Measuring and Analyzing the Impact of Public Debt on Investment in Iraq for the period (2004 -2019)

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Abstract

In the recent economic literature, there has been a great deal of discussion about the impact of public debt on investment. Many economists and other observers have viewed the public debt as harmful to the economy. The supposed harmful impacts include crowding out of investment due to raising interest rates. This paper re-examines the real impact of public debt on investment in Iraq. A time series analysis for the period between 2004 and 2019 has been used. It applies the ARCH model co-integration framework based on data from the central bank of Iraq, the World Bank, previous studies, etc. Based on the analysis as well as the results reached, it has been shown that there is a positive impact of public debt on total investment in Iraq, suggesting that reasonable levels of borrowing by a developing country are likely to enhance its economic growth and investment. This relation is different from other factors taken in this study, including inflation, GDP, and interest rates.

Introduction

Investment plays a vital role in the growth of the national economy. Countries depend on investment to reduce economic problems such as unemployment, poverty, etc. (Ojima and Emerenini, 2015). Furthermore, every country's economy necessitates a certain amount of capital for investment and long-term economic development.

Public borrowing, which usually occurs as a consequence of huge government expenses in comparison to its revenues, has generally been one of the most important methods of financing budget deficits in both developing and developed countries. Initially, it affects the allocation of resources in the economy and eventually generates an impact on macroeconomic activities like investment (Mabula and Mutasa, 2019). Nevertheless, there are many criticisms against the government's borrowing, as it may lead to a debt trap problem and thereby put the country's

development process in a stalemate situation unless borrowing is efficiently and productively used. For instance, if borrowed funds are used for long-term development programs, it will be advantageous for the country as higher returns reach the economy (Thilanka and Ranjith, 2018).

The global financial crisis (GFC) of 2007-2008 brought back to the fore the importance of using an expansionary fiscal policy to combat a recession, and the latter can be challenged only through investment. Borrowing can be used to overcome a recession, but the investment may be reduced. The balance between these two is a difficult task for decision-makers. On the one hand, an increase in public debt can be beneficial to the economy due to the strong correlation between public investment and the possibility of creating a crowding-in effect on private investment. On the other hand, when governments borrow money, interest rates increase. Accordingly, it crowds investors out of the market as borrowing costs increase (Adb, Furceri, and Topalova, 2016; Sánchez-Juárez and García-Almada, 2016 Cited in de Mendonça and Brito, 2021).

Iraq has achieved a number of positive economic developments over the past two decades despite the economic challenges, including the global decline in oil prices, the cost of the war on terrorist organizations, difficulties in enforcing the law, reconstruction, and returning the displaced people to their cities. The Iraqi government has succeeded in developing an efficient policy to control inflation and restructure its spending. A set of policies for standby arrangements with the International Monetary Fund and the signing of several international conventions have also been completed (Investment Map of Iraq, 2020–2021).

Iraq is characterized by having many factors, including natural and human resources that would attract capital and investments. Foreign investors have greater interests in countries with an abundance of their natural resources, which are waiting for extraction and growth, particularly highly marketable commodities like gas and oil (Hanna et al., 2014). According to the 2013 World Investment Report by the United Nations Conference on Trade and Development (UCTAD), within the developing countries, FDI inflow into Iraq has seen an upward trend, increasing by 22 percent in 2013 to $2.5 billion in comparison to 2012.

Despite of these all, several factors have contributed to fluctuating investment in Iraq during the last two decades or so. Decisions to invest are accompanied by a lack of trust in the government's capacity to provide a friendly environment in which encourages investors to pull their money into different sectors. Also, macroeconomic instability, including the government's performance, demotivates both foreign and domestic investors to enter into the market. One of the indicators investors might

look at it is the size of a budget deficit, and the accumulated debt accordingly. When the government enters into the money market to borrow, the interest rate increases; thus, investment decreases.

The problem this study mainly focuses on is this relationship, the relationship between public debt and investment in the last two decades or so. The study aims to answer a key question: Did the government debt crowd out investment in Iraq? Which type of investment was more influenced by government debt - foreign or Iraqi? By answering these questions, the study contributes to filling gaps in the existing literature and generating useful insights for public policy. Also, the study challenges the current literature by arguing that, for a specific period of time, the relationship is not one in the opposite direction in which borrowing by the government leads to crowding out investment. Accordingly, the study builds its argument based on the hypothesis that public debt has a positive effect on total investment in Iraq.

To achieve these objectives, and test the hypotheses, the study employs the ARCH model co-integration framework and uses time series data from various sources, including the central bank of Iraq, the World Bank, and previous research studies.

The rest of the paper is structured into six sections. Section 2 provides a theoretical view of public debt and investment. Section 3 includes relevant experimental research literature that has used different variables and models. Section 4 explains the climate investment in Iraq, presents and analyzes data on the Iraqi public debt and investment, and provides measurements that tell us how big the problem is. The methodology employed, the model specifications, the methods of data collection, the model (tests), and the discussion of results are provided in Section 5. Conclusions and policy implementations are presented in the last section.

1- Theoretical background: Theoretically, different schools of economists have different thoughts regarding the link between public debt and investment, and other factors affecting investment.

Since private investment nourishes in peaceful environments and well-established infrastructures where the government spends (public investments), possibly through public debt, there should be a correlation between public debt and private investment (Mabula and Mutasa, 2019). According to the crowding-out hypothesis of neo-classical economists, a higher budget deficit raises interest rates for government borrowing in the domestic financial market. Thus, the budget deficit crowds out non-state investment as the non-state sector will borrow smaller amounts at a higher interest rate while the interest rate is the price paid for using money (Ojima and Emerenini, 2015). Not surprisingly, the overall investment will decrease when

interest rates increase, which makes companies, put more resources into paying off the cost of investment (Muhammad et al. 2013). It is possible for the public debt to be used in a productive form (e.g., in the form of public investment), which in turn influences the private investment, but it could also be wasteful (Barro, 1979).

