THE RELATIONSHIP BETWEEN EFFECTIVE INTEREST RATES AND THE CONSUMER PRICE INDEX CPI AS AN INFLATION MEASURE: EVIDENCE FROM JORDAN

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OPEN ACCESS

How to cite this paper:
Al-Attar, M., Shaban, O. S., & Ali, N. N. (2019). The relationship between effective interest rates and the consumer price index CPI as an inflation measure: evidence from Jordan. *Risk Governance and Control: Financial Markets & Institutions, 9(2),* 65-71. http://doi.org/10.22495/rgcv9i2p6

ISSN Online: 2077-4303
ISSN Print: 2077-429X

Received: 22.02.2019
Accepted: 02.05.2019

JEL Classification: M41, L16, M41, N35
DOI: 10.22495/rgcv9i2p6

Abstract

The aim of this research is to figure out the type of relationship between the effective interest rates and the consumer price index rate CP and to determine the real relationship between them. In order to achieve the desired objectives of the research, we calculated the rate of inflation through the change in the consumer price index CPI, for the period 2010-2018. A Pearson Correlation is also conducted between the CPI rates and effective interest rates for the same period. The outcomes of CPI calculations show that the CPI average for the year 2018 reached 124.66 points, indicating a 5.33% difference from the same period of 2017, and this difference is referred to as the inflation rate, also, the outcomes of the correlation analysis conducted refers to a negative relationship between the CPI rates and the effective interest rates.

Keywords: Effective interest rates, Inflation rates, CPI rates, Jordan

1. INTRODUCTION

Effective interest rate is the real rate that is earned or paid on investment or other financial instruments as a result of compounding over a given period of time (Investopedia, 2019)

It's an important concept in economics because it compares loans, lines of credit and investment products, such as deposit certificates. It's calculated by taking the nominal interest rate and adjusting it for the number of compounding periods that the financial product will experience in the given period of time (Magister, 2018).

In this research paper, we focus on Consumer Price Index CPI as a measure of inflation. Inflation can be measured through CPI by tracking the specific prices of a specific basket of goods and services over a period of time, taking into consideration the improvements of quality into consideration (Petkovska & Jovanovic, 2015).

There are different indices that measure inflation, and the most well-known measure is CPI and Producer Price Index PPI. CPI monitors the prices of goods or services that a typical consumer in a specific population and geographical area is presumed to buy, while PPI takes the prices of raw materials that a producer of manufactured products is going to use in the manufacturing process (Giordano & Zollino, 2016). Inflation is an increase in the overall level of prices, and this inflation level is likely to rise or fall due to productivity or demand and supply conditions of specific goods or services. The link between inflation and interest rate is usually closely monitored by savers, investors and financial intermediaries (Mohanty, 2010).

The inflation rate of the index is the change in the level of the price level index. Inflation rates are generally expressed in compound form annually, for example, an inflation rate of 2% means that after three years, the price level indicator will be approximately 6.12% higher. In some cases, it is better to work with inflation rates on a yearly basis. When inflation rises by 2%, this does not necessarily mean that all prices will rise by 2%, some consumers may pay more than 2% while others may pay less, depending on how the basket of items they buy compares the basket of items used to create a price index a certain. Inflation rates provide information on the general trend of prices only (Bean, 2017).

The ability and willingness of the borrower to borrow funds at specific rates of inflation can be affected. Wages and prices tend to increase over time when inflation is present, which in turn means that the amount that a borrower can pay to repay a loan is greater than the lack of inflation. (Zulfa & Suseno, 2018).

Based on the above, the aim of this research is to know the relationship between the actual interest rates and the consumer price index and to determine the real relationship between them.

CPI Is the amount of monthly change in prices for a specific basket of consumer goods that includes food, clothing and transportation. The Consumer Price Index (CPI) is the main indicator of inflation, on the other hand, CPI is the rate of price change in a particular country. The Consumer Price Index (CPI) reports the total price of a specific basket of products and services that the public usually buys. The CPI is also called the cost of living index (Dailyforex, 2019).

