

The Macroeconomic and COVID-19 Effects on Economic Growth: Empirical Evidence from Some MENA Countries

آثار الاقتصاد الكلي وجائحة كوفيد-19 على النمو الاقتصادي: أدلة تجريبية من بعض بلدان الشرق الأوسط وشمال أفريقيا

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Abstract: The year 2020 marked a period of slow economic performance for the global economy as a result of COVID-19, which affects all countries around the world through high inflation, unemployment, income, taxation, and health-care systems. This paper seeks to analyze the influence of macroeconomic factors, including inflation and exchange rates, on economic growth and to present whether the COVID-19 crisis has an effect on the GDP of some MENA countries (Algeria, Bahrain, Morocco, Iran, Tunisia, and Saudi Arabia) during the period from 1990 to 2022. The findings demonstrated that inflation and COVID-19 negatively impact economic growth, but the exchange rate has no significant impact. This research offers valuable insights for policymakers aiming to enhance economic growth by focusing on macroeconomic variables. It is vital for them to take these practical findings into account when developing effective economic strategies for both the short and long term. Furthermore, understanding the impact of COVID-19 on the development policies of MENA countries is essential.

Keywords: Economic growth, Inflation, COVID-19, Panel Data, MENA Countries.

Résumé : L'année 2020 a marqué une période de faible performance économique pour l'économie mondiale en raison de la crise COVID-19, qui affecte tous les pays du monde en raison de l'inflation élevée, du chômage, des revenus, de la fiscalité et des systèmes de soins de santé. Ce document vise à analyser l'influence des facteurs macroéconomiques, notamment l'inflation et les taux de change, sur la croissance économique et à déterminer si la crise du COVID-19 a un effet sur le PIB de certains pays de la région MENA (Algérie, Bahreïn, Maroc, Iran, Tunisie et Arabie saoudite) au cours de la période allant de 1990 à 2022. Les résultats ont démontré que l'inflation et la crise COVID-19 ont un impact négatif sur la croissance économique, mais que le taux de change n'a pas d'impact significatif.

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Cette recherche offre des indications précieuses aux décideurs politiques qui cherchent à renforcer la croissance économique en se concentrant sur les variables macroéconomiques. Il est essentiel qu'ils tiennent compte de ces résultats pratiques lorsqu'ils élaborent des stratégies économiques efficaces à court et à long terme. En outre, il est essentiel de comprendre l'impact du COVID-19 sur les politiques de développement des pays de la région MENA.

Mots-clés : Croissance économique, Inflation, COVID-19, Données de panel, Pays MENA..

ملخص: شهد عام 2020 فترة من تباطؤ الأداء الاقتصادي للاقتصاد العالمي نتيجة لجائحة كوفيد-19 التي تؤثر على جميع دول العالم من خلال ارتفاع التضخم والبطالة والدخل والضرائب وأنظمة الرعاية الصحية. تسعى هذه الورقة البحثية إلى تحليل تأثير عوامل الاقتصاد الكلي، بما في ذلك التضخم وأسعار الصرف، على النمو الاقتصادي، وعرض ما إذا كان لأزمة كوفيد-19 تأثير على الناتج المحلي الإجمالي لبعض دول منطقة الشرق الأوسط وشمال أفريقيا (الجزائر والبحرين والمغرب وإيران وتونس والمملكة العربية السعودية) خلال الفترة من 1990 إلى 2022. وقد أظهرت النتائج أن التضخم وجائحة كوفيد-19 يؤثران سلبًا على النمو الاقتصادي، ولكن ليس لسعر الصرف أي تأثير كبير. يقدم هذا البحث رؤية قيمة لصانعي السياسات الذين يهدفون إلى تعزيز النمو الاقتصادي من خلال التركيز على متغيرات الاقتصاد الكلي. ومن الضروري أن يأخذوا هذه النتائج العملية في الحسبان عند وضع استراتيجيات اقتصادية فعالة على المديين القصير والطويل. علاوة على ذلك، من الضروري فهم تأثير جائحة كوفيد-19 على سياسات التنمية في بلدان الشرق الأوسط وشمال أفريقيا. الكلمات المفتاحية : النمو الاقتصادي، التضخم، كوفيد-19، بيانات اللوحة، بلدان الشرق الأوسط وشمال أفريقيا.