Nevertheless, the Ricardian Equivalence Theory argues that when the government borrows money, there is no crowding out of private investment. Instead, individuals will decrease the amounts they consume and intensify savings to cover the rise in the impending taxation charges in the future.

Keynesian economists claim that public investment through government expenditure increases private investment, resulting in a crowding-in effect through the multiplier effect (Thilanka and Ranjith, 2018). Reasonable levels of borrowing by a developing country are likely to enhance its economic growth. Countries at the early stages of development have small stocks of capital are likely to have investment opportunities with rates of return higher than those in advanced economies. As long as they use the borrowed funds for productive investment and do not suffer from macroeconomic instability, growth should increase and allow for timely debt repayments. These predictions hold up even in theories based on the more realistic assumption that countries may not be able to borrow freely because of the risk of debt repudiation (Pattillo et al., 2002).

Hence, it is apparent that the impact of state debt on the investments of a country is nonetheless ambiguous. For instance, Keynesians based on "the General Theory of Employment, Interest, and Money" believed that the absolute size of the debt does not constitute any burden upon society as a whole. However, post Keynesian theorists in the 1950s and 1960s like J.M. Buchanan and R.A. Musgrave reiterated that the real cost of government expenditure, which is financed through debt, implies postponed taxes to be paid in the future as taxes are compulsory and involuntary, hence a burden to future generations (Barro, 1974). It can be said that the interest rate increase might reduce the level of investment because it turns out to be extra expensive to have a loan of money. However, it is only one factor among others. Still, investors can make profits due to other factors. Also, it is of responsibility of the governments to provide infrastructure in many places of the world. Thus, despite of increasing borrowing, investment by governments might increase.

It is worth noting that the positive impacts of government borrowing are subject to using the borrowed money for productive sectors. When borrowed money is used to win elections, for example, the outcomes can vary. Also, if borrowing exceeds 90 percent of GDP, particularly in developing countries with weak economies, its disadvantages outweigh its advantages.

Turning to exchange rates, changes in them have two opposite effects on investment. Holding other things equal, exchange rate depreciation stimulates investment by enhancing demands in both the domestic and export markets, but it reduces investment due to increasing costs of imported intermediate goods (Harchaoui, 2005). In contrast, a positive shock to the exchange rate of the domestic currency (an unexpected appreciation) will make exports more expensive and imports less expensive. As a result, the competition from foreign markets will decrease the demand for domestic products, decreasing domestic output and prices.

According to Fischer (1993), the inflation rate can be used to gauge the government's competence in managing the economy, and high inflation can indicate that the government is struggling to maintain control. Evidently, there is little incentive to invest in a country where the government has lost control over the macroeconomic environment. Also, higher inflation rate causes interest rate to increase, lead to decrease investment.

Finally, when the GDP rises, the investment schedule shifts to the right due to the increase in demand for goods and services. This increase in demand leads to higher profits for companies, as both customers and governments are spending more. As a result, businesses reinvest these profits in order to continue increasing their profits in the future (Moneyfarm, 2020).

2- Literature Review: There is a large volume of empirical studies on the relationship between public debt and investment in different economies of the world. Some studies found a direct relationship between these macroeconomic variables while others found that they are inversely related. Whereas some studies found the relationship between public debt and investment to be significant, others discovered that one does not influence the other.

Chaudhry et al. (2009) investigate the impact of foreign debt on savings and investment in Pakistan using time series data for the period 1973–2006. According to the empirical results, there is partial evidence that foreign debt contributed favorably to investment expenditures and savings in Pakistan. Also, it concluded that the governance mechanism for the use and monitoring of funds generated through external borrowing needs much improvement because of its strong and significant impact on savings and investment.

Oke and Sulaiman (2012) conducted a study examining how Nigeria's foreign debt impacted investment and economic development between 1980 and 2008. The study found a positive relationship between external debt, economic growth, and investment, which was supported by a coefficient of determination (R2) of approximately 79.8%. However, private investment, which is a more tangible

measure of progress, has been declining despite the short-term growth benefits of the current external debt-to-GDP ratio. The debt overhang effect is likely to have negative consequences for GDP and the reserve-to-external-debt ratio, as the reserves that should be used to stabilize the local currency are being spent. Adamu's (2016) study, which used the autoregressive distributed lag (ARDL), bound testing approach to examine the impact of external debt and debt service on public capital investment in Nigeria from 1970 to 2013, found a negative impact on public capital investment but a positive impact on current real GDP. In the long term, insufficient domestic savings and investment lead to higher debt service payments and fewer resources for investment in social and economic sectors. Therefore, the study recommends that policymakers ensure that debt is used effectively for investment and that debt service payments do not exceed the country's capacity to pay. This inverse relationship in the Economic Community of the Great Lakes Countries (ECGLC) and its member states has also been found by Kasele et al. (2019).

Ogunjimi (2019) conducted a study between 1981 and 2016 to investigate the impact of state debt on various forms of investment in Nigeria in the short and long term. The autoregressive distributed lag (ARDL) framework was used. This study disaggregated public debt into domestic and external debt and tried to investigate the impact of public debt on various forms of investment such as public investment, private investment, and FDI in the short run and long run for the period between 1981 and 2016. The findings revealed that domestic debt attracts both private and public investment in the short and long terms but does not attract FDI. On the other hand, external debt attracts private investment but resists public investment in the short and long terms and does not influence FDI. According to Chukwu et al.'s study (2021), which also examines the effect of Nigeria's public debt on public investment from 1985–2018, the impact of public debt on public investment in Nigeria is not significant in the short run. The study recommends that the federal government practice fiscal responsibility by using borrowed funds for investments that will contribute to economic growth, among other suggestions.