It can be calculated by taking the average of the changes in the items in each predetermined basket of good. The changes in the CPI are used to evaluate price changes associated with the cost of living. One of the most used statistics for identifying periods of inflation or deflation is the CPI (Petkovska & Jovanovic, 2015).

The importance of this research stems from the expected results that are expected to help decision-makers, politicians, businessmen, and bankers, to implement and establish an effective and efficient monetary policy that may which may improve the current status of the Jordanian economy in particular and other economies of the world in general.

The composition of this research begins first with the introduction, and then followed by the theoretical framework and previous studies, and then followed by the research methodology, and then the analysis, and finally the conclusions and recommendations.

2. LITERATURE REVIEW

The effective interest rate is the real rate of interest earned and can also be referred to as the market interest rate, or the discount rate. From an economic perspective, interest is the price of the equilibrium of money, defined by the cross-curve of supply and demand for money. Moreover, this equilibrium price is not fixed. When shifts in supply curves or demand for money occur, the amount of interest balance and number of loans will also change. Thus, one of the important determinants of interest rates is the supply and demand for money (Assabeel, 2019).

The effective annual interest rate is also defined as the interest rate that is actually earned or paid on an investment, loan or other derivative financial instruments as a result of the stabilization within a certain period, also known as the actual rate or the annual equivalent rate (Investopedia, 2019).

There are also additional determinants of interest rates, including the length of lending of funds, the extent of the risk of non-payment of the full amount of money lent, and the extent to which money loses its purchasing power over time. In general, the determinants of interest rates are the cost of the fund, the cost of operating expenses, the emergency reserve, tax expenses, interest rate gain, credit rating, customers, inflation, and finally high competition (Bean, 2017).

It is said in economic theory that the conditions of demand and supply on credit available in banks and financial institutions determine the level of interest rates. The increase in demand for loans drives banks to raise interest rates or vice versa. Of course, the purpose of borrowing also determines the interest rates imposed on the amount borrowed, borrowing to investment by a business or government institutions, is different than borrowing to family needs. The benchmark interest rate in Jordan was last recorded at 4.75 percent. Interest Rate in Jordan averaged 5.90 percent from 1965 until 2019, reaching an all-time high of 9 percent in August of 1998 and its lowest record of 2.50 percent in June of 2003.

The increase in interest rates on loans, which reached around 9%, The reasons behind this increase from the available information did not come due to the rise in the cost of borrowing or due to a large increase in demand, but it is a subject of lending policy adopted by the bank which is related to the solvency of the borrower, and the existence of guarantees for the loan beyond its real value. In order to maintain the real interest rates (taking the effect of inflation) within the normal levels, any rise in the counterparty, the interest rates on the deposits of the dinar also will rise, and usually this interest is raised if the banks need more liquidity, but according to available data from the central bank, local banks are full of large surpluses of liquidity. Others argue that the impact of public-private borrowing on borrowing has contributed to raising interest rates on loans. Direct government borrowing from banks and financial institutions is more than indirect borrowing through government bonds, but the rates are lower than the interest rate granted to the private sector or individuals. (CBJ, 2019).

The monetary policy of the Central Bank of Jordan has been flexible over the last few years. The aim is to provide quantitative facilities, and also providing liquidity to the banking sector and facilitating the granting of loans to the economic sectors at a low level for establishing economic projects, expanding production and export operations, achieving monetary stability, medium and low-cost financing to establish service and productive projects and create job opportunities for young people entering the Jordanian labor market and unemployed in Jordan, and encouraging savings

and investment in the Jordanian market. Savings and investment are the foundation of the capital formation in Jordan, not to mention the attraction of foreign direct investment known as Foreign Direct Investment. Interest rates are determined by the Central Bank and its commercial, investment and Islamic banks according to a number of determinants and factors, which can be summarized as follows in accordance with the economic theories and the jurisprudence of financial transactions, as follows (Assabeel, 2019):

