 2.025434 |
| Prob(F-statistic) | 0.000000 | Wald F-statistic | 217.1299 |
| Prob(Wald F-statistic) | 0.000000 | | |

**CUSUM test**



**CUSUM Squared test**