Empirical evidence of the relationship between public debt/GDP ratio and investment based on panel data analysis considering 24 emerging markets from 1996 to 2018 has been shown by (de Mendonça and Brito, 2021). The effect of an increase in public debt on investment is investigated at three levels: aggregate, private sector, and public sector. It is concluded that the possibility of the global financial crisis of 2007–2008 (GFC) has changed the relationship between public debt and investment. The effect of a public debt/GDP ratio is higher than the prudential level of 60 percent on investment. The findings indicate that an increase in the public debt/GDP ratio has

a significant harmful effect on investment. In particular, they observe that after the GFC, the adverse effect of a higher public debt/GDP ratio on investment increased considerably. Moreover, their results show that the highest adverse effect of a rise in the public debt/GDP ratio is on public sector investment.

In 2015, Alshamsi and Azam conducted a study to analyze how inflation rate and GDP per capita influence the amount of foreign direct investment (FDI) entering the United Arab Emirates (UAE). They collected data from the World Bank and UNCTAD between 1980 and 2013, and used the auto regressive distributed lag (ARDL) model for their analysis. The study's results indicate that inflation does not have a significant impact on FDI inflows, while the use of GDP per capita as a proxy for market size has a noticeably positive effect on FDI inflows. Asab and Al-Tarawneh (2018) have pointed out that there is a non-linear connection between inflation and investment in Jordan. By employing a threshold model to examine the period from 1980 to 2016, the study discovered that when inflation rates rise above a certain threshold of 10%, it leads to a reduction in investment. As a result, to maintain and increase investment levels, it is crucial to keep inflation below 10%.

Turning to Iraq, a study by Hanna et al. (2014) concludes that the social and political unrest, corruption, and the low quality of state and economic institutions were contributing to preventing FDI to invest in different sectors apart from oil and gas following the fall of Saddam Hussein's regime. Also, lack of cooperation between the central government and the Kurdistan Regional Government (KRG) in applying economic policies has left its negative consequences on FI. They conclude that another reason for crowding out investors is a high rate of public debt to GDP as there is a fear of the government to be bankrupted.

Furthermore, the political instability, lack of transparency, and the inefficiency of the banking system has left their negative impacts on foreign investment in Iraq. In addition, a huge part of strong banks still belongs to the public sector while their ability to loan is limited which may not have benefited the private sector development strategy. Private sector banks are weak or risky, unable to provide sufficient loans unless for very specific sectors that are linked to the political elite and officials (Ali, 2018).

Naji et al. (2019) point out that the absence of financial funds for investment is the main factor in the retraction of investment in Iraq. From 2008 to 2017, 37 percent of these projects were suspended due to the absence of financial funds by the banks and the government (the absence of a financial bank, reduced subsidies and government expenditure on investment, and the financial crisis). The financial crisis has deteriorated the investment sector's performance. They argue that improving the

financial system, including stock and bond markets, allows offering funds and loans to buy goods and services. They interviewed 85 investors to understand causes of investment shrunk in Iraq. Among several factors, a weak financial institution in terms of providing easy loans was the main factor the investors determined as an obstacle in front of investment expansions. Moreover, austerity policies after the world financial crisis were selected as another profound factor for withdrawing investment activities.

Assad and Marran (2020) apply ordinary least squares to explain the influence of human development, the quality of the institutions, and ISIS (as a dummy variable) on investment. They found that foreign investment is mostly under the influence of the quality of institutions.

Tadlock (2004) shows that after the American-led invasion of Iraq in March 2003, foreign investment was ready to enter the country, but the unstable legal framework restricted foreign investment inflows.

These studies explain some causes of lowering investment levels. However, they lack focusing on the relationship of public debt and investment, particularly when other factors, such as exchange rate and inflation, are added to the equation.

3- Historical Review

In this section, two periods will be focused on: 1980–2003, and since 2004. This will help readers understand other parts of the gloomy story that surrounds investment in Iraq.

4.1 Investment Climate in Iraq during 1980-2003: A country's investment climate is determined by a set of economic, political, and social conditions that exist at a given time. The investment decision is determined by the investment climate and is affected by it to a large extent.

As far as the matter is concerned with Iraq, the investment decision in it has been subject for a long time to the fluctuations of its investment climate, which in its various aspects has not shown clear signs of stability. Despite decades of war and instability, Iraq's abundant natural resources, strategic geographic location, and cultural history endow it with tremendous potential for growth and diverse economic development (Hashm and Bkhayt, 2020).

The Iraqi economy experienced an important development in the 1970s; however, it dramatically declined during the Iraqi-Iranian war in the 1980s (Altaee and Saeed, 2019). The Gulf War between Iraq and Iran (1980–1988) inflicted substantial damage on the economy of Iraq, with the oil and manufacturing sectors taking the brunt of the damage. Oil and gas facilities, petrochemical plants, industrial complexes near major cities, ports, and power stations were the primary targets of the Iranian forces. One

result was that oil production dropped to less than 900,000 barrels per day (b/d) in 1981 from 3.2 million b/d prior to the initiation of the war in 1980. Oil revenues in 1981 decreased to less than 50 percent of the previous year, and GDP declined by 30 percent. The war also reduced the estimated foreign exchange reserve from about $35 billion in 1980 to less than $2 billion in 1981. Many development projects were either delayed or canceled, and external debt rose dramatically, reaching $65 billion by mid-1989. About 46 percent of this debt was incurred in the form of loans from neighboring Gulf states (Khalil and Mansour, 1989).

All energy capabilities and economic resources were directed to finance wars, and that was at the expense of all aspects of government spending, including domestic investment spending. Any investment activity outside the framework of the war and military effort was repulsive. There have also been wars and serious security consequences that have lasted to this day, with local and regional effects.

In 1990, the Iraqi invasion of Kuwait (the Second Gulf War) caused military strikes and economic sanctions by multinational forces against Iraq (Altaee and Saeed, 2019), opening the door wide to the United Nations Security Council resolution to impose economic sanctions on Iraq and tighten constraints on economic life. This matter certainly had negative repercussions on the performance of various economic variables, whose retreat became justified and contributed to the partial resumption of Iraqi oil exports in exchange for food and medicine under the "Oil for Food" program in September 1996 (Hashm and Bkhayt, 2020).

