

# Using Hierarchical Compatibility Tables to Study the Factors Affecting the Iraqi Dinar Exchange Rate for The Period (2011 – 2018)

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## ABSTRACT

The exchange rate is of great importance as it is a link between the local economy and the global economy, and there are many factors that determine the trends of the Iraqi dinar exchange rate against the US dollar. And measuring the extent of the impact of each factor, and the results have shown that the most affecting factor in the exchange rate is the annual inflation rate, where its impact ranges between (1-4) times that of revenue, surplus or deficit, and the interest rate, which shows a clear difference in that effect.

## 1. INTRODUCTION

Most countries are concerned with the necessity of stabilizing the exchange rate of their currencies, and searching for ways and policies that guarantee this stability, which is considered one of the priorities of the monetary policy goals of developing countries. The economic and social stability of the country is affected by the exchange rate, as studying the factors affecting the exchange rate and determining them will give the monetary authorities a wide scope to properly manage these factors. Iraq is one of the countries that aims to control the factors affecting the exchange rate in the service of economic activity and to control these factors as much as possible in order for the exchange rate to go and serve the economy of the country, and economic stability is achieved only with the stability and improvement of the Iraqi dinar exchange rate towards other foreign currencies.

The research included the theoretical side that represents the factors affecting the exchange rate, in addition to explaining the tables of hierarchical compatibility, the practical aspect that dealt with the application of the hierarchical model and the analysis of the results.

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## 2. RESEARCH IMPORTANCE

The importance of the research comes through limiting the fluctuations of the Iraqi dinar exchange rate and its money from the effects on the value of the national currency and its implications for the internal and external economic activities of the country.

### 2.1. Research objective

Determine the most influential factors in the Iraqi dinar exchange rate.

### 2.2. Research hypothesis

There are a number of factors that affect the fluctuation of the Iraqi dinar exchange rate or support its stability.

### 2.3. The research sample

Statistical bulletins for the Central Bank of Iraq and the Iraqi Central Bureau of Statistics for the years (2011-2018).

### 2.4. The research model

Figure No. (1) represents the research model, as there are four factors that affect the exchange rate, as shown in the figure below

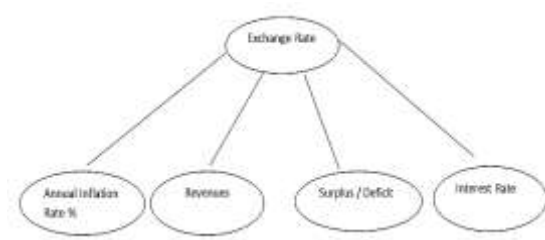


Fig:1:

## 2.5. Previous Studies

- 1- (Hassan Abdel Hadi) study, "Determining the precedence of machines using the hierarchical analysis process model." This study aimed to determine the precedence of machines in the General Company for Southern Refineries. The research has concluded that vacuum distillation machines are in the first precedence for which maintenance operations must be directed More than other machines.
- 2- (Hussam Ahmad Abu Wattafa) study, "Using the hierarchical analysis process to determine the priorities of the industrial sector in Palestine", this study aimed to determine the priorities of the industrial sector in Palestine in order to achieve sustainable development and the results showed that the food and beverage industries ranked first.
- 3- The study (Hussein and Mubarak), "The effect of exchange rate liberalization on domestic investment in Egypt", the importance of this study resulted in knowing the main reasons for Egypt's adoption of the policy of liberalizing the exchange rate and its effects on local investment.
- 4- The study (Abbas), "The effect of exchange rate fluctuations on the balance of payments in Iraq for the period (1990-2016)", the study included the problem of imbalance of payments and the search for balance in the balance, which is one of the most important economic problems affecting the internal and external balance of the country.
- 5- Study (Shalimon), "Analysis of the factors determining the trends of the Iraqi dinar exchange rate against the US dollar for the period 2004-2015", the study aimed to determine the most important factors determining the exchange rate trends and then to analyze those factors and determine their negative effects to reach the most important measures that may Contribute to her treatment.

