

# IMPACTS OF MONEY SUPPLY, GROSS DOMESTIC PRODUCT AND EXCHANGE RATES ON INFLATION IN CASE OF BAHRAIN AND KUWAIT: AN ECONOMETRIC ANALYSIS USING ARDL APPROACH

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## ABSTRACT

The present study has endeavored to analyze the impacts of money supply, gross domestic product and exchange rates in case of Bahrain and Kuwait. The study collected the data from the World Development Indicators for the fifty years from 1971 to 2021 for these two countries. To find the empirical results, the Auto Regressive Distributive Lag (ARDL) model has been incorporated. The results highlighted that the gross domestic product, broad money supply, and exchange rates have the strong statistical and significant relationships with the inflation in case of both the countries of the Gulf Cooperation Council (GCC). Policy recommendation is to keep these macroeconomic contents in consideration while inflationary targets are set.



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## INTRODUCTION

Purchasing power of the people is affected by the inflation. Inflation negatively affects the well-being of the people. The present study has tried to find the main components of inflation in the two countries of GCC that includes Bahrain and Kuwait. All the countries of the GCC region are highly dependent on the oil. Therefore, the prices of the oil affect these economies and especially when the oil prices decline. Moreover, the GCC countries also depend other sectors of the economy. As a result, there are many factors that are the main cause of inflation in this GCC region. In the recent years, the Saudi Arabia has suggested that all the countries of the GCC countries should diversify their sources of national income and this idea has been recorded as the Saudi Vision 2030. This proposal was proposed and presented by the Kingdom of Saudi Arabian Crown Prince, Mohammad bin Salman, and it was announced as KSA Vision 2030 in April 26, 2016. The process of finding the indicators or the components of the inflation is useful process for the policy makers in their endeavor to control the inflation rates through positive and negative changes occurring in these factors in Bahrain and Kuwait.

Many studies included in the literature review expose that if the inflation rates are controlled in these countries, it will be helpful in attracting the foreign investors to build the new corporations and businesses. In the recent years, it has been seen that these countries are facing many challenges such as the increasing trend in the

population rate and the lack of resources. This study has tried to investigate the main determinants of inflation in the Bahrain and Kuwait taking three variables such as the money supply, gross domestic product, and the exchange rate. The study took the data for the period from 1972 to 2021. The study has tried to answer the following questions:

1. What are the statistically significant and the positive determinants of inflation in Bahrain and Kuwait?
2. What are the statistically significant and the negative determinants of inflation in Bahrain and Kuwait?

The study has incorporated the econometric techniques such as autoregressive distributive lag model, and its short run as well as long run results. The econometric results have helped us to prove strong evidence of the relationships between the dependent variable (inflation) and the independent variables (that are money supply, gross domestic product, and exchange rate) in Bahrain and Kuwait.

## **LITERATURE REVIEW**

This section represents the literature reviews of the previous studies.

A-Mutairi et al. (2020) investigated the determinants of inflation in Kuwait. The study took the data for the years from 1979 to 2015 from the World Bank. The multiple linear regression was run in order to determine the relationships between inflation and the macroeconomic variables such as exchange rate, interest rate, current account, imports, taxation, GDP, unemployment and money supply. The study found that the rate of interest, foreign trade and money supply were positively associated with the CPI. However, current account balance and the tax revenue were negatively related with the consumer price index.

Mohaddes and Pesaran (2017) explored that what were the main determinants of inflation in the GCC countries and how there existed a huge difference between the inflation rates in all the countries of the GCC region. For this purpose, the pairwise technique was used in order to analyze these determinants that were bringing the differentials in the GCC region for the last 20 years. The study found that the oil price shock was the main influencer of the inflation differentials in the GCC economies. The study indicated that the fiscal and the well- coordinated monetary policies have increased convergence in the recent decade.

A sheikh and Rana (2021) elaborated that there were two main factors of inflation in the GCC countries;

money supply and the gross domestic product (GDP). The data were collected for all the countries of the GCC from two major sources; one is World Bank, and the second is region indicators lists. The study incorporated a simple linear regression method as well as the scattered plots. The study found that the money supply was the main and the major factor that was responsible for the inflation in all the GCC economies. The results of the study also found that gross domestic product was the main cause of increasing trend in the inflation rate specifically in the United Arab Emirates as compared to the other GCC countries.

Murshed and Nakibullah (2015) analyzed the prevailing inflation rates in the GCC countries. It was found that the recent pegging system of the exchange was responsible for inflation in these countries. The study took the data for the years from 1975 to 2011 from the Worlds Development Indicators. The study had shown that the exchange rate had significant influence on the inflation rate. It was also confirmed that the trading partners of this region were responsible for inflation in GCC region in the short and the long run. However, the domestic factors had influenced inflation rate a little in the long run in the GCC countries.

Alharthi (2019) tried to investigate the main determinants if inflation in the GCC economies. The study gathered the panel data for the year from 1996 to 2016 from the World Development Indicators and the International Monetary database. It was observed that the inflation is the main problem of the GCC countries and it was due to the value added tax in the year 2018. Therefore, the government of this region favored the development of the manufacturing sector more than the imports. The results of the generalized method of moments and the generalized least squares showed that the gross domestic product had a negative relationship with the inflation and corruption was the main cause of inflation in the GCC region.

Nasir et al. (2019) investigated the importance of oil price shock in the GCC countries. The study took the data for the year from 1980 to 2016 by incorporating the econometric techniques such as structural vector auto regression. The study endeavored to improve that the oil shocks have significant impact on the macroeconomic variables such as inflation, gross domestic product and the trade balance. The study suggested that the economies of the GCC region were in the need to decrease their dependence on the revenues coming from the oil resources.

Kandil and Morsy (2011) explored the determinants of inflation in the GCC countries. It was found that the inflation had accelerated in the GCC region. The study found inflation as the major foreign factor in the major countries. The study showed that the credit growth and the aggregate spending were the major cause of inflation in the GCC countries. Moreover, the government spending was also responsible for the higher level of inflation rates. The study suggested that the government spending on the capital may help to mitigate the inflationary pressures.

Basher and Elsamadisy (2012) investigated the long run determinants of inflation in the Gulf Arab states. The study collected the data from 1980 to 2008 for the GCC countries. The study applied the panel data methods based on the non-stationarity. The study found that the money and the aggregate demand were highly correlated. Therefore, the study found that the money supply was the main determinant of inflation in the GCC region. The study suggested to make the monetary policies to combat inflation in the GCC countries.

Researches on the inflation determinants highlight the multifaceted interplay between the macroeconomic factors. Oil prices have been found to meaningfully influence inflation in various countries, counting Indonesia (Syaharuddin et al., 2021) and Azerbaijan (Mukhtarov et al., 2019). Exchange rates also show a vital role, with studies in Ghana (Oppong et al., 2015) and Nigeria (Abonazel et al., 2021) demonstrating the impact on inflation rates. GDP and money growth have also been identified as additional determinants in some contexts (Abonazel et al., 2021). The connection between these factors is repeatedly long-term, as showed by cointegration analyses (Mukhtarov et al., 2019; Abonazel et al., 2021). Interestingly, political factors like electioneering spillover effects have also been found to impact inflation in firm cases (Oppong et al., 2015). These researches emphasize the significance of considering multiple variables when analyzing the dynamics of inflation, as the macroeconomic determinants can vary across diverse economic contexts.

## DATA AND METHODOLOGY

### Data

The present paper has conducted the analysis on two countries of the GCC countries such as Bahrain and Kuwait. The annual time series is collected for the

period from 1971 to 2021 for both countries separately. The sources of the data are world development indicators. All the variables are also shown in the table which shows their units and measurements and the sources.

Table 1: Variable and their Description

Variables	Notation	Detail	Source
Inflation Rate	INF	Inflation, consumer prices (annual %)	WDI
Gross Domestic Product	GDP	Gross domestic product growth (annual %)	WDI
Exchange Rate	ER	Official exchange rate (LCU per US\$, period average)	WDI
Money Supply	BM	Broad money (% of GDP)	WDI

### Methodology

The autoregressive distributive lag model has been used in order to estimate the short run and the long run results of inflation, money, supply, exchange rate and the gross domestic product. The ARDL equation can be represented in the following manner for Bahrain and Kuwait as the notations for all the variables are same;

$$\Delta \ln INF_j = \beta_0 + \beta_1 \sum_{N=1}^M \Delta \ln INF_{j-1} + \beta_2 \sum_{N=1}^M \Delta \ln GDP_{j-1} + \beta_3 \sum_{N=1}^M \Delta \ln ER_{j-1} + \beta_4 \sum_{N=1}^M \Delta \ln BM_{j-1} + \beta_5 \ln INF_{j-1} + \beta_6 \ln GDP_{j-1} + \beta_7 \ln ER_{j-1} + \beta_8 \ln BM_{j-1} + \varepsilon_j \quad \text{Eq. 1}$$

The long run association is expressed by the second part of the equation. Further, the ARDL bound test approach is applied to confirm that whether the long run association exists or not. After confirming the existence of the long run association, the next step is to calculate the long run association. Therefore, the estimated model is written in the following manner;

$$\Delta \ln INF_j = \alpha_0 + \alpha_1 \sum_{N=1}^M \Delta \ln INF_{j-1} + \alpha_2 \sum_{N=1}^M \Delta \ln GDP_{j-1} + \alpha_3 \sum_{N=1}^M \Delta \ln ER_{j-1} + \alpha_4 \sum_{N=1}^M \Delta \ln BM_{j-1} + \mu_j \quad \text{Eq. 2}$$

The short run model is shown in the following equation;

$$\Delta \ln INF_j = \lambda_0 + \lambda_1 \sum_{N=1}^M \Delta \ln INF_{j-1} + \lambda_2 \sum_{N=1}^M \Delta \ln GDP_{j-1} + \lambda_3 \sum_{N=1}^M \Delta \ln ER_{j-1} + \lambda_4 \sum_{N=1}^M \Delta \ln BM_{j-1} + \varphi ECT_{j-1} + \mu_j \quad \text{Eq. 3}$$

## RESULTS AND DISCUSSION

The statistical and the econometrics results of all the models are presented in this section.

### Descriptive Statistics for Bahrain

Table 2: Bahrain Descriptive Statistics

	INF	GDP	ER	BM
Mean	1.617754	65.66169	0.376028	67.63558
Median	1.721126	52.50505	0.376000	67.3662
Maximum	11.3446	113.4793	0.377000	86.02026
Minimum	-2.63597	40.39823	0.376000	32.31347
Std. Dev.	2.743858	25.4814	0.000167	10.40781
Skewness	1.489519	0.823281	5.747049	-0.96477
Kurtosis	6.61007	2.036138	34.02857	5.066779
Jarque-Bera	32.86091	5.460294	1642.330	11.99203
Probability	0.000000	0.06521	0.00000	0.002489
Sum	58.23915	2363.821	13.5370	2434.881
Sum Sq. Dev.	263.5065	22725.57	9.73E-07	3791.286
Observations	36	36	36	36

Table 2 describes the descriptive statistics for the Bahrain. It is reported that the mean value, median,

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maximum and minimum values for inflation are 1.617, 1.7211, 11.34, and -2.63 respectively. The same values are also recorded for the other variables such as in case of gross domestic product, the average mean value is 65.66, the median value is 52.50, the maximum is 113.47 and the minimum value is 40.398. In the same fashion, the average mean value, maximum, minimum and the median values for the broad money supply are 67.63, 86.020, 32.31 and 67.36 are reported. The standard deviations for all the four variables such as inflation rate, gross domestic product, exchange rates, and broad money supply are 2.74, 25.48, 0.16 and 10.40 respectively.

## Descriptive Statistics for Kuwait

Table 3: Kuwait Descriptive Statistics

	INF	GDP	ER	BM
Mean	2.657388	76.89382	0.295317	81.19707
Median	2.682297	81.22332	0.298448	82.72237
Maximum	10.58271	126.2857	0.306752	120.6437
Minimum	-0.54547	38.45468	0.268828	54.02392
Std. Dev.	2.162049	29.06152	0.010152	17.21062
Skewness	1.621236	0.181157	-0.89159	0.192676
Kurtosis	7.28565	1.630194	2.903688	2.392376
Jarque-Bera	34.89717	2.425899	3.853389	0.625558
Probability	0.000000	0.297319	0.145629	0.731412

Table 3 is showing the descriptive statistics for the Kuwait. It can be seen in the table that the mean average value of the inflation is 2.6573 points, whereas the median value is 2.6822. The maximum and the minimum values of inflation are 10.5827 and -0.5454. The second variable for Kuwait is shown in the third column. The average value of the gross domestic product is 76.89. The median value is 81.223. Moreover, the maximum and minimum values of the gross domestic product are reported as 126.28 and 38.45 respectively. The mean, median, maximum, and minimum values for the exchange rates are also reported and they are 0.2953, 0.2984, 0.3067, and 0.2688 respectively. The last variable is broad money supply in case of Kuwait. The same average mean, median, maximum and minimum values are calculated for Kuwait and it is reported that they are 81.97, 89.72, 120.64, and 54.02 respectively. Moreover, the standard deviation is also calculated for inflation as 2.16, for gross domestic product as 29.06, for exchange rates as 0.10 and for broad money supply as 17.21.

## Correlation Analysis for the Bahrain

Table 4: Bahrain Correlative Analysis

	INF	GDP	ER	BM
INF	1			
GDP	0.191256	1		
ER	0.140692	-0.16994	1	
BM	-0.47422	0.346214	-0.3155	1

Table 4 shows the correlation among the inflation rate, exchange rate, gross domestic product, and the broad money supply in case of Bahrain. The table 2

shows that the degree of association between the gross domestic product, and the inflation is 0.1912. Moreover, the degree of association between the exchange rate and gross domestic product is 0.1699. It shows the negative association between the exchange rate and the gross domestic product. The degree of association between the exchange rate and inflation is 0.1406 and it is showing the positive association between them. Lastly, the degree of association of broad money supply with inflation, GDP and exchange rate are -0.474, 0.34, and -0.315 respectively. It shows that the degree of association between broad money supply and exchange rate; broad money supply and inflation is negative.

## Correlation Analysis for Kuwait

Table 5: Kuwait Correlative

	INF	GDP	ER	BM
INF	1			
GDP	0.475863	1		
ER	-0.72983	-0.63679	1	
BM	-0.49921	-0.30391	0.669772	1

The correlation table in case of Kuwait has also been calculated. It shows that the degree of association between inflation and gross domestic product is positive and its value is 0.4758. The correlation value between the inflation and the exchange rate has been calculated as -0.7298 which is showing the negative relationship. The negative association with the correlation value -0.499 is reported of inflation and broad money supply. The degree of association between the gross domestic product and exchange rates is -0.6367 which is showing the negative association. Similarly, the correlation between the gross domestic product and the broad money supply is -0.3039 which is also showing the negative association. In the end, the degree of correlation between the exchange rate and broad money supply is reported as 0.6697 with the positive relationship between them.

## The Unit Root Tests for Bahrain and Kuwait

Table 6: Unit Root

Bahrain				
Name of Variables	ADF		PP	
	At Level	At First Difference	At Level	At First Difference
INF	-2.1712 0.2191	-7.1943 0.0000	-2.1780 0.2166	-10.0911 0.0000
GDP	-0.1805 0.9329	-5.7345 0.0000	-5.1208 0.0001	-
ER	-3.0140 0.1412	-6.4989 0.0000	-10.4048 0.0000	-
BM	-3.1062 0.0352	-	-3.1062 0.0352	-
Kuwait				
Name of Variables	ADF		PP	
	At Level	At First Difference	At Level	At First Difference
INF	-4.0837 0.0024	-	-3.3449 0.0182	-
GDP	-1.2178 0.6522	-3.9407 0.056	-1.2174 0.6524	-3.7868 0.0081
ER	-3.9513 0.0035	-	-4.1100 0.0022	-
BM	-4.8223 0.0003	-	-4.6163 0.0005	-

**The Bounds Test for Bahrain****Table 7: Bahrain Bound Test**

F-Statistics	k	Range	Critical Values	
			I(0) bound	I(1) bound
12.27139	6	10%	2.37	3.2
		5%	2.79	3.67
		2.5%	3.15	4.08
		1%	3.65	4.66

The bound test method has been applied in order to check that whether the long run association exists among the variables of the study. The table 6 shows that the F-statistic is 12.2714 and the upper and the lower bounds values at 1% are 3.15 and 4.43 respectively. The study confirms the existence of long run association among all the variables of the study.

**Auto Regressive Distributive Lag Model in Case of Bahrain****Table 8: Bahrain ARDL**

Long Run				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
INF(-1)	0.36022	0.110673	3.25482	0.0028
GDP	0.03257	0.011126	2.927368	0.0065
ER	4.92844	8.20682	6.0053	0.0000
ER(-1)	9.076942	14.56247	6.233105	0.0000
BM	0.07685	0.031474	2.44157	0.0207
C	15121.8	2549.526	5.931219	0.0000
Short Run				
D(ER)	49284.4	5835.37	-8.44581	0.0000
CointEq(-1)*	-0.63978	0.076722	-8.33894	0.0000

Table 8 reports the results of auto regressive distributive lag model in the long run and the short run. The dependent variable is the inflation rate. The table shows that the one percent change in the gross domestic product will increase the inflation rate by 0.323% as the association between the inflation and the gross domestic product is positive. The coefficient value for the exchange rate is 4.9284 which shows that the one percent positive change in the exchange rate will increase the inflation rate by 4.92%. Moreover, the statistical value for the broad money supply is 0.7685 which is showing that the one percent change in the broad money supply will increase the inflation by 0.768%.

**The Bounds Test Approach for Kuwait****Table 9: Kuwait Bound Test**

F-Statistics	k	Range	Critical Values	
			I(0) bound	I(1) bound
5.898554	4	10%	2.2	3.09
		5%	2.56	3.49
		2.5%	2.88	3.87
		1%	3.29	4.37

Bound test estimation results for Kuwait have also been calculated which show that the F-statistic is 5.8985 while the lower bound and the upper bound

values at 10% and 1% are 2.2, 3.09, and 3.29 and 4.37 which confirm the existence of long run relationships among the variables in the Kuwait.

**Auto Regressive Distributive Lag Model in Case of Kuwait****Table 10: Kuwait ARDL**

Long Run				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
INF(-1)	0.007372	0.177989	0.041418	0.9673
GDP	0.14693	0.072124	2.037181	0.0538
ER	3.1021	85.42539	3.63136	0.0015
ER(-1)	6.399124	5.658472	1.130893	0.2703
BM	0.02863	0.02869	0.99785	0.3292
C	74.68454	25.52977	2.925391	0.0078
Short Run				
D(ER)	310.21	38.38702	8.08112	0
CointEq(-1)*	-0.99263	0.150615	-6.59051	0

Table 10 shows the results for the long run and the short run auto regressive distributive lag model in case of Kuwait. The gross domestic product coefficient value is reported as 0.1469 which shows that one percent change in the gross domestic product will cause the inflation rate to rise by 0.14 percentage points as the relationship between the two is positive. Further, the coefficient value for the exchange rate is 3.10 which shows that it will increase the inflation by 3.10% as this value is highly statistically significant. Moreover, the coefficient value of the broad money supply is 0.0286 and is also highly statistically significant which supports that inflation rate will rise by 0.28% if there comes any change in the broad money supply as the relationships between them is reported as positive.

**CONCLUSION**

The study aimed to identify those macroeconomic factors which bring inflation in case of two countries of GCC: Bahrain and Kuwait. The data of the main variables of the study were gathered from the World Development Indicators for the year from 1971 to 2021. The econometric results of the available data have been derived from utilizing ARDL model. The main findings of the present study showed that there are three major factors that cause inflation in Bahrain and Kuwait. The econometric results have reported that the gross domestic product, broad money supply, and the exchange rates have statistically significant and also the positive relationships with the inflation. It means that all of these variables increase the inflation in Bahrain and Kuwait. Furthermore, the study suggests that the financial and monetary authorities should make appropriate monetary policies in order to tackle this situation of inflation in case of Bahrain and Kuwait.

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