4.2 Investment Climate in Iraq Since 2004: US forces and its allies occupied Iraq in 2003, and this made things even worse though the oil embargo was lifted, and as a result, there has been a major development in GDP (Altaee and Saeed, 2019). The situation was not better than the previous years, and there was an intensification of conflicts among political parties, and personalities who rose to the political stage. Consequently, successive waves of violence appeared, including sectarian bombings and sporadic bombings that escalated in different parts of Iraq with obvious security instability. This was interspersed with political action programs with conflicting trends and interests and electoral processes that required recruitment energies, efforts, capital, and timelines to accomplish their requirements (Hashm and Bkhayt, 2020).

The matter has become more complicated by the entry of a terrorist organization known as ISIS onto Iraqi soil in 2014. Killing, torture, and forced displacement were on the agenda for several more years, spanning the 2017 and 2018 military years. All of these circumstances, by their nature and negative repercussions, were not suitable for softening the investment climate in Iraq. On the contrary, it made things worse

and connected investment strongly with the political factor which was not supportive of it at any stage in the Iraqi economy.

It shall be reminded that in terms of legal framework the government of Iraq could provide businesses and investors with the right tools to land the best opportunities in the country. For example:

*The One-Stop Shop at the National and Provincial Investment Commissions facilitates the processing of the investment license applications, issuing the license, allocating the land, and the like.

*The Investor Guide provides the necessary information to facilitate entry and exit procedures to Iraq, and exit from it alongside showing many benefits of the legal framework for investment in that country.

In partnership with the U.S. government, Iraq has attempted to create a business-friendly environment. For example, on February 16, 2013, the U.S. and Iraqi governments, with the help of private sector leaders, launched the second phase of the Iraqi Solutions for Administrative and Regulatory Reform (ISRAR). One of the attempts was to reduce the time needed to register a business from 74 days to 4 days (Invest in Iraq, https://www.iraqiembassy.us/page/invest-in-iraq).

The following table provides more information on trends of total investment, domestic investment, and foreign investment in Iraq from 2004 to 2019.

Year	Total Investment(TI) Million $	Domestic Investment(DI) Million $	Foreign Investment (FI) Million $	%growth TI	%growth DI	%growth FI	DI/TI %	FI/TI %
2004	1485.2	903.5	581.7				0.60	0.39
2005	1727.4	810.7	916.8	16.3	-10.3	57.6	0.47	0.53
2006	2246.0	1002.2	1243.8	30.0	23.6	35.7	0.45	0.55
2007	4683.0	3312.2	1370.8	108.5	230.5	10.2	0.70	0.29
2008	3759.9	2552.7	1207.2	-19.7	-22.9	-11.9	0.68	0.32
2009	3516.9	2367.56	1149.3	-6.5	-7.3	-4.8	0.67	0.33
2010	8461.9	7123.0	1338.9	140.6	200.9	16.5	0.84	0.16
2011	5722.8	4451.7	1271.2	-32.4	-37.5	-5.0	0.78	0.22
2012	5165.8	3935.7	1230.1	-9.7	-11.6	-3.2	0.76	0.24
2013	3633.7	2272.1	1361.6	-29.7	-42.3	10.7	0.63	0.37
2014	4833.9	3514.6	1319.3	33.0	54.7	-3.1	0.73	0.27
2015	11458.1	8232.4	3226.5	137.1	134.2	144.6	0.72	0.28
2016	10505.3	8318.4	2186.9	-8.3	1.0	-32.2	0.79	0.21
2017	13042.0	11003.1	2038.9	24.1	32.3	-6.8	0.84	0.16
2018	15017.1	11458	3559.1	15.1	4.1	74.6	0.76	0.24
2019	16294.0	10311.4	5982.6	8.5	-10.0	68.1	0.63	0.37
Total	111553	81568.46	29984.7					
Sources: Iraqi Central Bank available on: https:// www.cbi.iq								

Table 1: Different Measurements of Investment in Iraq (2004-2019)

The table shows the upward movement of total investment following the fall of Saddam Hussein's regime in 2003 in which a wave of rehabilitating the country's economy and infrastructure began. Since 2004, the growth of total investment has been positive, partially due to optimistic expectations and increasing oil prices. Consumers and producers were re-trusted the Iraqi dinar, too. Needless to say, living in starvation for almost 12 years during the embargo made people to have any reason to spend abnormally. These all stimulates total investment by enhancing demands in both the domestic and export markets, though importing consumer and intermediate goods and services was parallelly increased. As any other macro variable in Iraq, for example economic growth, upward movements of investment have shortly occurred. When the winds of the financial crisis blew in 2008, total investment growth slowed. In comparison, in 2010, it reached its highest level following an increase in oil prices and an improvement in political stability. This wave took not so long. Contrary to optimistic expectations, total investment eventually reduced as government expenditure decreased.

Changes in total investment are a reflection of changes in domestic and/or foreign investments. These two types of investments were not moving in the same direction throughout the last two decades. The growth of domestic investment has been fluctuating. From 2004 to 2005, the growth rate of domestic investment became negative before starting to move up to 2007. Almost every three years, investment slowed down.

Figure 1: Percentage Changes in Total Investment, Domestic Investment, and Foreign Investment in Iraq.