## 3. The Ttheoretical Side

First - the concept of the exchange rate and the factors affecting it:

The concept of the exchange rate is replacing one unit of foreign currency with a number of units of the local currency, as it is considered as a link between commodity prices in global markets and their prices in local markets, as it is an important means of mutual influence on the allocation of resources between the economic sector and the profits of export industries, and it is common knowledge Therefore, the exchange rate is often unstable, sometimes we notice its rise or fall in other times, or it may stabilize for a specific period of time, and there are some factors that

affect the exchange rate changes that were emphasized in this research, namely:

- 1- Annual inflation: It is considered one of the monetary factors, and there is an inverse relationship between the annual inflation rates and the value of the local currency, which causes an imbalance in the payments budget and consequently the increase in imports relative to exports due to the high prices of local goods compared to foreign goods, thus increasing the demand for foreign goods, which leads to an increase Demand for foreign currency and as a result the local currency depreciates against the foreign currency.
  - 2- Public Revenue (Taxes): It is considered a financial factor, exchange rates are affected by the tax policy, as the encouragement of investments through exemptions submitted to capital investments, which leads to an influx of foreign capital into the country and thus increases the demand for the local currency, which causes an increase in Exchange prices . It is worth noting that the developing countries do not impose taxes on the income of their citizens, but they impose taxes on the income resulting from the profits of foreign investments, which results in an influx of capital from those countries to the developed countries and this leads to an increase in the demand for the currency of the developed countries. [4]
  - 3- The surplus or deficit is also considered a financial factor. As the budget deficit is one of the problems that causes instability in the economy and most of the countries facing this factor are developing countries, as the exchange rate is affected by the budget deficit directly, and thus the control of the budget deficit must be controlled in proportion to the growing capabilities and capabilities of the national economy.
  - 4- The interest rate: it is one of the monetary factors, there is a direct relationship between the interest rate and the currency rate, as high interest rates lead to attracting foreign capital, which leads to higher exchange rates. [3]
- Second - Statistical Methods

To achieve the aims of the study, tests and statistical methods were used, as follows:

- 1-Hierarchical compatibility tables: hierarchical compatibility tables were used that show the effect of four factors, each of which has three levels in the study of that effect on the main factor E, where we indicated the four factors

With  $A_1, A_2, A_3$  and  $A_4$  respectively

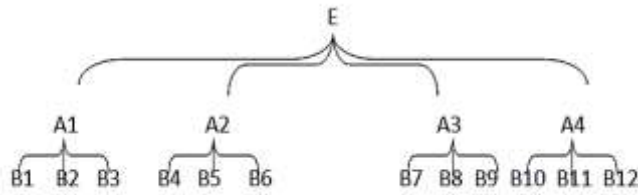
Factor  $A_1$  has three levels  $B_1, B_2, B_3$ .

Factor  $A_2$  has three levels  $B_4, B_5, B_6$ .

Factor  $A_3$  has three levels  $B_7, B_8, B_9$ .

Factor  $A_4$  has three levels  $B_{10}, B_{11}, B_{12}$ .

As shown in the following chart



From the above table, the following statistical indicators can be calculated:

$$\chi^2(\text{overall}) = \frac{\sum_{i=1}^{12} b_i^2}{pq} - \frac{B^2}{N} \dots(1)$$

$$p = \frac{B}{N}, \quad q = 1 - p$$

We compare the calculated in (1). If the differences were significant for all variables of the phenomenon studied, then we continue to calculate the test for differences between the main factors.

$$\chi_{(4)}^2 = \left[ \frac{(b_1)^2}{n_1} + \frac{(b_2)^2}{n_2} + \frac{(b_3)^2}{n_3} - \frac{(b_1 + b_2 + b_3)^2}{n_1 + n_2 + n_3} \right] + \dots + \left[ \frac{(b_{10})^2}{n_{10}} + \frac{(b_{11})^2}{n_{11}} + \frac{(b_{12})^2}{n_{12}} - \frac{(b_{10} + b_{11} + b_{12})^2}{n_{10} + n_{11} + n_{12}} \right] \dots(2)$$

And test the significance of the differences between the levels of each of the four factors as follows:

$$\chi_{(3)}^2 = \frac{\frac{(b_1 + b_2 + b_3)^2}{n_1 + n_2 + n_3} + \dots + \frac{(b_{10} + b_{11} + b_{12})^2}{n_{10} + n_{11} + n_{12}} - \frac{(b_1 + b_2 + \dots + b_{12})^2}{n_1 + n_2 + \dots + n_{12}}}{pq} \dots(3)$$

2- Relative Risk

We need to calculate this indicator the following table:

	State	Yes	No
Totals	S1	A1	A2
	S2	C1	C2

Whereas, ( $A_1, A_2, C_1, C_2$ ), represent the frequencies seen), and the relative risk is calculated by the following formula:  $(A_1 \times C_2) / (A_2 \times C_1)$ , which represents the doubling of the case of the first group from the second group according to the above formula.