I- Introduction:

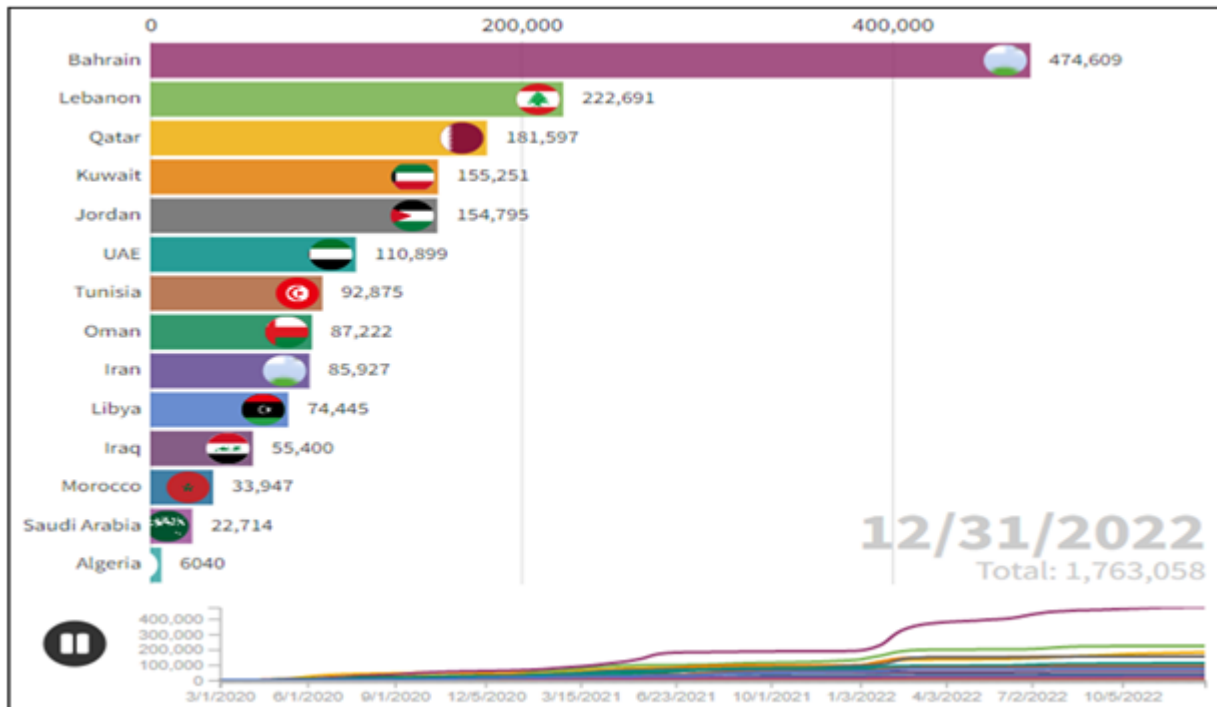
Economically, the Middle East and North Africa (MENA) is among the world's most impacted regions. They have witnessed a series of events in the last ten years, including the Arab Spring, which has resulted in a lack of political stability in the region, the collapse of oil prices, and the global coronavirus pandemic (Covid-19). The first Covid-19 was detected in the Chinese city of Wuhan in December 2019 (Hengbo, Li, & Ping, Since then, the virus has spread around the world, people have reduced their activity and mobility as governments imposed blocking measures, resulting in a slowdown in economic activity, and the process of manufacturing the companies was interrupted (Khamis & al, 2021, p. 4).

Consumption has decreased, the investment was interrupted in some situations, and imports and exports were tense. In many nations, the sides of demand and supply were severely damaged (Khamis & al, 2021, p. 13). ESCWA (2020) reports that, due to the pandemic, MENA countries are expected to have a loss of \$ 42 billion in gross internal products and an increase in unemployment rates by 1.2%, and could also lose more than 1.7 million jobs in 2020. 33% in Tunisia and 23% in Morocco among the surveyed vulnerabilities in the labor market (OECD, 2022). The initial outbreaks in the region were mainly centered on the Gulf area, highlighting their connections with the global economy and the travel bonds between Iran and the smallest states of the Gulf, which experienced an early increase in COVID-19 cases. Among these populations, Bahrain recorded the largest percentage of confirmed cases, followed by other smaller Gulf nations, such as Kuwait and Qatar. Over time, confirmed cases also increased significantly in Iran, Lebanon, Jordan, and Tunisia as public health restrictions were facilitated and test capabilities improved. Notably, the low rates of covid-19 infections confirmed in fragile states such as Iraq, Libya, Syria, and Yemen suggest a limited ability to monitor the disease. Similarly, low cases in Algeria and Egypt indicate

substantial underground infections, which can be attributed to insufficient testing and tracking efforts (Middle East Council on Global Affairs, 2023).