Figure 1: Percentage Changes in Total Investment, Domestic Investment, and Foreign Investment in Iraq.
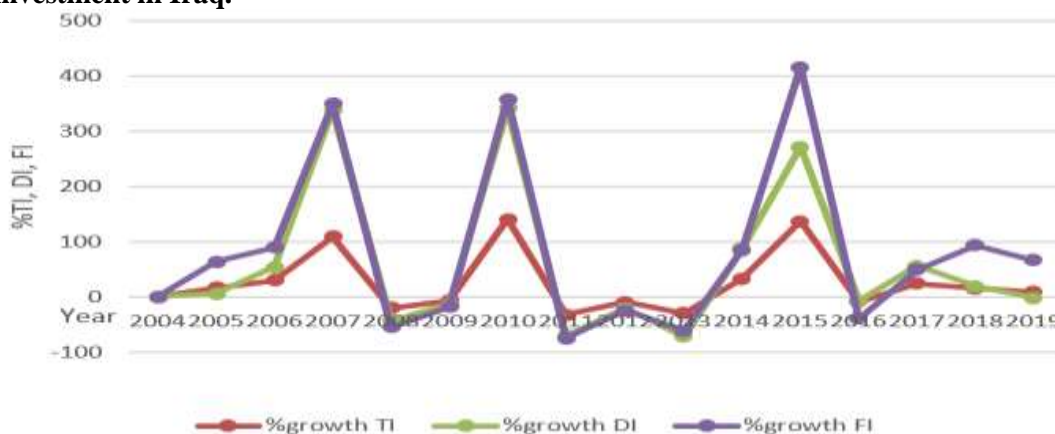
Sources: Made by authors based on table 1

Finally, foreign investment in Iraq continues as international players injecting billions of dollars into the country following legal framework improvements in 2006. Overall, as the table shows, foreign investment consists of a smaller fraction of total investment. In most of the years, it has not surpassed 20 percent on average. Both foreign and domestic investments were under the influence of several factors, most notably are the 2008 and 2014 recessions, ISIS attacks, and oil price shocks.

5. Methodology and Results

5.1 The Model: The data used in this study are semi-annual and span the years 2004 to 2019. The dependent variable is total investment (see the table above), while the independent variables are public debt, exchange rate, interest rate, inflation, GDP, export, import, and the dummy variables are political and economic instability (ISISFC). The secondary data was collected from the World Bank, the Central Bank of Iraq (CBI), and a study by Al-Yasiri and Kadhem (2021). Thus, the fundamental equation for this study can be shown as follows:

TI= f (PD, EXC, R, INF, GDP, X, M, and D1 (ISISFC)………………………………….. (1)

In the first equation, total investment (TI) is a function of public debt, exchange rate, interest rate, inflation, GDP, exports, imports, and ISISFC.

Some of these variables in the formula can be transferred into the logarithmic form, as mentioned before:

LTI = B0+ B1 LPD +B2EXC+ B3 R+ B4 INF +B5 LGDP +B6LX++B7LM+ B8 Dummy variable (ISISFC)+ Ut ………………. (2)

Where at time t, LTI, LPD, LGDP, LX, and LM are the natural logs of total investment, public debt, gross domestic product, exports, and imports, respectively, Ut represents the error term, B0 is the constant coefficient, which is the intercept of the equation, and B1, B2, B3, B4, B5, B6, B7, and B8 are the coefficients of these independent variables, representing the slope of the equation.

5.2Methodology: The Augmented Dickey-Fuller (ADF) and stationary methods are used to find the unit root test (Dickey and Fuller, 1979) and the Engel-Granger co-integration test are employed to estimate the possible long-run equilibrium relationship between these variables. At last, the Granger causality test is used to analyze the direction of the causal relationship between the variables (Granger, 1988). Results can be seen in the tables below.

5.3 The Results

5.3.1 Unit Root Test (Augmented Dickey-Fuller Test)

Table 2: Result of Stationary test for variables (TI, DI, FI, PD, ID, ED, GDP, EXC, R , INF, X and M)						
Augmented Dickey-Fuller (ADF) statistics test						
Variables	Level, first difference and second difference	ADF t-statistic	Critical value with the constant			
			%1	%5	%10	Prob.*
TI	Level	-0.388012	-3.661661	-2.960411	-2.619160	0.8994
	1st Difference	-5.726663	-3.67017	-2.963972	-2.621007	0.0000
PD	Level	-1.3254	-3.6793	-2.9677	-2.6229	0.6040
	1st Difference	-3.2971	-3.6793	-2.9677	-2.6229	0.0244
GDP	Level	-1.120368	-3.670170	-2.963972	-2.621007	0.6945
	1st Difference	-7.876392	-3.670170	-2.963972	-2.621007	0.0000
EXC	Level	-2.773374	-3.679322	-2.967767	-2.622989	0.0745
	1st Difference	-5.568656	-3.670170	-2.963972	-2.621007	0.0001
R	Level	-14.65310	-3.711457	-2.981038	-2.629906	0.0000
INF	Level	-5.064073	-3.769597	-3.004861	-2.642242	0.0005
Export	Level	-1.756563	-3.661661	-2.960411	-2.619160	0.3941
	1st Difference	-5.463128	-3.670170	-2.963972	-2.621007	0.0001
Import	Level	-1.521526	-3.661661	-2.960411	-2.619160	0.5097
	1st Difference	-5.430954	-3.670170	-2.963972	-2.621007	0.0001
Augmented Dickey-Fuller (ADF) statistics test						
Variables	Level, first difference and second difference	ADF t-statistic	Critical value with the constant and Trend			
			%1	%5	%10	Prob.*
TI	Level	-2.147203	-4.284580	-3.562882	-3.215267	0.5007
	1st Difference	-5.712623	-4.296729	-3.568379	-3.218382	0.0003
PD	Level	-2.1668	-4.3098	-3.5742	-3.2217	0.4892
	1st Difference	--6.2634	-4.2967	-3.5683	-3.218382	0.0001
GDP	Level	-1.946655	-4.309824	-3.574244	-3.221728	0.6047
	1st Difference	-7.911162	-4.296729	-3.568379	-3.218382	0.0000
EXC	Level	-1.329185	-4.284580	-3.562882	-3.215267	0.8614
Inflation	Level	-6.047856	-4.356068	-3.595026	-3.233456	0.0002
Export	Level	-1.885918	-4.284580	-3.562882	-3.215267	0.6376
	1st Difference	-5.441737	-4.296729	-3.568379	-3.218382	0.0006
Import	Level	-0.947325	-4.284580	-3.562882	-3.215267	0.9371
	1st Difference	-5.645633	-4.296729	-3.568379	-3.218382	0.0004
Source: Made by authors based on Eviews, 9						

The results show that these variables (interest rate and inflation with intercept, intercept and trend) are stationary at level in the ADF test, which means that they have the ability to reject the null hypothesis of unit root (H0 = unit root exists) because in absolute value their t statistic is greater than the critical DF value. Moreover, variables (total investment, public debt, exchange rate, GDP, exports, and imports) are non-stationary at levels in the ADF test, which means that they do not have the ability to reject the null hypothesis of unit root (H0 = unit root exists) because in absolute value their t statistic is smaller than the critical DF value. Thus,

at the 1%, 5%, and 10% levels of significance, taking the first difference for these variables become stationary with intercept, intercept and trend.