1. The fixed exchange rate between the Jordanian Dinar's and the US dollar since 1995; The Jordanian monetary policy is largely in line with the policy of the US Federal Reserve against the interest rate on the US dollar. This situation is not limited to Jordan, but in all countries that link their currencies to the US dollar, Gulf Cooperation Council other than Kuwait, which pegs its currency with a basket of currencies.
2. The amount of profit margin that Jordanian banks want to achieve, which is affected by the interest margin in banks, which is the gap between the bank's interest on loans and the interest it pays on customer deposits, ranging between 3% and 4% on loans.
3. The type of monetary policy towards savings and investment; if the government wants to encourage domestic savings, it raised the interest rate on customer deposits in banks, and vice versa, if the government wants to encourage investment, has reduced the interest rate in order to direct money and cash to invest in projects instead Of the deposit in banks; according to the economist John Keynes, there is an inverse relationship between the interest rate and investment.
4. The rate of inflation that the government wants to reach; it is known economically that raising interest rates lead to an increase in the cost of loans to projects, leading to higher prices of goods and services produced, and there is a positive relationship between the interest rate and inflation.
5. The Government's policy towards promoting micro, small and medium enterprises The Central Bank of Jordan has recently adopted the policy of encouraging low-cost lending to SMEs to increase its ability to create new job opportunities for young new entrants and unemployed persons in the Jordanian labor market; The central bank reduced the interest rate on loans to small and medium enterprises in Jordan.

The CPI is measured from a basket of all consumer goods and services consumed within the country, weighted by each commodity or service according to coefficients representing the relative weight of these goods and services in the average household expenditure on consumption. These transactions are calculated on the basis of household consumption expenditure structure, according to data from field surveys carried out by the statistical bodies, which monitor the living standards of the population and their consumer spending. The goods and services included in the consumption basket are classified into a number of different categories, such as food and beverages, clothing and textiles, housing and basic services of water and electricity, mobility and communications, health services, education and recreation. The range of geographical coverage of the price monitoring process varies from country to country, depending on the financial and human resources allocated to the task. A general consumer price index (CPI) of all goods and services can be measured and covers most of the national territory. Sub-indices that are relevant to the prices of particular categories (food and beverages, for example) or geographical indicators that monitor price changes in specific cities or regions can be measured (Aljazeera, 2019).

As far as the monetary approach is concerned, it explains inflation in terms of disproportional monetary growth in comparison with the national income. As for the structural approach it attributes the rapid increase of prices to the existing intrinsic rigidities of the economic system itself (Boujelbene & Boujelbene, 2010).

The Department of Statistics issued its monthly report on consumer price index (inflation), which indicates a rise in the consumer price index for March 2019 to 124.02 compared to 123.99 for the same month of 2018, recording an increase of 0.02%. The increase was mainly contributed by 0.49 percentage points of vegetables and dry and canned cereals, 0.34 percentage points, cereals and products by 0.11 percentage points, fuel, lighting and education by 80.0 percentage points each. On the other hand, the prices of a group of commodities, including meat and poultry, decreased by 0.64 percentage points, milk and dairy products by 0.20 percentage points, transport by 0.14 percentage points, fruits and nuts by 0.08 percentage points. As for the basic index of consumer prices for March 2019 (which is measured by excluding the most volatile commodities such as food, fuel, lighting and transport), it reached 129.1 against 127.9 during the same month of 2018 with an increase of 1.0%. At the cumulative level, Consumer spending for the first three months of this year was 129.2 versus 127.7 compared to the same period of 2018, an increase of 1.2% (DoS, 2019).

Since this study aims to know the relationship between the actual interest rates and the consumer price index and determine the real relationship between them. The existence of linkages between the effective interest rate and the rate of inflation has been more commonly established in the theoretical literature. Boamah (2019), Zulfa and Suseno (2018), Lopez and Mignon (2017). The results of previous studies, Boamah (2019), indicate that changes in money supply, real effective exchange rate, nominal interest rate, real income per capita and foreign prices have a significant influence on the behavior and path of inflation in the long run. Ibrahim & Agbaje (2010), in their study examined the long-run relationships and dynamic interactions between stock returns and inflation in Nigeria using monthly data of the all share price index from the Nigerian stock exchange and Nigerian Consumers Price Index from January 1997 to 2013, and the study concluded that there is a short run relationship between stock returns and inflation. Meshkin (1981) in his famous paper talking about the real interest rate said that the monetary policy is viewed as affecting the real

rate of interest which then affects business and consumers' investment decisions and hence aggregate demand, and he also said that Real interest rates also play a prominent role in explanations of business cycles and particular business cycle episodes, and he concluded that declines in the real interest rate can have an adverse effect on capital formation and hence on productivity, and there should be a serious concern about the real interest rate.