The graph below depicts the total confirmed COVID-19 cases in relation to the overall population of MENA countries from March 2020 to December 2022.

Figure1:Confirmed cases of COVID-19 in MENA countries (Per million of population)



Source: (Max, Hannah, Esteban, & Joe, 2023)

While most of the available literature focuses on the links between macroeconomic variables and GDP, this article contributes to the empirical review of the literature by analyzing the impact of macroeconomics and the COVID19 crisis on the economic growth of some MENA countries (Algeria, Bahrain, Morocco, Iran, Tunisia, Saudi Arabia) during the period 1990 to 2022. We chose inflation and exchange rate as macroeconomic variables for our study because of their importance in the country's economic growth in general and economic stability in particular, and because the impact of GDP inflation when it is sudden is quite harmful. (Khan, Cottani & Cavallo, 1990). Inflation creates uncertainty and destroys the economy when it is high, as well as making exports more expensive. The traditional view is that the exchange rate is positively related to economic growth. As the exchange rate rises, the volume of exports increases, and, as a result, economic development increases by increasing aggregate demand. However, structural economists argue that the exchange rate and GDP are inversely related. An increase in exchange rates makes imports more expensive, which negatively affects economic growth in developing countries where the structure of production, especially capital, is highly dependent on imported capital and intermediate goods (Karahana, 2020).

I.1.Literature Review:

The literature review consists of three parts, these are given below:

I.1.1.Inflation and Economic Growth: What's the Relationship?

The complex relationship between inflation and economic growth in Burundi was examined by (Ezako, 2023). Using an autoregressive distributed lag model, the author analysed data from 1990 to 2020 and found a significant negative short-run relationship between price increases and gross domestic product. According to Mansoor & Bibi (2019), inflation and real exchange rate have a low impact on Pakistan's economic growth in the short run. Using a panel structure, Dang & Binch (2018) analysed the impact of macroeconomic variables on economic growth in 68 developing countries between 1996 and 2016. They concluded that inflation, money supply and interest rates have a negative impact on economic growth in developing countries. Ivan & al (2017) examined the impact of macroeconomic variables on Serbia's real GDP between 2001 and 2015 and found that GDP and inflation have a positive association. Malik & Chowdhury (2001), examined the impact of inflation on GDP in four South Asian countries and found that inflation had a positive and statistically significant impact on economic growth. Ihsan & Anjum (2013), based on their analysis of the impact of money supply (M2) on economic growth in Pakistan during 2000-2011, found that the inflation rate has no significant impact on GDP, but the consumer price index and interest rate have a large impact on GDP.

I.1.2.Exchange Rate and Economic Growth: What's the Relationship?

(Karahan Ö., 2020) examined the relationship between exchange rate volatility and Turkey's economic growth from 2003 to 2019 using the ARDL model. The results revealed a negative effect of exchange rate volatility on economic growth, both in the short and long run. Ehikioya (2019) studied the effect of exchange rate volatility on Nigeria's GDP using GARCH and GMM techniques. The results revealed that inflation and economic growth are negatively correlated. In addition, exchange rate volatility adversely affects Nigeria's economic growth.

Vaz & Baer (2014) applied unbalanced panel data from 1995 to 2008 to a sample of 39 Latin American countries, and showed the negative impact of exchange rates on output. The depreciation of the currencies of Latin American countries increases the nominal cost of the production process, which in turn reduces economic growth. Anik & Biplob (2019), studied the relationship between some macroeconomic variables and the GDP of Bangladesh during the period from 1987 to 2017, the economic estimate showed the existence of a positive association from the real exchange rate for long-term GDP.

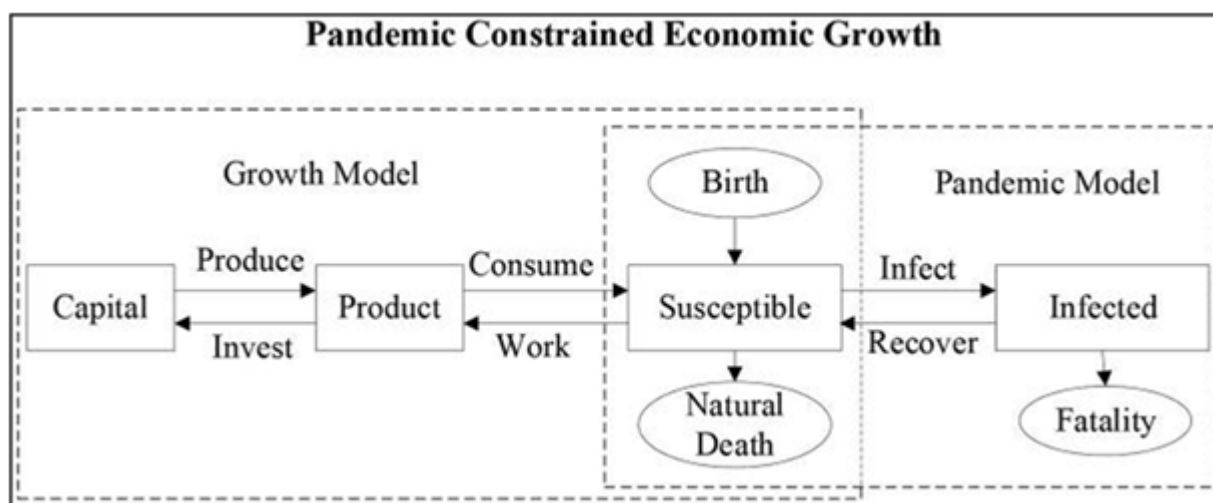
When Habib & al (2017) examined the influence of the real exchange rate on GDP in a panel of 150 countries in the post-Bretton Woods period, they found that a real devaluation increased annual real GDP. The results indicated that the depreciation would have a greater impact on the growth of developing countries. The relationship between the real exchange rate and economic growth was empirically tested by Missio & al (2015), using a broad sample of 63 developing countries from 1978

to 2007. The researchers found that maintaining the real exchange rate has a positive effect on GDP growth rates. Accordingly, currency depreciation may increase the elasticity of demand for exports, which in turn affects long-run growth. Barro (1999) studied the determinants of economic growth and found that exchange rate stability supports economic growth.

I.1.3. COVID-19 and Economic Growth: What's the Relationship?

(Lijin, Mingli, Zhichao, Mengmeng, & Shuang, 2021), Infectious Disease Models to Examine the Long-Term Effects of the Novel Coronavirus Pandemic on Labour Supply, Household Consumption, and Economic Growth.(Ghecham, 2022), Confirmed the detrimental effects of health issues (indicated by the number of COVID-19 deaths and infected individuals) on the economic growth of nations. The results show that the COVID-19 pandemic has a direct impact on labour supply and production, leading to a significant negative impact on economic growth.

Figure.2 Interdisciplinary theoretical model



Source: (Lijin, Mingli, Zhichao, Mengmeng, & Shuang, 2021)

The objective of the Inegbedian study (2021) was to find out how respondents felt about the impact of the COVID-19 pandemic on the Nigerian economy. The least squares test indicated that the blockage of economic activities as a result of the Nigerian economic growth of COVID-19, implying that the most COVID-19 induced restricts circular income flow, the greater GDP is restricted.

Among the studies investigating the economic impact of COVID-19 in the MENA region are Haouas & al (2021). They revealed that COVID-19 has a negative impact on the economy of the Mena countries, The empirical results showed that an increase of 1% in the total number of COVID-19 leads to a decrease of 1.48% in the GDP per capita in the Mena region in the Human Development Index (HDI) and the Stringency Index (SI), where a 1% increase in the number of COVID-19 cases reduces the HDI and SI by 0. 8% and 0.02% respectively (Zhang, Lu, & Zheng,

2020) showed that pandemics have unpredictable socio-economic and long-term consequences in low and middle income countries, with individuals or nations of lower socio-economic status facing greater challenges in these circumstances.

Maryla & al (2020) analysed the potential impact of COVID-19 on the economy and trade using a world standard computerized general equilibrium model. The shock was characterized as an under-utilisation of labour and capital, an increase in international trade prices, a decrease in transport services and a change in the demand for activities that require people to be close to each other. According to the results, both developing and developed countries experienced significant GDP losses. Losses were found to be about 4% lower than the global average. Pandemic closures appear to have hurt domestic services more, as well as highly negotiated tourism services. Lucas (2020) examined the "Impact of COVID-19 on Inclusive Economic Growth in Middle-Income Countries." The design was based on a literature review of studies on coronaviruses. According to his research, COVID-19 is expected to cause significantly more economic damage than any recent disease epidemic or economic crisis because its economic impact is broader and more severe than previous crises. Worse still, COVID-19 has caused significant disruptions in global value chains, which now account for more than two-thirds of global trade, with no end in sight.

II –Methods and Materials:

II.1.Data:

The authors of the study rely on annual data from six MENA countries (Algeria, Bahrain, Morocco, Iran, Tunisia, and Saudi Arabia) from the period 1990-2022 to examine the impact of some macroeconomic variables and COVID-19 on MENA countries' economic growth; the selection of the country is determined by the availability of the necessary data for the study. The data of GDP were obtained from the World Bank's World Development Indicators (WDI), the data of inflation and real effective exchange rate were obtained from the International Monetary Fund (IMF), where COVID-19 represents a dummy variable, which means that in the years 2019 and 2021, it takes the value of 1, and otherwise it is 0.

The model proposed below is based on the theoretical and empirical literature presented above:

$$GDP_{it} = \beta_0 + \beta_1 INF_{it} + \beta_2 REER_{it} + \beta_3 COVID19_{it} + \varepsilon_{it} \quad (1)$$

Where

GDP_{it} : Real gross domestic product growth rate (%) in a country i and the period t ;

INF_{it} : Inflation rates in a country i and the period t ;

$REER_{it}$: Real effective exchange rates in a country i and the period t ;

$COVID19_{it}$: COVID-19 in a country i and the period t ;

$\beta_0, \beta_1, \beta_2, \beta_3$: estimated coefficients;

ε_{it} : The value of the error terms in the country i and the period t ;

II.2. Methodology:

We chose panel data methodology for several reasons: first, it allows us to adjust for individual or time heterogeneity by combining inter-individual differences and intra-individual dynamics (Baltagi, 2008). Second, it usually has more information, more variability and less multicollinearity than cross-sectional data (Hsiao C. , 1985). Third, it allows econometric estimation to be more efficient (Hsiao, 2005). The following is the general form of a panel data regression model:

$$y_{it} = \beta_0 + \alpha_i + \beta_1 x_{1,it} + \beta_2 x_{2,it} + \dots + \beta_k x_{k,it} + \varepsilon_{it} \quad (2)$$

Where $i=1, \dots, n$ signify the countries; and $t=1, \dots, T$ present the time period; and α_i is a parameter that represents each cross section's specific effects, namely each country. ε collect the effects of any missing variables specific to the cross-section and time frame.

The above model's estimation is based on assumptions, and several models for panel data are developed based on these assumptions, such as "Pooled regression model (PRM)", "Fixed Effect Model (FEM)", and "Random Effect Model (REM)".

II.2.1. Pooled Regression Model (PRM):

The pooled model is identical to the standard regression equation. It considers each observation to be independent of the others, disregarding panels and time; no panel information is used (Seddiqi & Lawler, 2000). The pooled model is represented by the equation below:

$$y_{it} = \beta_0 + \beta_1 x_{1,it} + \beta_2 x_{2,it} + \dots + \beta_k x_{k,it} + \varepsilon_{it} \quad (3)$$

The assumption is that the individuals behave in the same way, with homoscedasticity and no autocorrelation; hence a pooled model is utilized. Then and only then can OLS be used to obtain accurate estimates from the model in equation (3) (T. Sheytanova, 2015).

II.2.2. Fixed Effect Model (FEM):

Fixed effects models are used to find out the causes of changes within a person (or entity) (Ulrich & Frauke, 2009). The FEM allocate intercept value to all its candidate entities for allowing heterogeneity, the fixed effect model written as follow:

$$y_{it} = \alpha_i + \beta_1 x_{1,it} + \beta_2 x_{2,it} + \dots + \beta_k x_{k,it} + \varepsilon_{it} \quad (4)$$

In the fixed effects model , there is no constant term.

II.2.3. Random Effect Model (REM):

The REM allows generalizing the inferences beyond the sample used in the model since random effects assume that the entity's error term is unrelated to the predictors. This allows time-invariant

variables to play a role as explanatory variables (Torres-Reyna, 2007).The following is how the random effect model is expressed:

$$y_{it} = \mu + \beta_1 x_{1,it} + \beta_2 x_{2,it} + \dots + \beta_k x_{k,it} + (\alpha_i - \mu) + \varepsilon_{it} \quad (5)$$

Where μ is the average individual effect. Let $\mu_{it} = (\alpha_i - \mu) + \varepsilon_{it}$ and (5) can be rewritten as:

$$y_{it} = \mu + \beta_1 x_{1,it} + \beta_2 x_{2,it} + \dots + \beta_k x_{k,it} + \mu_{it} \quad (6)$$

III- Results and discussion:

III.1.Estimation of the model by the use the three panel models

The table blow presents the estimation results of Pooled regression model and Fixed /Random effect model:

Table1. Estimating the model using the three panel models (PRM, FEM,REM)

Regressors	Pooled regression Model (PRM)	Fixed Effect Model (FEM)	Random Effect Model (REM)
INF	-0.0999691(0.001)***	-0.14597(0.001)***	-0.1049278(0.001)***
REER	-0.000099(0.992)	-0.0011787 (0.902)	-0.000269(0.977)
COVID19	-1.879146(0.072)*	-1.845149(0.077)*	-1.034888(0.070)*
Constant	4.397829(0.000)***	4.81328(0.000)***	4.118676
F-test	4.96	4.74	14.61
Prob>F-test	0.0025	0.0033	0.0022

Source:STATA.15 output

Note: *,**and *** indicates statistical significance at the 10%, 5%and1% level.

From the table above we see that the value of Prob F=0.0033 in the Fixed effect model is less than 5%, indicating that the model's coefficients are all different from zero, the random effect's prob f is also greater than 5%, indicating that the model is well fitted.

III.2.Selection among the three models of panel the suitable one:

To select the suitable model for our study among the three models of panel (PRM/FEM/REM), we apply the Hausman Test and the LM test.

III.2.1. The Hausman Test :

Basically, The Hausman test distinguishes between the Fixed Effect Model (FEM) and the Random Effect Model (REM), where the hypotheses of the Hausman test are (William, 2012):

H_0 :The appropriate model is Random Effects. There is no correlation between the error term and the independent variables in the panel Data model.

H_1 :Fixed Effects is the appropriate model. The correlation is statistically significant between the error term and the independent variables in the Panel Data model.

Table2.Hausman's Test Results

H_0 Test : Difference in the coefficients not systematic	
Chi2(3)=	1.78
Prob>chi2=	0.6187

Source:STATA.15 output

The results of the Hausman specification test indicate that the suitable model to use is the Random Effects as it yields a value of Prob chi2 = 0.6187, the null hypothesis of no correlation between individual country effects and explanatory variables is not rejected by this result.

III.2.2.Breusch-Pagan Lagrange Multiplier(LM) :

The LM test aids in determining whether a random effects regression or a simple OLS regression should be used. The null hypothesis of the LM test is that variances across entities are zero, implying that no significant difference exists between units (Torres-Reyna, 2007).

Table3.The LM Test Results

Breusch-Pagan Lagrange multiplier (LM)	
Chibar2(01)=	0.11
Prob>chibar2=	0.3704

Source:STATA.15 output

From the result of LM test we see that Prob Chibar2= 0.3704 >0.05; As a result, the null hypothesis is accepted, so the random effects model is not appropriate. Because no major discrepancies across countries have been identified. In this case the appropriate model is OLS regression (PRM).

III.2.3.The final results and discussion:

From the results of Hausmann test and LM test, the author of study confirmed that the appropriate model for this research among the three models of panel is the Pooled effect model (PRM).

Table4.The results of Pooled Effect Model

Regressors	Coef (Prob)	Std.Err	t	95% conf	Interval
INF	-0.0999691 (0.001)***	0.0298291	-3.335	-0.1588243	-0.0411138
REER	-0.000099 (0.992)	0.0094961	-0.01	-0.0188357	1.0186376
COVID19	-1.879146 (0.072)*	1.037878	-1.81	-3.926966	0.1686743
Constant	4.397829 (0.000)***	1.1	3.96	2.208261	6.587398

Source: STATA.15 output

Note: *,**and*** indicates statistical significance at the 10%,5% and 1% level.

The table above revealed that the inflation is statically significant and impact negatively on Economic growth, which means if inflation increase by 1% there is 0.0999691% decreases in the economic growth, this result aligns with the general position of the previous studies which argue that inflation does not support growth in developing countries ((Karahan O. , 2020),(Mansoor & Bibi, 2019), (Ehikioya, 2019), (Dang & Binch, 2018)), the table.6 showed also that the exchange rate has no impact on MENA countries economic growth during the period of 1990-2020.In the case of COVID-19, the results shows the existence of a significant but negative association occurs between COVID-19 and GDP in the MENA countries of study, which means if the COVID-19 rises by1% the economic growth will decrease by1.879146%in MENA countries, and this finding is symmetric with the results of ((Ghecham, 2022), (Lijin, Mingli, Zhichao, Mengmeng, & Shuang, 2021), (Inegbedion, 2021), (Lucas, 2020), (Maryla, Aaditya, & Dominique, 2020) (Haouas & al, 2021)).

IV- Conclusion:

In this paper, the author of the study used the panel data methodology to analyse the impact of macroeconomic variables including inflation, exchange rate on economic growth and to present whether the COVID-19 crisis affected the economic growth of some MENA countries (Algeria, Bahrain, Morocco, Iran, Tunisia, Saudi Arabia), by using annual data during the period from 1990 to 20022.

The results of the Hausmann and LM tests showed that, among the three panel models (pooled regression model, fixed effects model and random effects model), the pooled regression model is the most appropriate model to describe the purpose of the study. The estimated results show that inflation and COVID-19 have a negative impact on economic growth in MENA countries, while the

exchange rate has no significant impact on GDP. According to the findings of this study, policy makers should be aware of macroeconomic variables in order to boost economic growth. Moreover, it is crucial to understand the impact of COVID-19 on the development policies of MENA countries.

This study makes several notable and distinct contributions. First, it fills a gap in the academic literature on the specific economic dynamics of MENA countries in the context of global crises. Second, it confirms the negative relationship between inflation and GDP in the MENA context, contributing to the broader economic literature on the impact of inflation. Third, it provides concrete data on the impact of the COVID-19 pandemic on the MENA economies, contributing to the global understanding of the economic consequences of the pandemic. The finding of no significant impact on GDP exchange rates challenges some conventional economic theories and provides a different view of currency dynamics in MENA economies. Fourth, it suggests that policymakers in MENA countries may need to reconsider the effectiveness of exchange rate management as a tool for economic growth. Finally, this study provides information on how MENA economies interact with global economic trends, thus contributing to the debate on international economic integration.

The research provides valuable insights for policymakers, investors, and researchers focusing on MENA economies. First, this paper provides regionally relevant information for policymakers in MENA countries, allowing for more targeted and effective economic strategies. Second, the negative impact of inflation and COVID-19 on GDP suggests that MENA countries may face significant challenges in their economic recovery efforts. Policymakers will need to focus on controlling inflation and mitigating the lingering effects of the pandemic in order to stimulate economic growth. The findings also underscore the need for effective pandemic management. MENA countries may need to continue to invest in health infrastructure, vaccination programs, and economic support measures to minimize the long-term impact of COVID-19 on their economies. Third, the lack of a significant impact of exchange rates on GDP suggests that currency manipulation or exchange rate intervention may not be effective tools to stimulate economic growth in these countries. Instead, policymakers may need to focus on other areas to stimulate economic activity. In addition, countries may need to rely more on fiscal policies to stimulate economic growth, such as targeted government spending or tax incentives. Finally, MENA countries may need to develop more robust long-term economic plans that take into account potential inflationary pressures and global health crises to ensure sustainable growth.

The present study has some limitations. This article paves the way for further research, particularly in the investigation of the factors that contribute to the minimum influence of GDP exchange rates in the MENA region. In addition, many MENA countries have structurally distinct economies from those of other regions. An important example is their dependence on oil and gas exports. Researchers could examine how efforts to reduce this dependence on the Impact GDP on oil, inflation and exchange rates.

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