5.3.2 Correlation: The test of correlation has been done to show the relationship between these variables. Table 3 shows that LTI has a strong and negative correlation with LEXC and LINF. LTI and LGDP, on the other hand, had a strong positive correlation. Moreover, LPD and ISISFC had a weak and positive correlation with LTI. Furthermore, R, LX, and LM were moderately correlated with LTI with a positive sign.

Table 3: Correlation Result for Total Investment								
	LTI	**LPD**	**LEXC**	**R**	**LINF**	**LGDP**	**LX**	**LM**	**ISISFC**
LTI	1.000	0.415	-0.724	0.626	-0.856	0.871	0.659	0.657	0.407
LPD	0.415	1.000	0.091	0.004	-0.444	0.365	-0.080	0.067	0.273
LEXC	-0.724	0.091	1.000	-0.937	0.762	-0.761	-0.853	-0.842	-0.442
R	0.626	0.004	-0.937	1.000	-0.875	0.636	0.716	0.741	0.564
LINF	-0.856	-0.444	0.762	-0.875	1.000	-0.858	-0.705	-0.773	-0.54
LGDP	0.871	0.365	-0.761	0.636	-0.858	1.000	0.791	0.875	0.434
LX	0.659	-0.080	-0.853	0.716	-0.705	0.791	1.000	0.873	0.237
LM	0.657	0.067	-0.842	0.741	-0.773	0.875	0.873	1.000	0.376
ISISFC	0.407	0.273	-0.442	0.564	-0.54	0.434	0.237	0.376	1.000
Source: Made by authors based on Eviews, 9								

5.3.3 Co-integration: According to MacKinnon et al. (1999), the Engel-Granger co-integration test indicates that there are four co-integrating equations at the 0.05 level of significance required to reject the null hypothesis. Therefore, there is a long-run co-integration relationship among TI, PD, EXC, R, INF, GDP, X, and M.

Table 4: Engel - Granger Cointegration Test for Total Investment				
Dependent	**tau-statistic**	**Prob.***	**z-statistic**	**Prob.***
TI	-4.259152	0.4791	-36.78931	0.0125
PD	-5.089707	0.1938	-47.97075	0.0000
EXC	-4.793654	0.2782	-51.40850	0.0000
R	-2.800515	0.9534	-12.39993	0.9676
INF	-2.798422	0.9536	-12.90723	0.9595
GDP	-4.901998	0.2449	-48.79845	0.0000
X	-2.655978	0.9692	-12.87162	0.9601
M	-2.371332	0.9875	-33.11251	0.0279
Source: Made by authors based on Eviews, 9				

5.3.4 Granger causality test: According to Granger causality results in Table 5, there is a causal relationship, running with two lags between these variables. So there is a unidirectional relationship from LTI to LPD, ISISFC to LTI, LINF to LPD, LGDP to LPD, LX to LPD, LM to LPD, ISISFC to LPD, LEXC to R, LEXC to LM, LM to LGDP, and a bidirectional relationship from LPD to LEXC.

Table 5: Pairwise Granger Causality Tests for Total Investment, Lags: 2			
Sample: 2004S1 2019S2			
Null Hypothesis:	Obs	F-Statistic	Prob.
LTI does not Granger Cause LPD	30	7.92518	0.0022
ISISFC does not Granger Cause LTI	30	5.06136	0.0143
LEXC does not Granger Cause LPD	30	4.41559	0.0228
LPD does not Granger Cause LEXC		3.43999	0.0479
LINF does not Granger Cause LPD	30	3.84210	0.0351
LGDP does not Granger Cause LPD	30	10.4594	0.0005
LX does not Granger Cause LPD	30	2.66995	0.0889
LM does not Granger Cause LPD	30	3.60680	0.0420
ISISFC does not Granger Cause LPD	30	2.68173	0.0881
LEXC does not Granger Cause LM	30	8.94993	0.0012
LM does not Granger Cause LGDP	30	3.53800	0.0444
Source: Made by authors based on Eviews, 9			

5.3.5 Using (ARCH) Approaches for Estimation Coefficients: In the regressions, the ML ARCH-Student's t distribution (BFGS/MMarquardt steps) was used, which is a model commonly used by time series data. The main idea of the ARCH regressions is that using these models to estimate the coefficients. This section applies the macroeconomic view to total investment and public debt. Thus, based on Equation (1), we can investigate the study objectives, which are to identify the impact of public debt on total investment in Iraq by applying data from 2004 to 2019. The results are reported in Table 6.