3. METHOD

Since this study aims to know the relationship between the actual interest rates and the consumer price index and determine the real relationship between them. The data used in this study is secondary data collected from the Jordanian Department of Statistics (DoS), and the Central Bank of Jordan. The type of data used in this research paper is the time series data from 2010–2018. The type of research used in this study is a quantitative analysis approach. The Statistical Package for the Social Sciences (SPSS) was used to examine the correlation relationship between the variables.

With regard to the interest rates and banking policy, the CBJ has taken further measures to organize banks' operations, enhance their ability to finance economic activities and strengthen the soundness of the banking system. The CBJ also continued to streamline financing to small- and medium-sized enterprises (SMEs) at preferential interest rates and appropriate maturities. In the context, realistically, in the first three-quarters Gross domestic product (GDP) increased by 0.2% in the year 2018, compared to a growth of 2.2% over the same period of 2017. Also, the overall price level measured by the relative change in the consumer price index (CPI) recorded 5.4% in the year 2018 compared to a growth rate of 3.3% during the 11 months during the same period of 2017. The unemployment rate increased during the third quarter of 2018 to 6.18% of the total workforce, compared to 5.18% during the same quarter of 2017.

The Consumer Price Index (CPI) is an indicative number or statistical indicator that measures changes in the overall level of prices from a basket tracking of all goods and services consumed within a given country. The composition of this basket is supposed to reflect the structure of household consumption expenditure in this country. The CPI is measured from a basket of all consumer goods and services consumed within the country, weighted by each commodity or service according to coefficients representing the relative weight of these goods and services in the average household expenditure on consumption (reference household) expenditure. These transactions are calculated on the basis of household consumption expenditure structure, according to data from field surveys carried out by the statistical bodies, which monitor the living standards and consumption expenditure of the population, and through the following formula:

$$CPI = \frac{Cost\ of\ Market\ Basket\ in\ a\ given\ year}{Cost\ of\ Market\ Basket\ in\ the\ base\ year} * 100 \quad (1)$$

As per the methodology adopted in this study, CPI rates are calculated. The outcomes of CPI calculations show that the CPI average for 2018 reached 124.66 points, indicating a 5.33% difference from the same period of 2017, and this difference is referred to as the inflation rate. A Pearson Correlation is also conducted between the CPI rates and effective interest rates for the period between 2010 and 2018. Table 1 shows the outcomes of CPI calculations. Table 2 and Figure 2 reflect the outcomes of the correlation analysis conducted between the two variables for the period 2010, and 2018.

Figure 1. Yearly average consumer price indices 2010-2018 (2010=100)

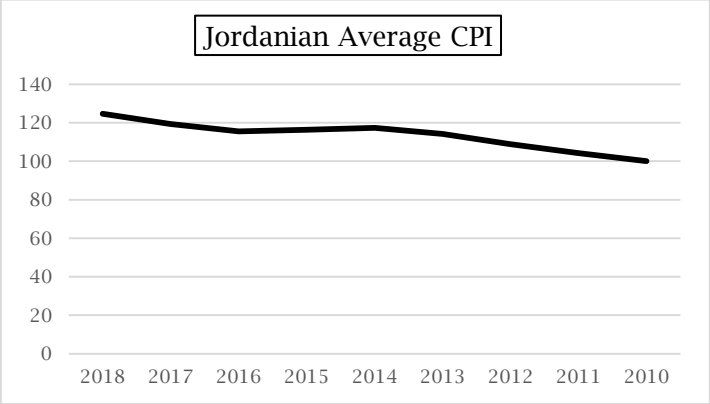


Table 1. Monthly average consumer price indices (CPI) & monthly effective interest rates 2010-2018 (2010=100)

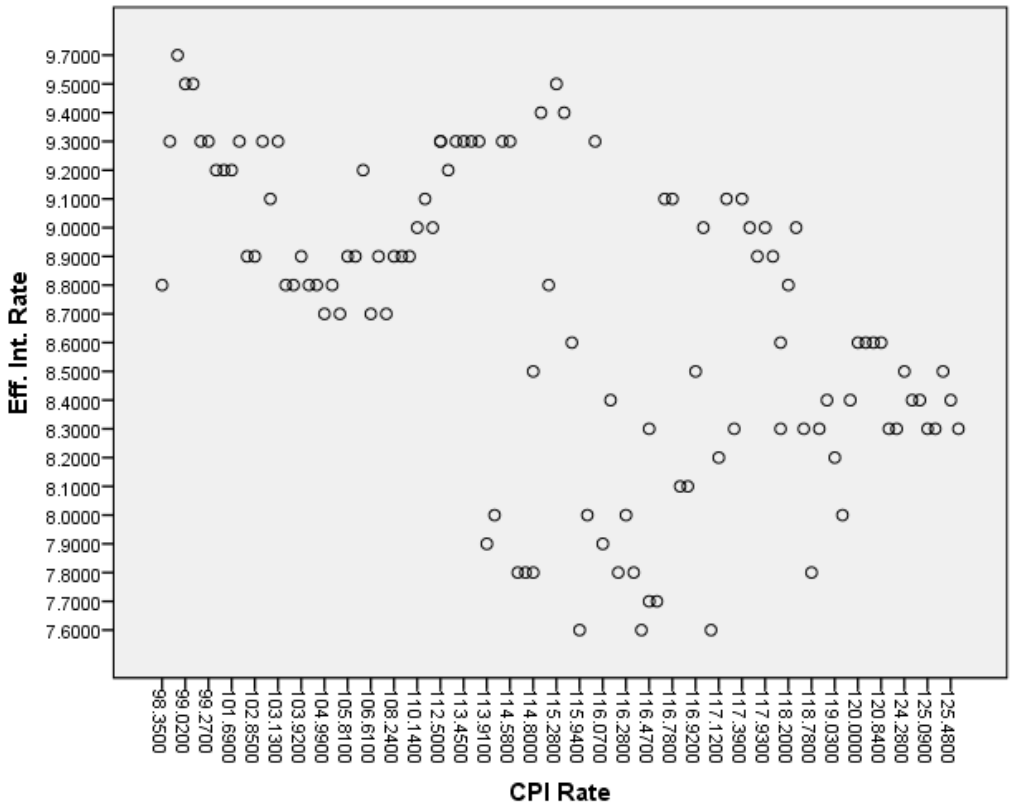
Month	*CPI*	*Eff Int %*	*Month*	*CPI*	*Eff Int %*	*Month*	*CPI*	*Eff Int %*	*Month*	*CPI*	*Eff Int %*	*Month*	*CPI*	*Eff Int %*
2018M01	118,17	8,6	2016M01	115,24	8	2014M01	116,28	9,1	2012M01	106,18	8,9	2010M01	98,35	9,7
2018M02	123,46	8,3	2016M02	113,93	7,9	2014M02	116,78	9,1	2012M02	105,81	8,7	2010M02	98,98	9,5
2018M03	123,99	8,3	2016M03	113,91	7,8	2014M03	117,27	9,1	2012M03	106,61	8,7	2010M03	99,05	9,5
2018M04	124,28	8,5	2016M04	114,76	7,8	2014M04	117,39	9,1	2012M04	107,88	8,9	2010M04	99,02	9,3
2018M05	124,93	8,4	2016M05	114,64	7,8	2014M05	116,72	9	2012M05	107,7	8,9	2010M05	98,68	9,3
2018M06	125,07	8,4	2016M06	114,8	7,8	2014M06	116,99	9	2012M06	108,24	8,9	2010M06	99,27	9,3
2018M07	125,3	8,5	2016M07	116,43	7,7	2014M07	117,65	8,9	2012M07	109,16	8,9	2010M07	99,21	9,2
2018M08	125,48	8,4	2016M08	116,47	7,6	2014M08	117,99	8,8	2012M08	109,92	9	2010M08	99,85	9,2
2018M09	125,25	8,3	2016M09	115,94	7,8	2014M09	118,2	9	2012M09	110,14	9,1	2010M09	100,96	9,2
2018M10	125,09	8,3	2016M10	116,21	7,7	2014M10	118,23	8,9	2012M10	110,37	9	2010M10	101,69	9,3
2018M11	126,12	8,3	2016M11	116,55	7,6	2014M11	117,74	9	2012M11	111,93	9,3	2010M11	101,83	9,3
2018M12	125,21	8,3	2016M12	117,05	7,6	2014M12	117,93	9,2	2012M12	112,5	9,3	2010M12	103,13	9,1
2017M01	118,17	8	2015M01	116,46	8,5	2013M01	112,54	9,3	2011M01	103	8,9			
2017M02	119,12	7,8	2015M02	114,8	8,6	2013M02	113,15	9,3	2011M02	102,53	8,9			
2017M03	118,78	8,3	2015M03	115,84	8,4	2013M03	113,53	9,3	2011M03	102,85	8,8			
2017M04	118,8	8,4	2015M04	116,14	8,3	2013M04	113,47	9,3	2011M04	103,57	8,8			
2017M05	118,88	8,2	2015M05	116,47	8,3	2013M05	112,5	9,3	2011M05	103,64	8,9			
2017M06	119,03	8,3	2015M06	117,38	8,5	2013M06	113,45	9,3	2011M06	103,92	8,8			
2017M07	118,56	8,4	2015M07	116,92	8,2	2013M07	114,09	9,3	2011M07	104,08	8,8			
2017M08	119,13	8,6	2015M08	117,12	8,1	2013M08	114,58	9,4	2011M08	104,77	8,7			
2017M09	120	8,6	2015M09	116,81	8,1	2013M09	115,17	9,4	2011M09	104,99	8,8			
2017M10	120,26	8,6	2015M10	116,84	8	2013M10	115,71	9,5	2011M10	105,1	8,7			
2017M11	120,44	8,6	2015M11	115,97	7,9	2013M11	115,28	9,3	2011M11	105,41	8,9			
2017M12	120,84	8,8	2015M12	116,07	8	2013M12	116	9,2	2011M12	106,14	8,8			

Table 2. Correlations analysis

		CPI Rate	*Eff. Int. Rate*
CPI Rate	Pearson correlation	1	-.522**
	Sig. (2-tailed)		.000
	N	108	108
Eff. Int. Rate	Pearson correlation	-.522**	1
	Sig. (2-tailed)	.000	
	N	108	108

***. Correlation is significant at the 0.01 level (2-tailed).*

Figure 2. Correlation analysis for both %CPI & effective interest rate



The results of this correlation match the results of Boamah, (2019) which indicates that changes in effective exchange rate have a significant influence on the inflation rate. Figure 2 indicates that there is 52.2% correlation or relationship between CPI rates and interest rates for the period between 2010 and 2018, and the type of this relationship is negative, (Uma, 2016), and this means that when CPI rates increases, the interest rates decrease.

4. RESULTS

The following results can be mentioned:

- Effective interest rates and CPI rates have a significant relationship in Jordan's economy.
- The outcome shows a negative correlation when the CPI rate increases, the effect of interest rates decrease. That indicates that the CPI rates can cause direct opposite effects of the determination level of effective interest rates on the economy in Jordan, which matches the results with Boyd et al. (2001), Thanh (2015), that there is a significant, and economically important, negative relationship between inflation and both banking sector development, growth, and equity market activity.
- The government should reduce inflation rates by increasing market interest rates in order to encourage savings by citizens.

Each study has some limitations that should be determined, and the following are the possible limitations of this study:

- Due to the fact that the study is conducted on Jordan's environments, the results and conclusions of this study should not be generalized on other environments.
- Additional research should be done in the field because this study examines the relationship between the effective interest rates and the CPI as an inflation measure.
- In order to figure out if there is a relationship between the actual interest rates and the consumer price index, the results can be attributed to other factors affecting the CPI's rate and interest rates. So additional research should be carried.

Since this study aims to know and determine the real relationship between them

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