3- Test of Proportion  $\chi^2$  homogeneity test We use the following table:

	State	Yes	No	total
Totals	S1	A1	A2	N1
	S2	C1	C2	N2
	Total	N3	N4	N

$$\chi^2 = \frac{N(A1 \times C2 - A2 \times C1)^2}{N1 \times N2 \times N3 \times N4} \quad \text{where}$$

$$H_0: S1 = S2, \quad H_1: S1 \neq S2$$

$$\chi_{\text{table}}^2 = \chi_{(1,0.05)}^2 = 3.84 \text{ Note that}$$

<http://ocw.jhsph.edu/courses/fundepiii/PDFs/Lecture17.pdf>

3.1. The Practical Side

Through the observations available to us and using the program Excel, the figures (3-7) shown on the last page of the research were obtained. Table No. 1 can be inferred.

Table :1

Factors affecting the exchange rate	Level of change	affect	not affect	Total	Impact rate according to the level of change	Overall impact rate
Annual Inflation Rate %	Height	18	18	36	%50	%44
	Stability	1	6	7	%14	
	Drop	23	30	53	%43	
Revenues	Height	33	45	78	%42	%42
	Stability	0	0	0	-	
	Drop	7	11	18	%39	
Surplus / Deficit	Height	16	25	41	%39	%31
	Stability	5	28	33	%15	
	Drop	9	13	22	%41	
Interest Rate	Height	0	0	0	-	%18
	Stability	17	77	94	%18	
	Drop	0	2	2	-	
Total		129	255	384		

We note from Table No. (1) that the highest rate that affects the rise in the exchange rate at a rate of (0.50) is the high annual inflation rate, and the highest rate that affects its decline is (0.43), while the highest rate that affects its stability is the stability of the interest rate, at a rate of (0.18) We also note that the highest rate that affects the exchange rate with a value of (0.44) is the annual inflation rate, followed by revenue then surplus or deficit and finally the interest rate, as the stability of revenue does not affect the stability of the exchange rate or the rise and fall of the interest rate in its rise and fall as Shown in Figure 2.

Fig: 2

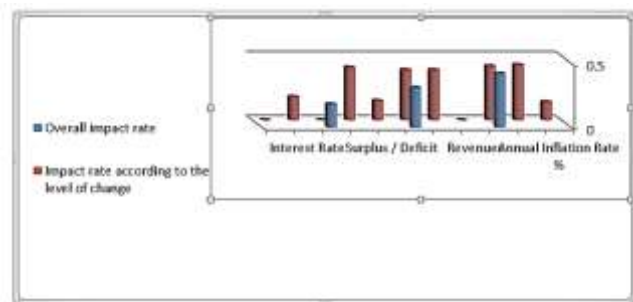


Table No. (2)

Computational	Tabular
$\chi^2_{(over\ all)}=27.93$	$\chi^2_{(11,0.95)}=19.7$
$\chi^2_{(4)}=9.59$	$\chi^2_{(3,0.95)}=7.81$
$\chi^2_{(3)}=18.34$	$\chi^2_{(2,0.95)}=5.99$

By applying the equations from (1-3) we get the table No. (2), where the differences between the factors affecting the exchange rate and the level of influence of each factor are shown, and this is an indication of the difference in the effect of the annual inflation rate, revenue, surplus or deficit, and the interest rate in the exchange rate as well. Difference in the effect levels of each factor.

Table No. (3)

Totals	Relative Risk	$\chi^2$ test for homogeneity
Annual Inflation Rate %	1	0.09
Revenues		
Annual Inflation Rate %	2	3.2
Surplus / Deficit		
Annual Inflation Rate %	4	15.29
Interest Rate		
Surplus / Deficit	1	2.25
Revenues		
Surplus / Deficit	2	4.76
Interest Rate		
Revenues	3	13.20
Interest Rate		

Table No. (3) shows the amount of the relative risk of the relationship between each of the factors affecting the exchange rate, where the results showed that the probability of an annual inflation rate impacting the exchange rate is twice the probability of the revenue effect, and is twice the probability of the effect of the surplus or deficit and equal to four times the probability of the effect Interest rate. The probability of an exchange rate surplus or effect is equal to twice the probability of revenue impact and twice the probability that interest rate will affect the exchange rate.

Likewise, the probability of revenue being affected is three times the probability of the interest rate impacting the exchange rate. Table No. 3 also shows the amount of the contribution of each of the four factors to the changes in the exchange rate, as both the annual inflation rate and revenues contribute almost equally to changes in the exchange rate, while the surplus or deficit contributes to a lesser degree than the contribution of each worker The former, and the interest rate has no real contribution to these changes.