Table 6: Estimation Coefficients for total investment in Iraq by applying ARCH				
Variable	Coefficient	Std. Error	z-Statistic	Prob.
LPD	0.388614	1.86E-05	20854.40	0.0000
R	-0.042816	0.000557	-76.80357	0.0000
EXC	-0.007648	1.40E-06	-5447.135	0.0000
INF	-0.022322	0.002021	-11.04388	0.0000
LGDP	2.334389	0.000337	6925.920	0.0000
LX	0.110696	0.001045	105.9354	0.0000
LM	-1.726668	0.000457	-3780.047	0.0000
ISISFC	-0.086759	0.095990	-0.903841	0.3661
(*), (**), (***) denotes Significance at 1%, 5% and 10% respectively				

Table 6 illustrates that the coefficient of public debt (LPD) is positive, which indicates a 1% increase in public debt would have resulted in an increase of 0.3886 % of Iraq's total investment during the period under study. This result further shows that p-value of public debt is significant and consequently lower than 5%. Reasonable levels of borrowing by a developing country are likely to enhance its economic growth and investment (Pattillo et al., 2002). Also, as being discussed in the theoretical and literature review, investment in a country such as Iraq is largely linked to the government. Thus, a reasonable level of borrowing by the government

has had positive impacts during (2004) and (2019). In contrast, the coefficient of interest rate (R) implies that a 1% increase in R would result in a decrease in Iraq's total investment of -0.0428%. This result is supported by Saeed's (2016) study in Iraq, where it was found that an increase in interest rates leads to lower investment. Taking the first and second variable, one can argue that the government's borrowing could increase the interest rates; however, the investment has still moved up as it was more influenced by the public expenditure. Moreover, the coefficient of exchange rate (EXC) shows that a 1% increase in the exchange rate would result in a decrease in total investment of -0.0076%. The negative sign is understandable: a revaluation of the Iraqi dinar stimulates investment by enhancing demands in both the domestic and export markets, but it also encourages imports of consumer goods at the expense of savings. One form of increasing consumption has been by spending abroad, such as travelling to Iran following the appreciation of dinar against Iranian rial. In addition, aside from the oil sector, other sectors are weak at exporting goods. Meanwhile, visitors would not visit the country due to political instability and weak infrastructure, causing demand on domestic products to be not so strong. It should be noted that the p-value of the exchange rate is significant and consequently lower than 5%.

As for inflation, the coefficient indicates that a 1% increase in inflation would result in a decrease in total investment of -0.0223%; this result further shows that the p-value of inflation is significant and consequently lower than 5%. Explanations for this result have been shown in the theoretical part. However, it is worth noting that inflation can be a bigger threat in Iraq than in most other developing countries. One reason for this is that the country has already seen hyperinflation, for example in the 1990s, which changed investors' trust in the value of domestic currency. Investors neither trust the government (e.g., the ministry of finance) nor the central bank. For instance, there is still controversy surrounding the exchange rate policy. Some political groups are requesting to alter the policy in favor of the Iraqi dinar once again. Others believe that the policy is unique for getting rid of public debt. The government has started to be worried about its accumulated budget deficit in recent years, leading to follow austerity policies and put pressure on investment through levying taxes or depreciation of IQD. In short, inflation has negatively affected investment.

On the other hand, a 1% increase in GDP would result in a 2.3343% increase in Iraq's total investment. This result is in line with the analysis provided in the previous research in Iraq by Saeed (2016). An increase in GDP increases income, which partially goes to savings and investment. Moreover, the coefficient of export is

0.1106, which shows that there is a positive and significant relationship between export and total investment. A 1% increase in imports, on the other hand, would result in a -1.7266% decrease in total investment. This is due mostly to increase consumption goods at the expense of capital goods. It should also be noted that the p-values of imports are significant as they are lower than 5%. Additionally, the coefficient of ISISFC is -0.1304, which shows a negative relationship between ISISFC and total investment in the case of Iraq, and the p-value of ISISFC is insignificant and consequently higher than 5%.

5.3.6 Using Diagnostic Checking for Accurate Estimation

Table 7 : Diagnostic Test		
Test statistic	Model1 (Total Investment)	Decision
Serial correlation/LM test*	Prob.F=0.13 > 0.05	good fit
Heteroscedasticity ** Breuscg-Pagan-Godfrey	Prob.F=0.1031> 0.05	good fit
Foundation form /ramsey test	Prob. F= 0.79> 0.05	good fit
Normality	Prob.J.B=0.51 > 0.05	good fit
VIF	Centered VIF<10	good fit
S.E. of regression	R2	Adjusted R-squared
0.22	0.93	0.91

The diagnostic statistics in Table 7 indicate that the equations were well specified. The model fulfilled the conditions of non-autocorrelated; homoskedasticity; the Breusch-Godfrey Serial Correlation LM test shows no evidence of residual serial correlation, while the Ramsey's RESET test shows no functional form of misspecification. Furthermore, the models pass the normality tests.

Table 7 also shows the importance of S.E. regression given its low minimal value. The R^2 indicates that the model is well fitted.

Also, for the stability test, the figure shows that the statistic plots of CUSUM and CUSUMSQ are within the critical range. Therefore, no evidence of any significant structural instability is observed. The model can be used for policy decision-making. The stability tests are presented as follows:

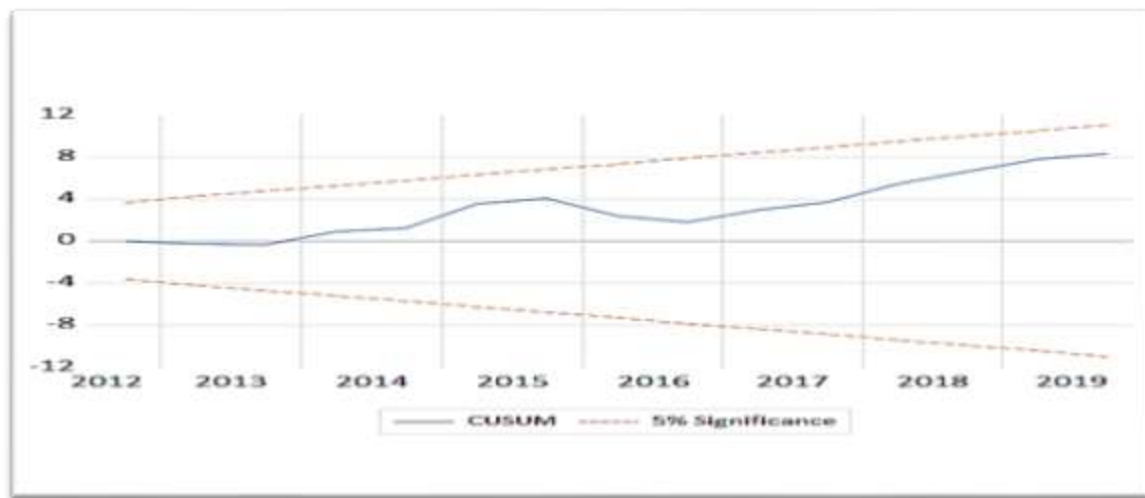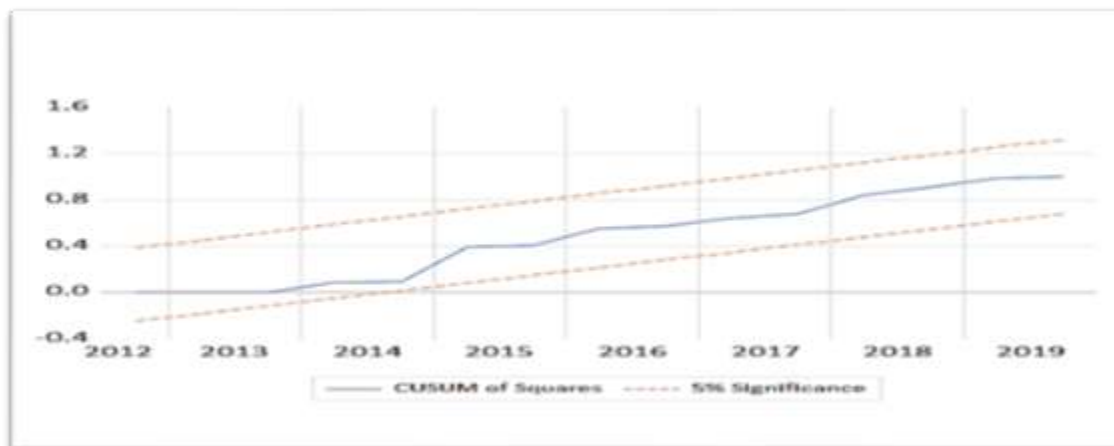**Figure2: Stability Test for Total Investment (CUSUM)**

Figure 3: Stability Test for Total Investment (CUSUMSQ)

6. Conclusions and Recommendations: Iraq, like many other developing regions, has excellent investment opportunities due to its free-market policies, investment law, and relative stability, as well as an abundance of natural resources. But these investment environments are not supported by modern incentives compatible with the new economic reality such as the Asian tigers.

It suffers from an increase in public debt due to wars and the economic blockade that was imposed on Iraq in the 1990s, besides the political and economic instability

recently. Thus, the present study has been motivated by the significant increase in the public debt of Iraq.

The ARCH approach was used to estimate the impact of public debt on total investment in Iraq from 2004 to 2019, which eight variables have been considered. Unlike many studies that found an opposite relationship between public debt and investment, this study found that just the opposite can be true: in some circumstances, public debt has a positive impact on investment as the case of Iraq demonstrates. During the period under study, government debt did not lead to a decline in overall investment as the government itself was a large investor. However, this does not mean that the accumulation of debt has not had a perilous impact on investment. It negatively affected investment through increasing interest rates. Also, debt heightening has had several unfavorable impacts on other macro variables, such as inflation.

If the government does not manage the debt, the relationship can change into the other direction: investors will be crowded out eventually. One reason for this is that getting rid of the debt makes the government to appreciate dinar further, causing aggregate demand to slow down. Consequently, there will be little opportunity for investors to produce goods and services.

The government shall boost the reputation of the central bank in order to make the monetary policy more effective on investment. Also, improving legal framework by implementing the rules and protecting the rights of investors through property rights are necessary steps to be taken if there is a tendency to encourage investors to invest in various sectors. This supports the government in preventing further accumulation of debt to boost investment in Iraq.

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Year	*Public Debt (PD)	*Internal Debt(ID)	*External Debt (ED)	ISISFC	**Inflation	**EXC	***GDP Million $	****X	****M	**R
2004	62810	4400	58410	0	27	1453.417	104188	17810	21302	-21
2005	40210	4490	35720	0	37	1472	114771.6	23697	23532	-30
2006	25900	3840	22060	0	53.2	1467.417	116352.7	29360.9	20892	-37.2
2007	29010	4130	24880	0	30.8	1254.567	125926.3	41267.9	21516	-10.8
2008	30510	3730	26780	0	2.7	1193.083	130181.8	61273.3	33000	14.05
2009	24130	7080	17050	0	2.8	1170	138516.7	41928.6	38437	11.63
2010	27400	9200	18200	0	2.4	1170	148969.8	52482.6	43915.3	3.85
2011	29100	10500	18600	0	5.6	1170	169730.9	83225.9	47802.9	0.4
2012	27800	9900	17900	0	6.1	1166.167	182630.5	94391.6	59006	-0.1
2013	28200	11200	17000	0	1.9	1166	183908.9	93065.6	65103.7	4.1
2014	32500	17300	15200	0	2.2	1166	192736.5	88111.9	59990.4	3.8
2015	43360	26640	16720	0	1.4	1167.333	213937.5	57577.1	58517.1	4.6
2016	52030	39210	12820	0	1.4	1182	212268.6	46829.5	44116	3.83
2017	66020	40620	25400	0	0.5	1184	212268.6	63604.3	48505.5	3.8
2018	62810	36620	26190	0	0.4	1182	210441.9	92830.8	56876	3.6
2019	57910	32420	25490	0	0.2	1183	219703.2	82309.4	46262.1	4.2

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* Al-yasiri, A.J. and Kadhem, Z. M. (2021). The Relationship Between Public Debt And Selected Economic Indicators Of Iraqi Economy: An Analytical Study. *Turkish Journal of Computer and Mathematics Education (TURCOMAT)*, 12(7), Public debt data was taken from pp.2475-2476.
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Appendix: