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Using Econometrical Models to Analyze the Consumption Pattern of the Iraqi Individual for the Period 2004-2021

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ABSTRACT: Studying Iraqi consumer behavior and analyzing its consumption pattern provides an excellent opportunity to reach logical and more accurate results. In particular, we are looking for the consumption pattern when the Iraqi per capita income witnessed a significant and continuous increase. Accordingly, the source of this increase is a change in the proportions of consumer spending on commodities to the consumer. He changed his consumer preferences and tendencies because of this subject, the consumption function, of an essential link to the overall economy. This was done by providing accurate quantitative results for the consumption function per capita, which can reach the prevailing economic form in society. Therefore, in this research, we relied on standard models after obtaining the data for the research period. The time series of average per capita expenditure in Iraq was analyzed. To achieve the main objective of the research, we identified the research variables, where the independent variable is represented by the average annual per capita income.

KEYWORDS: Consumption pattern, per-capita income, Spending, per-capita income, Iraq, econometrics

I. INTRODUCTION

Descriptive economics provides a method by which we can describe the economic phenomena of any given topic. However, at the same time, we do not reach, through this method, a logical analysis of the causes and circumstances surrounding this phenomenon. This is because descriptive economics describes the economic system in any society and is an apparent analysis of economic theories. However, with the increase and complexity of economic crises significantly, these approaches developed and changed, so the quantitative method entered as an essential tool in describing the economic phenomenon, and the quantitative analysis of the economic phenomenon became more feasible and logical in the results. Therefore, in this part of the research, we used the standard quantitative method to reach more acceptable and realistic results.

II. PROBLEM STATEMENT

The descriptive analysis of Iraq's increase in per capita income after 2004 does not lead us to more logical and in-depth results. Therefore, we need to use the quantitative side and standard analysis to know precisely the extent to which the consumption pattern of the Iraqi individual is affected by this change in income.

III. PAPER HYPOTHESIS

Because consumption is linked to the economic development process of any society, we had to reach the objective consumption function of the Iraqi economy. The standard model was used to describe the per capita consumption pattern in Iraq with increasing income.

IV. PAPER SIGNIFICANCE

The significance of the research lies in addressing the issue of the consumption pattern during the research period more accurately, depending on the standard programs. This was done to determine this topic's relevance and role in the Iraqi economy. As well as analyzing the expenditure ratios of commodity groups, with the impact of these ratios on the high level of individual income.

V. PAPER GOAL

The research aims to indicate the increase in per capita income during the research period and whether the spending rates on all goods and services have changed in the same proportion or whether there is a discrepancy between them.

VI. DESCRIBING THE ECONOMETRIC MODEL

1-THE ECONOMETRIC MODEL

A series of data on the Iraqi average annual per capita income and expenditure ratios were obtained between 2004 and 2021. Before analyzing these data and measuring the relationship's strength, the series was checked for stability through the extended Dickey-Fuller (ADF) test. It was also confirmed that there is no problem of linear correlation between the independent research variables through the VIF test and through drawing as well. Also, autocorrelation between the residuals was tested through the Durban- Watson tests to ensure that no autocorrelation problem often accompanies time series values. After that, the multiple regression model was employed to study the effect and measure the relationship between the study variables through the correlation coefficient. To formulate research models, it is required to analyze the time series of the average per capita expenditure in Iraq on commodity and service totals for the period (2004_2021), as the analysis of time series has a prominent and essential role in providing information about the basic elements that characterize a particular phenomenon during specific periods. By following the general development of the time series, it is possible to predict how it will develop. Therefore, standard models came to study time series and predict variables and factors that could affect various fields. In order to achieve the objectives of the research and test its hypotheses, it is necessary to define the research variables. These variables have been identified in the previous paragraph of this Section, as the independent variable is (the average annual per capita income). In contrast, the dependent variables are (commodity and service totals). After determining the dependent and independent research variables, the following standard models can be adopted to conduct the econometric analysis in a manner that is commensurate with the requirements of the current research as follow:

$$y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \beta_4 x_4 + \beta_5 x_5 + \beta_6 x_6 + \beta_7 x_7 + \beta_8 x_8 + \beta_9 x_9 + \varepsilon \quad (1)$$

Where

B_0 is the intercept.

$B_i, \mathbf{i} = 1,9$ estimates of independent variables

Table 1. Variable names, variable abbreviations, and variable types

variable		Variable type
Average annual income per person	y	dependent
Food	X1	Independent variables
Cigarettes and spirits	X2	
Textiles, clothes, and shoes	X3	
Furniture and household goods	X4	
Housing, water, and energy	X5	
Transportation and communications	X6	
Education, culture, and entertainment	X7	
Medical and healthcare	X8	
Miscellaneous goods and services	X9	

2-Applied Econometric tools

a- testing hypothesis of the linear model

2-1-Testing Hypothesis of this study

This paragraph aims to test research hypotheses using appropriate statistical methods. Therefore, the focus was on the statistical tests used in the research, the steps of statistical analysis, and the statistical test of the study hypotheses, which includes descriptive statistics and analytical statistics for the research variables.

The multiple-regression analysis method was used to test the relationship between the dependent variable (average annual income per capita) and the independent variables (goods and services) to find the independent variables affecting the dependent variable. The statistical program (Eviews 10) was used to analyze the data statistically. In addition, the least squares method was used in estimating the parameters of the multiple linear regression models because the characteristics of a good estimate characterize the estimates obtained from this method, provided that several assumptions can be applied. The most important of which is to ensure that there is no solid linear correlation between the independent variables and that the error variances are constant, in addition to ensuring no self-correlation between the errors. The steps of the statistical analysis used in the current study in order to test the hypotheses of the study can be presented as follows:

1. Calculate the correlation coefficients between the independent and dependent variables and calculate the multiple linear regression equation for the independent variables that significantly impact the dependent variable.
2. Studying the significance of the regression equation by using the (T-Test) and (F-Test) tests, with determining the value of the determination coefficient (R^2) associated with the regression model, at a confidence level of 95%, as:

a. Coefficient of Determination (R^2): Refers to the ability of the independent variables to explain the change in the dependent variable, and its value ranges between zero and one. Therefore, the closer the value of the coefficient of determination to one, the greater the confidence in the ability of the independent variables to explain the change in the dependent variable.

b. (F-Test): It determines the overall significance of all independent variables present in the regression model, and the closer the significance of F is to zero, the more this confirms the existence of a regression relationship between the dependent variable and the independent variables, and this value should not exceed 5%.

c. (T-Test): refers to the significance of each regression coefficient separately to find out which variables are statistically significant. This also means which explanatory variables affect the dependent variable. The independent variable is considered influential on the dependent variable when the significance value of the T-test is less than 0.05.

2-2- Analyzing time series

Financial and economic phenomena are exposed to continuous changes, necessitating the study of time series to identify this change. In addition, it is the statistical tool used to predict the phenomenon under study. This pushes economists to give utmost importance to time series analysis, relying on modern scientific methods. The time series must be analyzed to ensure the stability of the study variables and to know their statistical characteristics, and then start estimating and testing the relationship between the studied variables of the research sample.

2-3- Testing for Autocorrelation

When making sure that the model is free from the problem of self-correlation, and when the data to be analyzed using the regression analysis method is in the form of a time series. This is done using the Durbin-Watson test, which tests the following Hypothesis:

H_0: There is no autocorrelation problem in the model used in the study.

H_1: There is an autocorrelation problem in the model used in the study

The Null Hypothesis is accepted or rejected according to the following cases:

1- The null Hypothesis is accepted if (du<D.w<4-du).

2- The null hypothesis is rejected if 0<D.W<dL or 4-dL<D.W < 4-du and the alternative hypothesis is accepted.

3- We tend to accept the null Hypothesis, and the test fails if it is 4-dL<D.W<4-du or dL<D.W<du, meaning the value of (D.W) ranges between (0-4), and there is no autocorrelation if (D.W) is close to (2).

2-4- testing the stationary of variables utilized in this study.

1- Testing the stationary of time series: An assumption behind the regression theory uses time series in estimation. This assumption is that the time series is stable. Time series analysis is an essential step before estimating and testing the relationship between variables to ensure the stability of these variables and to know their statistical properties. It is said that the time series is completely stable if the following conditions are met ().

1- The stability of the average values over time $E(Y_t) = U$

2- The stability of variance over time (variance) $Var(Y_t) = \mathrm{E}(Y_t - U)^2 = \sigma^2$

3- The covariance between any two values of the same variable should be based on the time gap (K) between the two values and not on the actual value of time, which is calculated according to the following formula ( ) Y k = [(Y t - μ) (Y t +K -μ)]

When the time series is unstable, that means the absence of stability. So the regression between the time series variables is primarily false, and some indicators indicate false regression. This would include a high coefficient of determination R2 and a significant increase in the estimated parameters (T) (F) statistical significance. An essential modern test used to determine the stability of time series is the unit root test, which might lead to more accurate results. Also, the most widely used method in testing data that suffers from the unit root is the extended Dickey-Fuller test.

2-5- Augmented Dickey-Fuller test (ADF)

This test is considered one of the contemporary and the most widely used method in testing data to determine the stability or lack thereof for a time series. This test came to avoid the shortcomings of the simple Dickey-Fuller test, which is based on the assumption that (ut) does not suffer from the correlation problem. That is, they are not linked to each other. However, the reality shows that the errors may be linked to each other, but on the contrary, the results are inaccurate. In order to eliminate the correlation problem, the extended Dickey-Fuller test (ADF) is used. As well as the stability of the series, the time series will be tested to ensure that the correlation between the research variables is real.

The results of the Dickey-Fuller test can be explained in the following Table:

Table 2. Tests the stability of the study variables using the Augmented Dickey-Fuller test.

The Variables		The test in	Test critical values:			P-Value	t-statistics
			10%	5%	1%		
Average annual income per person	Y	The Level	-2.67	-3.05	-3.89	0.42	-1.68
		The First Difference	-2.67	-3.07	-3.92	0.08	-2.81
		The second Difference	-2.68	-3.08	-3.96	0.00	-4.88
Food	X1	The Level	-2.67	-3.05	-3.89	0.04	-3.19
		The First Difference	--	--	--	--	--
		The second Difference	--	--	--	--	--
Cigarettes and spirits	X2	The Level	-2.67	-3.07	-3.92	0.14	-2.48
		The First Difference	-2.69	-3.10	-4.00	0.04	-3.30
		The second Difference	--	--	--	--	--
Textiles, clothes, and shoes	X3	The Level	-2.67	-3.05	-3.89	0.00	-5.14
		The First Difference	--	--	--	--	--
		The second Difference	--	--	--	--	--
Furniture and household goods	X4	The Level	-2.67	-3.05	-3.89	0.28	-2.02
		The First Difference	-2.67	-3.07	-3.92	0.00	-6.06
		The second Difference	--	--	--	--	--
Housing, water, and energy	X5	The Level	-2.68	-3.08	-3.96	0.80	-0.76
		The First Difference	-2.68	-3.08	-3.96	0.01	-3.75
		The second Difference	--	--	--	--	--
Transportation and communications	X6	The Level	-2.67	-3.07	-3.92	0.01	-3.85
		The First Difference	--	--	--	--	--
		The second Difference	--	--	--	--	--
Education, culture, and entertainment	X7	The Level	-2.67	-3.05	-3.89	0.02	-3.62
		The First Difference	--	--	--	--	--
		The second Difference	--	--	--	--	--

Medical and healthcare	X8	The Level	-2.68	-3.08	-3.96	0.99	2.05
		The First Difference	-2.67	-3.07	-3.92	0.00	-4.43
		The second Difference	--	--	--	--	--
Miscellaneous goods and services	X9	The Level	-2.67	-3.05	-3.89	0.05	-3.02
		The First Difference	-2.67	-3.07	-3.92	0.00	-4.40
		The second Difference	--	--	--	--	--

Source: made by authors using E-views 10 version.

Table (2) shows that the dependent variable (average annual income per capita) suffers from the instability of the original time series of the data even after taking the first Difference. However, stability was achieved after taking the second Difference of the time series as indicated by the value of (P-Value), which was equal to (0.00). As for the first independent variable (food items), we note that the original time series was stable, as indicated by the (P-Value), which was equal to (0.04). For the second independent variable (Cigarettes and alcoholic beverages), we find that the time series stabilized after taking the first Difference in the data, as indicated by the (P-value), which was equal to (0.04). Concerning the third independent variable (fabrics, clothes, and shoes), we find that the original time series was stable, as indicated by the (P-Value), which was equal to (0.00).

With regard to the fourth independent variable (furniture and household goods), we find that the original time series was unstable. However, it stabilized after taking the first Difference of the series, as indicated by the value of (P-Value), which was equal to (0.00). As for the fifth independent variable (housing, water, and energy), we note that the original time series was not stable, but it achieved stability after taking the first Difference of the data, as indicated by the value of (P-Value), which was equal to (0.01). Concerning the sixth and seventh independent variables (transportation and communication, Education, culture and entertainment), we note that the original time series was stable according to the stability test, as indicated by the value of (P-Value), which was equal to (0.01, 0.02), respectively. Concerning the eighth and ninth independent variables (medical and health care, various commodities and services), we note that the original time series was unstable according to the stability test. However, it achieved stability after taking the first Difference of the data, as indicated by the value of (P-Value), which was equal to (0.00) for both series.

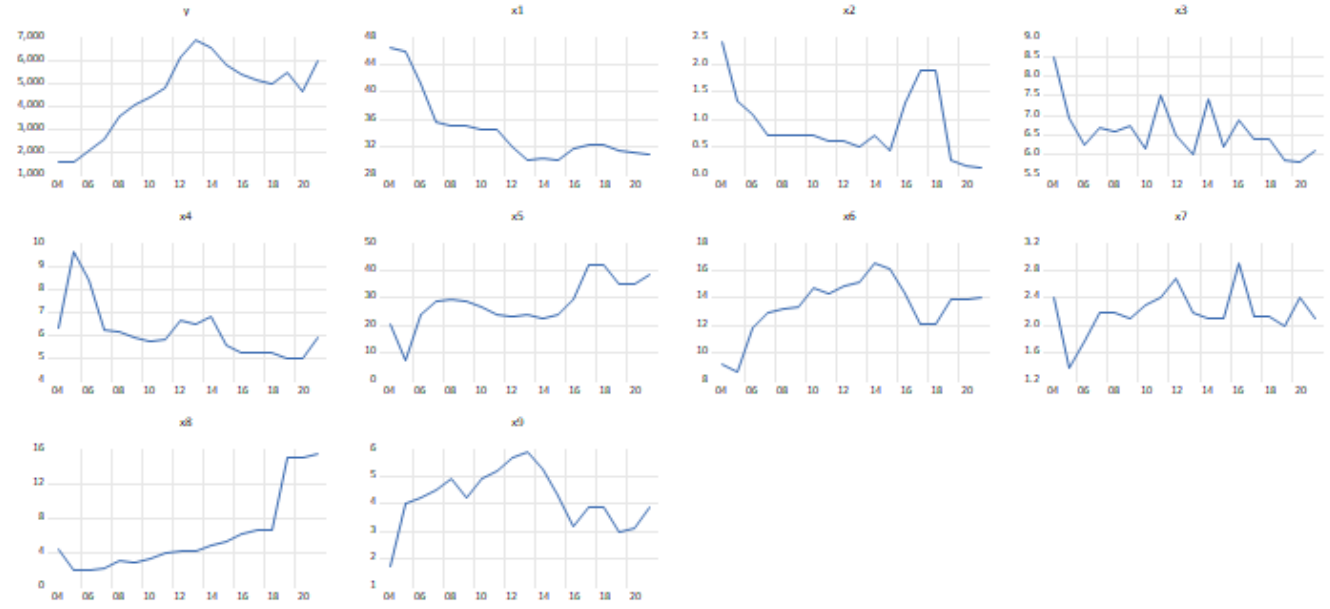


Figure 1. The trend of the original time series data for the dependent and independent variables

Figure 1 shows the trend of this study's original time series data. These trends are for the dependent and independent variables. Trends depicted in Figure 1 will be modified after some modifications for stationary purposes.

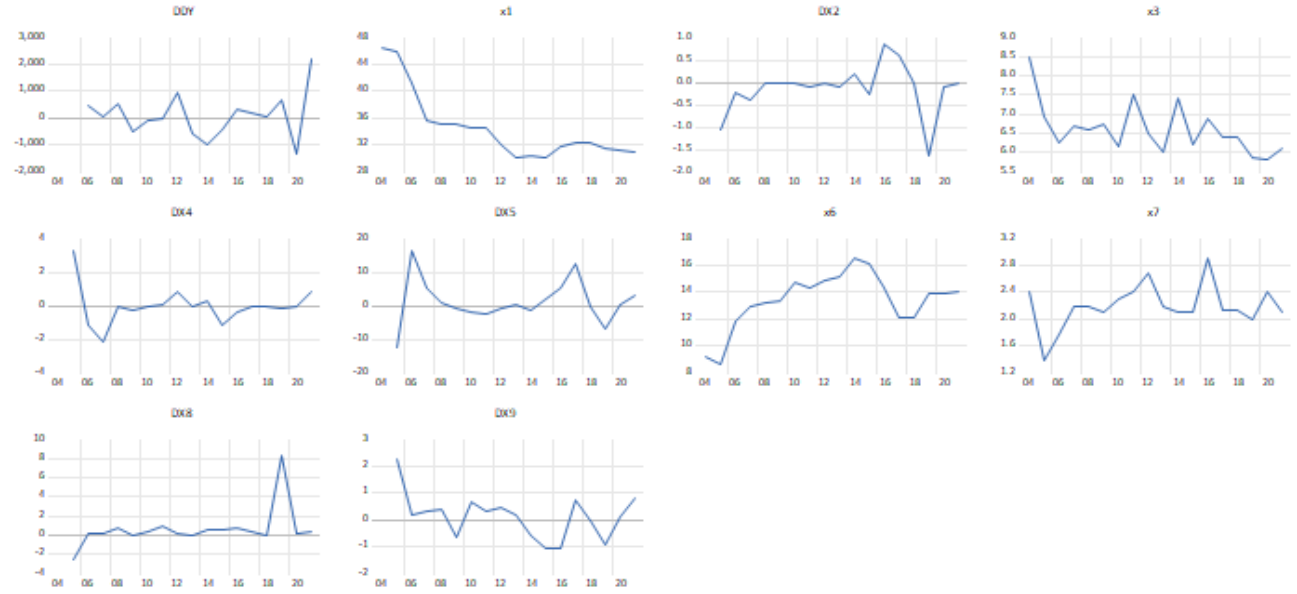
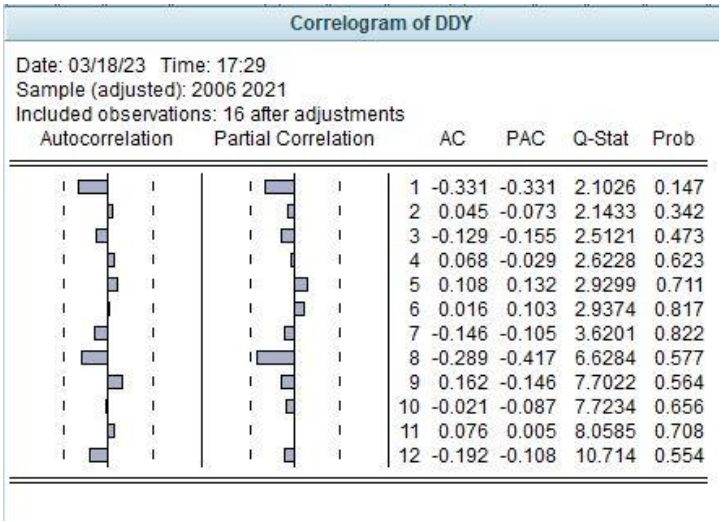


Figure 2. The trend of the time series data after some modifications for the dependent and independent variables

Figure 2 shows what would happen if some modifications took place for the dependent and independent variables for stationary purposes. Drawing autocorrelation and partial correlation functions for the dependent variable



Correlogram of DDY

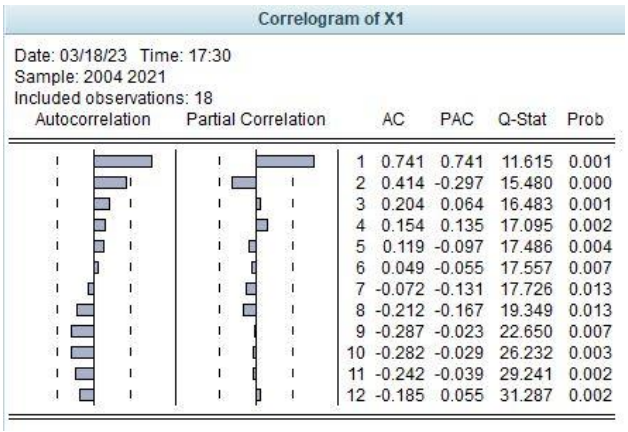
Date: 03/18/23 Time: 17:29
Sample (adjusted): 2006 2021
Included observations: 16 after adjustments

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	-0.331	-0.331	2.1026	0.147
		2	0.045	-0.073	2.1433	0.342
		3	-0.129	-0.155	2.5121	0.473
		4	0.068	-0.029	2.6228	0.623
		5	0.108	0.132	2.9299	0.711
		6	0.016	0.103	2.9374	0.817
		7	-0.146	-0.105	3.6201	0.822
		8	-0.289	-0.417	6.6284	0.577
		9	0.162	-0.146	7.7022	0.564
		10	-0.021	-0.087	7.7234	0.656
		11	0.076	0.005	8.0585	0.708
		12	-0.192	-0.108	10.714	0.554

Figure 3. Autocorrelation and partial correlation functions for the dependent variable

Drawing autocorrelation and partial correlation functions for the independent variables

1- First independent variable (Food)



Correlogram of X1

Date: 03/18/23 Time: 17:30
Sample: 2004 2021
Included observations: 18

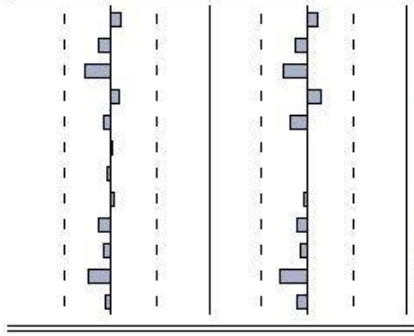
Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	0.741	0.741	11.615	0.001
		2	0.414	-0.297	15.480	0.000
		3	0.204	0.064	16.483	0.001
		4	0.154	0.135	17.095	0.002
		5	0.119	-0.097	17.486	0.004
		6	0.049	-0.055	17.557	0.007
		7	-0.072	-0.131	17.726	0.013
		8	-0.212	-0.167	19.349	0.013
		9	-0.287	-0.023	22.650	0.007
		10	-0.282	-0.029	26.232	0.003
		11	-0.242	-0.039	29.241	0.002
		12	-0.185	0.055	31.287	0.002

Figure 4. Autocorrelation and partial correlation functions for the "food" variable

2- Second independent variable (Cigarettes and spirits)

Correlogram of DX2

Date: 03/18/23 Time: 17:31
Sample (adjusted): 2005 2021
Included observations: 17 after adjustments



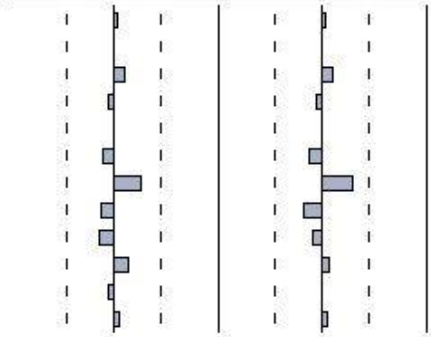
	Autocorrelation	Partial Correlation	AC	PAC	Q-Stat	Prob
1			0.110	0.110	0.2443	0.621
2			-0.124	-0.138	0.5744	0.750
3			-0.271	-0.248	2.2702	0.518
4			0.083	0.134	2.4412	0.655
5			-0.078	-0.179	2.6047	0.761
6			0.019	0.007	2.6148	0.855
7			-0.032	-0.004	2.6489	0.915
8			0.035	-0.045	2.6937	0.952
9			-0.127	-0.113	3.3476	0.949
10			-0.068	-0.073	3.5579	0.965
11			-0.243	-0.293	6.7430	0.819
12			-0.057	-0.113	6.9493	0.861

Figure 5. autocorrelation and partial correlation functions for the "Cigarettes and spirits" variable

3- Third independent variable (Textiles, clothes, and shoes)

Correlogram of X3

Date: 03/18/23 Time: 17:31
Sample: 2004 2021
Included observations: 18



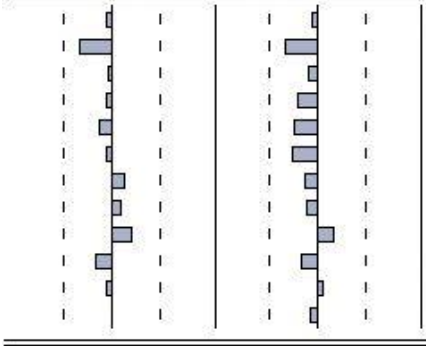
	Autocorrelation	Partial Correlation	AC	PAC	Q-Stat	Prob
1			0.032	0.032	0.0223	0.881
2			0.007	0.006	0.0232	0.988
3			0.114	0.114	0.3350	0.953
4			-0.054	-0.062	0.4093	0.982
5			0.004	0.007	0.4097	0.995
6			-0.114	-0.129	0.7977	0.992
7			0.271	0.304	3.1991	0.866
8			-0.123	-0.185	3.7466	0.879
9			-0.143	-0.089	4.5601	0.871
10			0.136	0.073	5.3867	0.864
11			-0.060	0.006	5.5704	0.900
12			0.057	0.054	5.7642	0.928

Figure 6. Autocorrelation and partial correlation functions for the "Textiles, clothes and shoes" variable

4- Forth independent variable (Furniture and household goods)

Correlogram of DX4

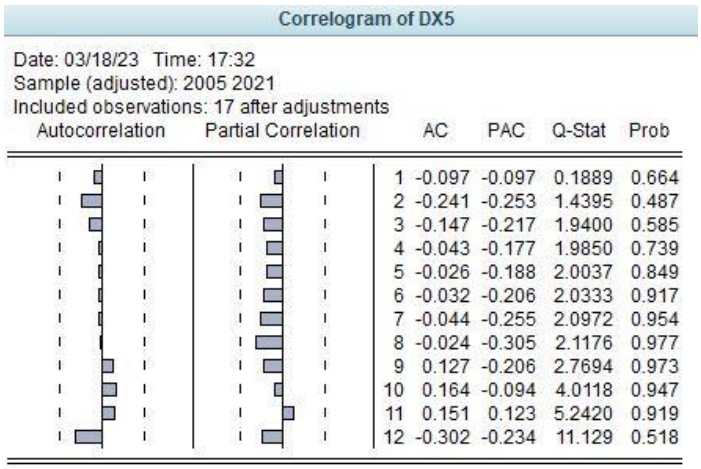
Date: 03/18/23 Time: 17:32
Sample (adjusted): 2005 2021
Included observations: 17 after adjustments



	Autocorrelation	Partial Correlation	AC	PAC	Q-Stat	Prob
1			-0.059	-0.059	0.0692	0.793
2			-0.323	-0.328	2.3226	0.313
3			-0.043	-0.098	2.3654	0.500
4			-0.054	-0.197	2.4381	0.656
5			-0.123	-0.234	2.8482	0.723
6			-0.063	-0.255	2.9647	0.813
7			0.119	-0.120	3.4248	0.843
8			0.093	-0.107	3.7371	0.880
9			0.193	0.170	5.2433	0.813
10			-0.169	-0.171	6.5630	0.766
11			-0.058	0.052	6.7446	0.819
12			0.006	-0.068	6.7467	0.874

Figure 7. Autocorrelation and partial correlation functions for the "Furniture and household goods" variable

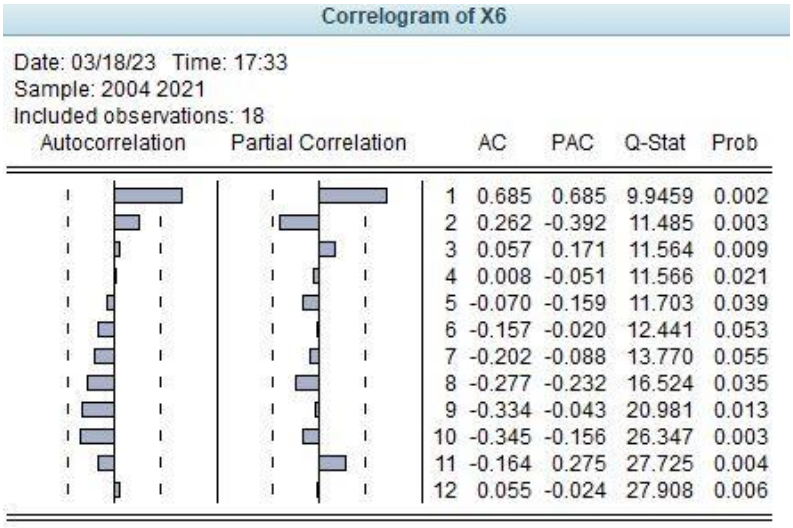
5- Fifth independent variable (Housing, water, and energy)



	AC	PAC	Q-Stat	Prob
1	-0.097	-0.097	0.1889	0.664
2	-0.241	-0.253	1.4395	0.487
3	-0.147	-0.217	1.9400	0.585
4	-0.043	-0.177	1.9850	0.739
5	-0.026	-0.188	2.0037	0.849
6	-0.032	-0.206	2.0333	0.917
7	-0.044	-0.255	2.0972	0.954
8	-0.024	-0.305	2.1176	0.977
9	0.127	-0.206	2.7694	0.973
10	0.164	-0.094	4.0118	0.947
11	0.151	0.123	5.2420	0.919
12	-0.302	-0.234	11.129	0.518

Figure 8. Autocorrelation and partial correlation functions for the "Housing, water, and energy" variable

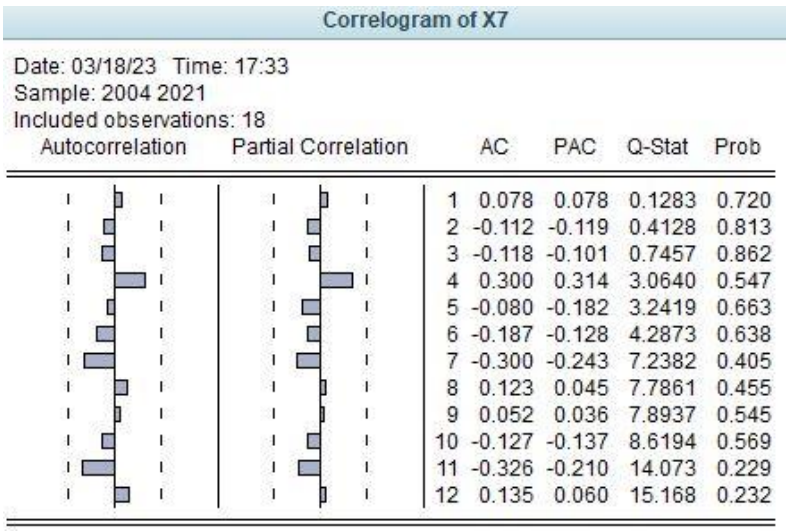
6- Sixth independent variable (Transportation and communications)



	AC	PAC	Q-Stat	Prob
1	0.685	0.685	9.9459	0.002
2	0.262	-0.392	11.485	0.003
3	0.057	0.171	11.564	0.009
4	0.008	-0.051	11.566	0.021
5	-0.070	-0.159	11.703	0.039
6	-0.157	-0.020	12.441	0.053
7	-0.202	-0.088	13.770	0.055
8	-0.277	-0.232	16.524	0.035
9	-0.334	-0.043	20.981	0.013
10	-0.345	-0.156	26.347	0.003
11	-0.164	0.275	27.725	0.004
12	0.055	-0.024	27.908	0.006

Figure 9. Autocorrelation and partial correlation functions for the "Transportation and communications" variable

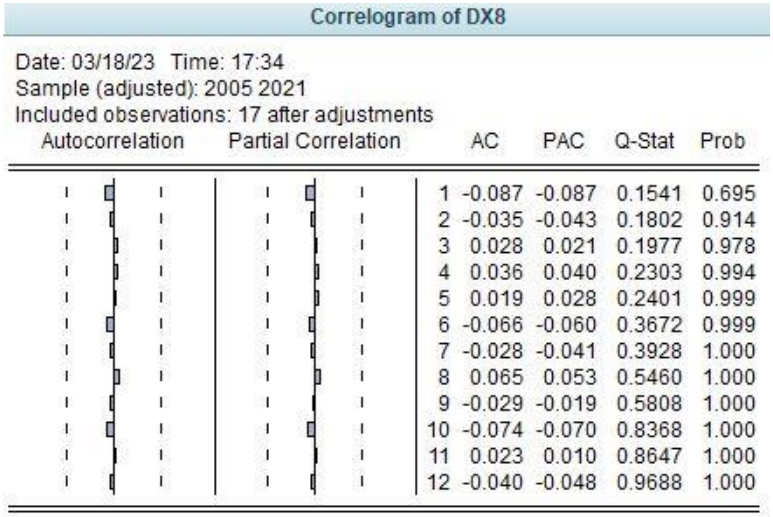
7- Seventh independent variable (Education, culture, and entertainment)



	AC	PAC	Q-Stat	Prob
1	0.078	0.078	0.1283	0.720
2	-0.112	-0.119	0.4128	0.813
3	-0.118	-0.101	0.7457	0.862
4	0.300	0.314	3.0640	0.547
5	-0.080	-0.182	3.2419	0.663
6	-0.187	-0.128	4.2873	0.638
7	-0.300	-0.243	7.2382	0.405
8	0.123	0.045	7.7861	0.455
9	0.052	0.036	7.8937	0.545
10	-0.127	-0.137	8.6194	0.569
11	-0.326	-0.210	14.073	0.229
12	0.135	0.060	15.168	0.232

Figure 10. autocorrelation and partial correlation functions for the "Education, culture and entertainment" variable

8- Eighth independent variable (Medical and health care)



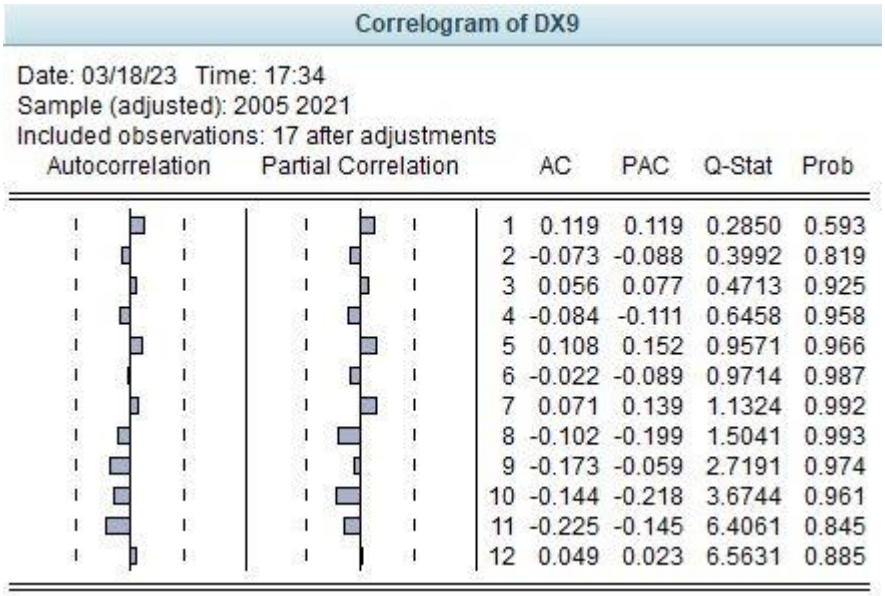
Correlogram of DX8

Date: 03/18/23 Time: 17:34
Sample (adjusted): 2005 2021
Included observations: 17 after adjustments

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	-0.087	-0.087	0.1541	0.695
		2	-0.035	-0.043	0.1802	0.914
		3	0.028	0.021	0.1977	0.978
		4	0.036	0.040	0.2303	0.994
		5	0.019	0.028	0.2401	0.999
		6	-0.066	-0.060	0.3672	0.999
		7	-0.028	-0.041	0.3928	1.000
		8	0.065	0.053	0.5460	1.000
		9	-0.029	-0.019	0.5808	1.000
		10	-0.074	-0.070	0.8368	1.000
		11	0.023	0.010	0.8647	1.000
		12	-0.040	-0.048	0.9688	1.000

Figure 11. autocorrelation and partial correlation functions for the "Medical and health care" variable

9- Ninth independent variable (Miscellaneous goods and services)



Correlogram of DX9

Date: 03/18/23 Time: 17:34
Sample (adjusted): 2005 2021
Included observations: 17 after adjustments

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	0.119	0.119	0.2850	0.593
		2	-0.073	-0.088	0.3992	0.819
		3	0.056	0.077	0.4713	0.925
		4	-0.084	-0.111	0.6458	0.958
		5	0.108	0.152	0.9571	0.966
		6	-0.022	-0.089	0.9714	0.987
		7	0.071	0.139	1.1324	0.992
		8	-0.102	-0.199	1.5041	0.993
		9	-0.173	-0.059	2.7191	0.974
		10	-0.144	-0.218	3.6744	0.961
		11	-0.225	-0.145	6.4061	0.845
		12	0.049	0.023	6.5631	0.885

Figure 12. autocorrelation and partial correlation functions for the "Miscellaneous goods and services" variable

Testing Normal Distribution of the Data

1- Testing Normal distribution for the dependent variable (Average annual income per person or Y)

To estimate the variables of this study, the normal distribution of the dependent variable (y) will be tested by using the Jarque-Bera test, where the test hypothesis will be formulated as follows:

H_0: data for the dependent variable (average annual income per capita) y follows a normal distribution.

H_1: data for the dependent variable (average annual income per capita) y do not follow a normal distribution.

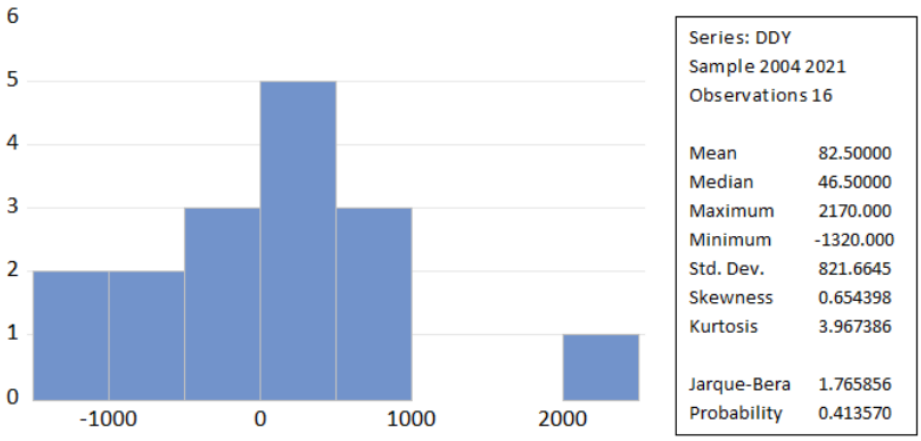


Figure. 13 shows descriptive statistics and the normal distribution test for the dependent variable (average annual per capita income) y

We notice from Figure (13) that the probability value of the Jarque-Bera test is 1.765, which is greater than the significance level of 0.05. Here, the statistical decision is to accept the null Hypothesis, and accordingly, the dependent variable (average annual income per capita) y follows the normal distribution.

2- Testing Normal distribution for the first independent variable (food or X1)

To estimate the variables in this study, the normal distribution of the independent variable X1 will first be tested by using the Jarque-Bera test, where the test hypothesis will be formulated as follows:

H_0: the data of the independent variable (food) X1 follow a normal distribution.

H_1: Data for the independent variable (food) X1 does not follow a normal distribution.

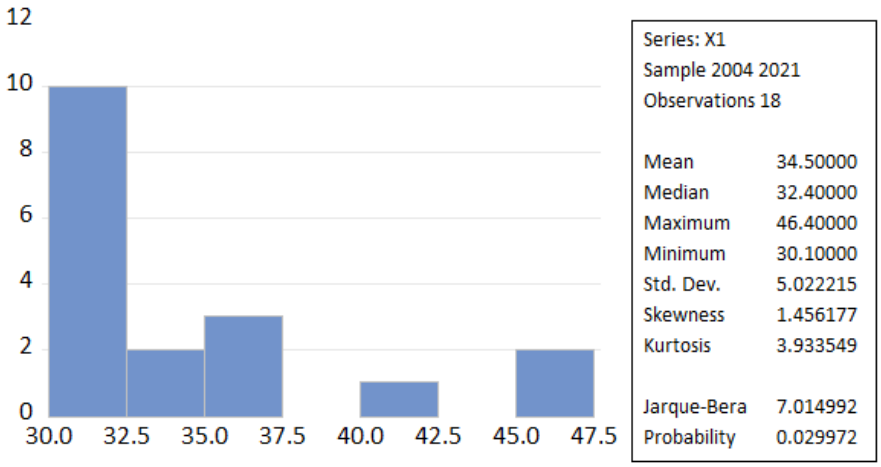


Figure 14. Descriptive statistics and normal distribution test for the "food" independent variable X1

We notice from Figure (14) that the probability value of the Jarque-Bera test is 7.014, more significant than the significance level of 0.05. Here the statistical decision is to accept the null Hypothesis, and accordingly, the independent variable X1 follows the normal distribution.

3- Testing Normal distribution for the second independent variable (Cigarettes and spirits or X2)

To estimate the variables under study, the normal distribution of the independent variable X2 will first be tested. By using the Jarque-Bera test where the test hypothesis will be formulated as follows:

H_0: Data for the independent variable (Cigarettes and alcohol) X2 follow a normal distribution.

H_1: Data for the independent variable (Cigarettes and alcohol) X2 does not follow a normal distribution.

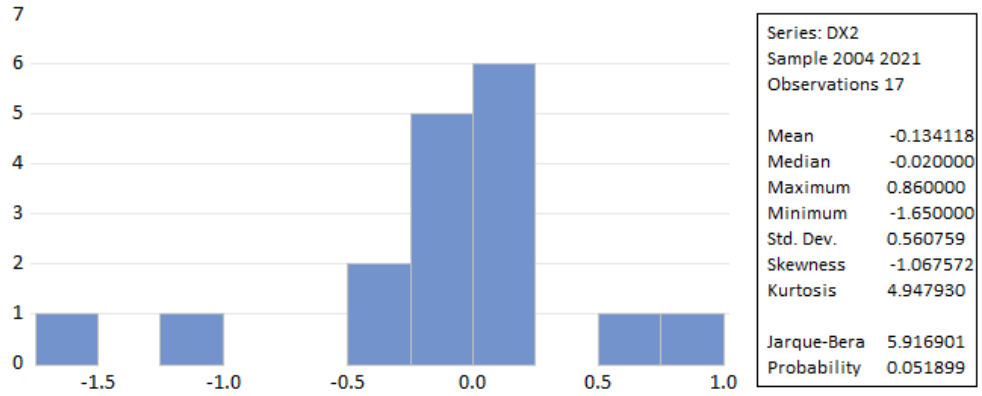


Figure 15. Descriptive statistics and normal distribution test for the "Cigarettes and spirits" independent variable X2

We notice from Figure (15) that the probability value of the Jarque-Bera test is 5.916, greater than the significance level of 0.05. Here the statistical decision is to accept the null Hypothesis, and therefore the independent variable (cigarettes and spirits) X2 follows the normal distribution.

4- Testing Normal distribution for the third independent variable (Textiles, clothes, and shoes or X3)

To estimate the variables under study, the normal distribution of the independent variable (fabrics, clothes, and shoes) X3 will be tested first. By using the Jarque-Bera test where the test hypothesis will be formulated as follows:

H_0: Data of the independent variable (fabrics, clothes, and shoes) X3 follows a normal distribution.

H_1: The data of the independent variable (fabrics, clothes, and shoes) X3 does not follow a normal distribution

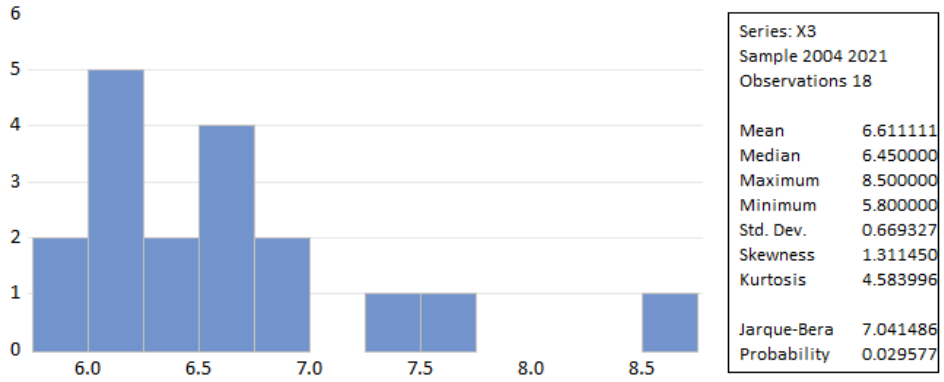


Figure 16. Descriptive statistics and normal distribution test for the "fabrics, clothes, and shoes" independent variable or X3)

We notice from Figure (16) that the probability value of the Jarque-Bera test is 7.041, which is greater than the significance level of 0.05. Here, the statistical decision is to accept the null Hypothesis, and accordingly, the independent variable (fabrics, clothes, and shoes) X3 follows the normal distribution.

5- Testing Normal distribution for the fourth independent variable (Furniture and household goods or X4)

To estimate the variables under study, the normal distribution of the independent variable (furniture and household goods) X4 will first be tested. By using the Jarque-Bera test where the test hypothesis will be formulated as follows:

H_0: Data of the independent variable (furniture and household goods) X4 follows a normal distribution.

H_1: The data of the independent variable (furniture and household goods) X4 does not follow a normal distribution.

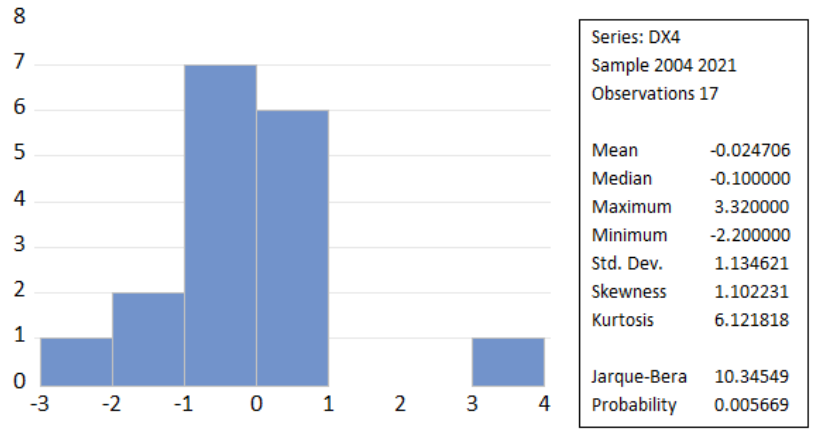


Figure 17. Descriptive statistics and normal distribution test for the "furniture and household goods" independent variable or X4)

We notice from Figure (17) that the probability value of the Jarque-Bera test is 10.345, which is greater than the significance level of 0.05. Here, the statistical decision is to accept the null Hypothesis, and accordingly, the independent variable (furniture and household goods) X4 follows the normal distribution.

6- Testing Normal distribution for the fifth independent variable (Housing, water, and energy or X5)

To estimate the variables under study, the normal distribution of the independent variable (housing, water, and energy) X5 will first be tested. By using the Jarque-Bera test where the test hypothesis will be formulated as follows:

H_0: Data for the independent variable (housing, water, energy) X5 follows a normal distribution.

H_1: Data for the independent variable (housing, water, energy) X5 does not follow a normal distribution.

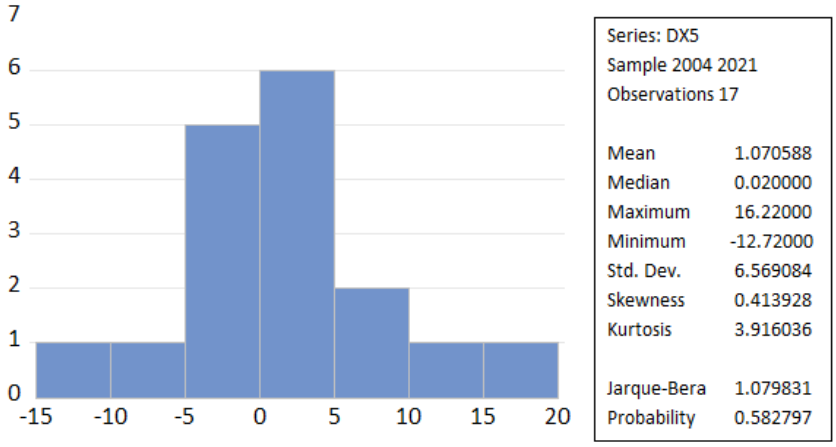


Figure 18. Descriptive statistics and normal distribution test for the "housing, water, energy" independent variable or X5)

We notice from Figure (18) that the probability value of the Jarque-Bera test is 1.079, which is greater than the significance level of 0.05. Here the statistical decision is to accept the null Hypothesis, and therefore the independent variable (housing, water, and energy) X5 follows the normal distribution.

7- Testing Normal distribution for the sixth independent variable (Transportation and communications or X6)

To estimate the variables under study, the normal distribution of the independent variable (transportation and communication) X6 will first be tested. By using the Jarque-Bera test where the test hypothesis will be formulated as follows:

H_0: The data of the independent variable (transport and communication) X6 follows a normal distribution.

H_1: data for the independent variable (transport and communication) X6 does not follow a normal distribution.

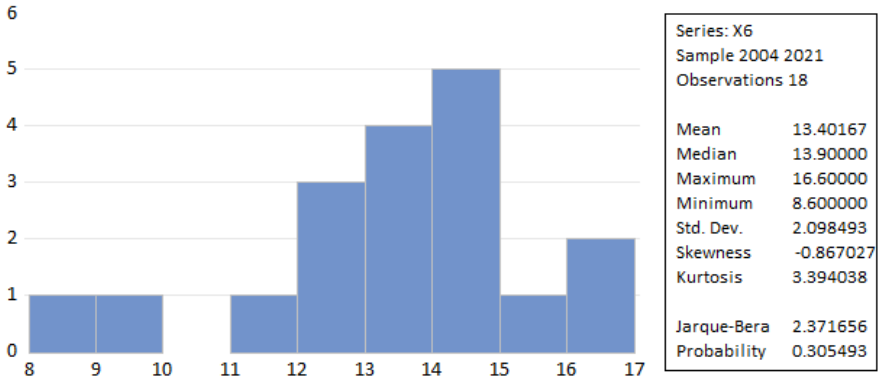


Figure 19. Descriptive statistics and normal distribution test for the" transport and communication" independent variable or X6)

We notice from Figure (19) that the probability value of the Jarque-Bera test is 2.371, which is greater than the significance level of 0.05. Here the statistical decision is to accept the null Hypothesis, and accordingly, the independent variable (transportation and communication) X6 follows the normal distribution.

8- Testing Normal distribution for the seventh independent variable (Education, culture, and entertainment or X7)

To estimate the variables under study, the normal distribution of the independent variable (education, culture, and entertainment) X7 will first be tested. By using the Jarque-Bera test where the test hypothesis will be formulated as follows:

H_0: Data for the independent variable (education, culture, and entertainment) X7 follow a normal distribution.

H_1: data for the independent variable (Education, culture, and entertainment) X7 do not follow a normal distribution.

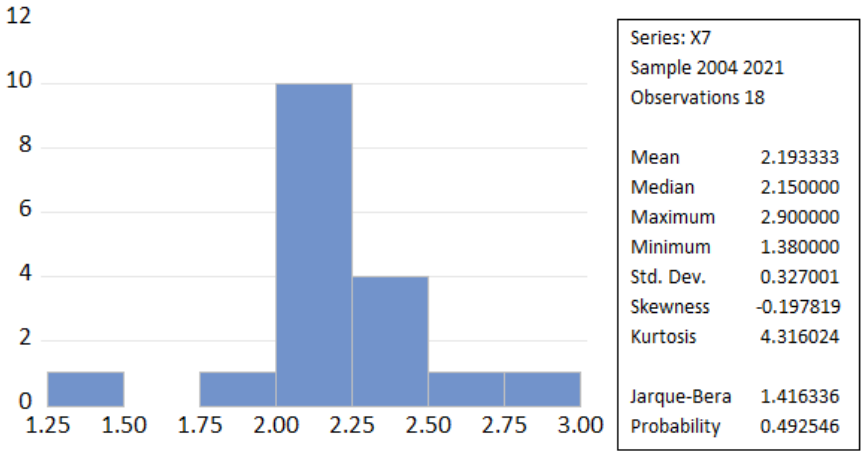


Figure 20. Descriptive statistics and normal distribution test for the" Education, culture, and entertainment" independent variable or X7)

We notice from Figure (20) that the probability value of the Jarque-Bera test is 1.416, which is greater than the significance level of 0.05. Here the statistical decision is to accept the null Hypothesis, and therefore the independent variable (Education, culture, and entertainment) X7 follows the normal distribution.

9- Testing Normal distribution for the ninth independent variable (Medical and health care or X8)

To estimate the variables under study, the normal distribution of the independent variable (medical and health care) X8 will first be tested. By using the Jarque-Bera test where the test hypothesis will be formulated as follows:

H_0: Data of the independent variable (medical and health care) X8 follows a normal distribution.

H_1: Data for the independent variable (medical and health care) X8 does not follow a normal distribution.

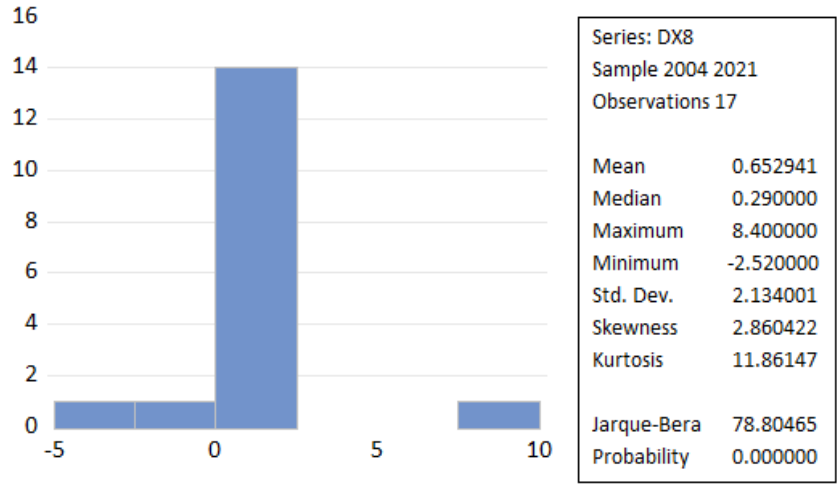


Figure 21. Descriptive statistics and normal distribution test for the" medical and health care" independent variable or X8)

We notice from Figure (21) that the probability value of the Jarque-Bera test is 78.804, which is greater than the significance level of 0.05. Here the statistical decision is to accept the null Hypothesis, and therefore the independent variable (medical and health care) X8 follows the normal distribution.

10- Testing Normal distribution for the ninth independent variable (Miscellaneous goods and services or X9)

To estimate the variables under study, the normal distribution of the independent variable (miscellaneous goods and services) X9 will first be tested. By using the Jarque-Bera test where the test hypothesis will be formulated as follows:

H_0: Data of the independent variable (miscellaneous goods and services) X9 follows a normal distribution.

H_1: The data of the independent variable (miscellaneous goods and services) X9 does not follow a normal distribution.

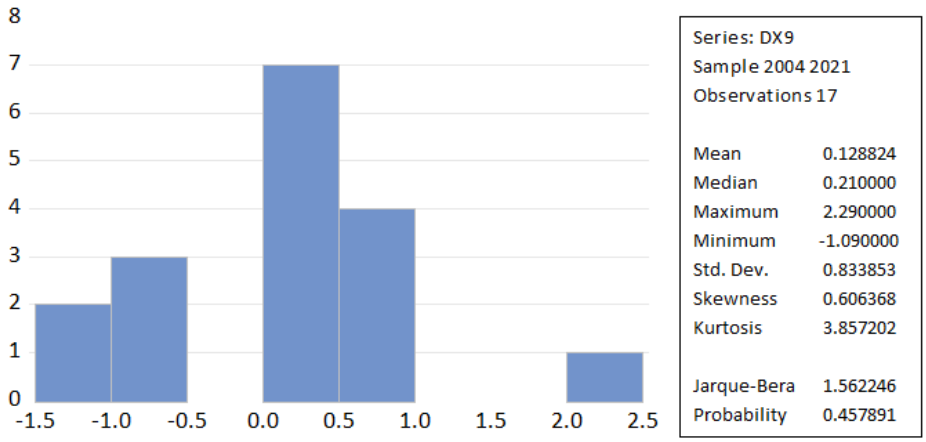


Figure 22. Descriptive statistics and normal distribution test for the" miscellaneous goods and services" independent variable or X9)

We notice from Figure (22) that the probability value of the Jarque-Bera test is 1.562, which is greater than the significance level of 0.05. Here the statistical decision is to accept the null Hypothesis, and therefore the independent variable (miscellaneous goods and services) X9 follows the normal distribution.

CONCLUSIONS

1. Decrease in Spending on food; that is, with the improvement of the individual's living situation, his inclination towards food commodities decreases, and he tends to non-food commodities that may be luxury or durable, which is evidence of an improvement in his subsistence.
2. An increase in the percentage of Spending on transportation and communications, as there is a high demand for cars and satellite receivers that entered the country after 2004.
3. The flexibility indicators calculated for all commodity groups show that household spending witnessed a positive transformation after 2004.

RECOMMENDATIONS

To follow up on the continuous changes in Spending rates on commodity aggregates and on changes in individual income, economic and social surveys must be conducted annually to find out the consumption function.

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