#### 4. CONCLUSINS

The application of the hierarchical compatibility tables shows the following:

- 1- The high rate of exchange affected by the increase in the annual inflation rate and by (0.50). While the interest rate affects its stability at a rate of 0.18).
- 2- The annual inflation rate and revenues affect the exchange rate by 4 and 3 times, respectively, from the effect of the interest rate.
- 3- Both the annual inflation rate and revenues contribute effectively to the stability of the Iraqi dinar exchange rate.

#### RECOMMENDATIONS

Based on the above conclusions, we recommend the following:

- 1- The general level of prices must be maintained to avoid the rise in inflation, which in turn affects the rise in the exchange rate.
- 2- Attention to diversifying the sources of revenue from foreign currencies.
- 3- Setting an import policy that follows a specific approach programmed to import productive goods that are necessary for the country's need and limit import of luxury goods.

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Fig:3

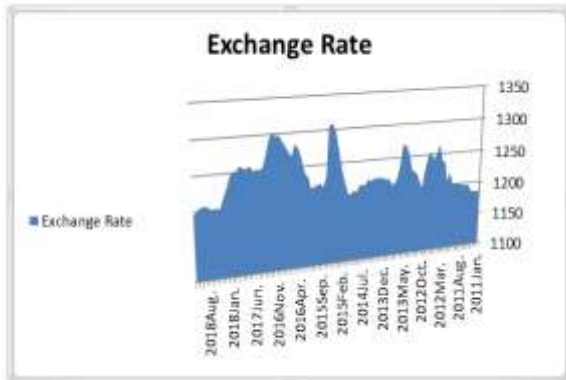


Fig:4

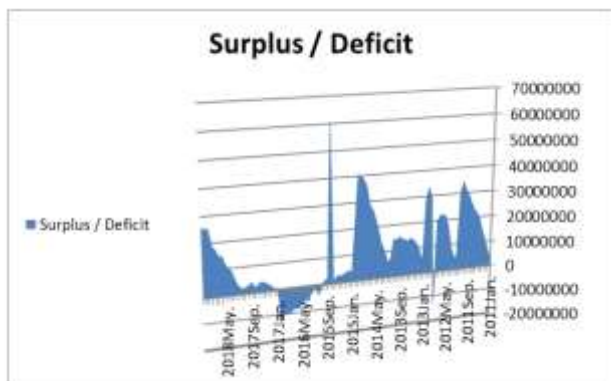


Fig:5

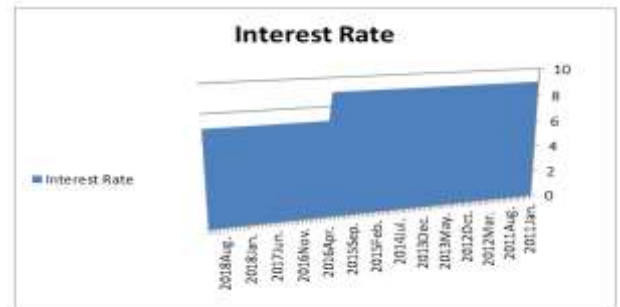


Fig:6

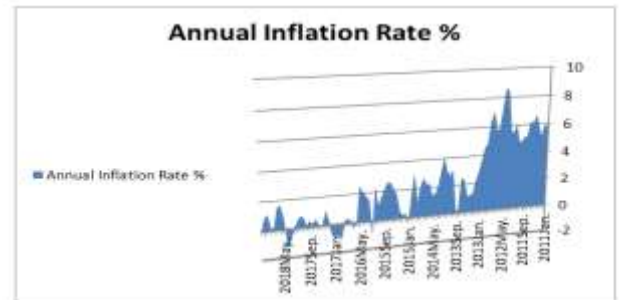


Fig:7



## استخدام جداول التوافق الهرمي لدراسة العوامل المؤثرة في سعر صرف الدينار العراقي للفترة (2018-2011)

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الخلاصة:

لسعر الصرف أهمية كبيرة كونه حلقة وصل بين الاقتصاد المحلي والاقتصاد العالمي، وتوجد عوامل عديدة تحدد اتجاهات سعر صرف الدينار العراقي مقابل الدولار الأمريكي تناول البحث أهم هذه العوامل وهي معدل التضخم السنوي، الإيرادات، الفائض أو العجز، سعر الفائدة، ودراسة تأثيرها باستخدام جداول التوافق الهرمي وقياس مدى تأثير كل عامل، وقد أظهرت النتائج أن أكثر عامل يؤثر في سعر الصرف هو معدل التضخم السنوي، حيث يتراوح تأثيره بين (1-4) أضعاف من تأثير كل من الإيرادات والفائض أو العجز وسعر الفائدة والتي تظهر اختلافا واضحا في ذلك التأثير.