Muhasebe ve Finansman Dergisi – Nisan 2023 (98): 189-208

ISSN: 2146-3042
DOI: 10.25095/mufad.1183719

Relationship Between Investment Instruments and Inflation in Türkiye: A VAR Analysis (2015.12-2021.12)*

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ABSTRACT

Investment instruments are important not only for companies but also for the financial stability of national economies. On the other side, inflation is also critical in terms of production costs, sales prices of companies and the economic stability of the countries. In addition, the size of the returns to be obtained from investment instruments is crucial to protect the purchasing power of individuals in inflationary environments as well.

In this study, the relationship between the investment instruments of selected portfolio investors and inflation was examined. For this purpose, monthly data were used between the years 2015-2021 in Türkiye. In the analysis, the VAR model was used with the index returns of investment instruments and consumer price index (CPI) data. According to the results, the stability condition of the VAR model was met among all variables. It has been revealed that private pension funds, gold, and foreign exchange returns have been the one-way cause of inflation, on the other side gold and foreign exchange returns and inflation have been one-way causes of deposit returns. In addition, it has been determined that the return of the private pension system is effective on the change of all investment instruments. Besides, it has been found that foreign exchange returns are effective in explaining the changes in inflation and deposit returns. Finally, it has been concluded that inflation is effective on changes in deposit and foreign exchange returns.

Keywords: *VAR model, investment instruments, consumer price index, Türkiye*

Jel Classification*: C32, G17, E31*

Türkiye'de Yatırım Araçları Enflasyon ilişkisinin VAR Analiziyle İncelenmesi (2015.12-2021.12)

ÖZET

Yatırım araçları gerek firma boyutunda ve gerekse ülke ekonomilerinin finansal istikrarı açısından önemlidir. Bunun yanında enflasyon da firmaların üretim maliyetleri ile satış fiyatları açısından ve ülkenin ekonomik istikrarı yönünden büyük önem taşımaktadır. Buna ilaveten enflasyonist ortamlarda bireylerin satın alma güçlerini korumada yatırım araçlarından elde edilecek olan getirilerin büyüklüğü ciddi önem taşımaktadır.

Türkiye'de yatırımcılarının finansal piyasalarda yapmış oldukları seçilmiş portföy yatırım araçlarının aralarındaki ilişkinin enflasyon çerçevesinde incelendiği bu çalışmada 2015-2021 arası dönemde aylık veriler kullanılmıştır. Çalışmada söz konusu yatırım araçlarının endeks getirileriyle birlikte TÜFE verileri kullanılarak VAR modeli ile analiz yapılmıştır. Analiz sonuçlarına göre, tüm değişkenler arasında VAR modelinin istikrarlılık koşulu sağlanmıştır. Bireysel Emeklilik Sistemi fonları, altın ve döviz getirilerinin enflasyonun tek yönlü nedeni olduğu, altın ve döviz getirileri ile enflasyonun, mevduat getirisinin tek yönlü nedeni olduğu görülmüştür. Ayrıca BES getirisinin tüm yatırım araçlarının değişimi üzerinde etkili olduğu tespit edilmiştir. Bunun yanında döviz getirisinin, enflasyon ve mevduat getirisindeki değişmeleri açıklamada etkili olduğu bulunmuştur. Son olarak da enflasyonun, mevduat ve döviz getirisi değişmeleri üzerinde etkili olduğu sonucuna ulaşılmıştır.

Anahtar Kelimeler: *VAR modeli, yatırım araçları, tüketici fiyat endeksi, Türkiye*

JEL Sınıflandırması: *C32, G17, E31*

* **Makale Gönderim Tarihi:** 03.102022, **Makale Kabul Tarihi:** 06.01.2023, **Makale Türü:** Nicel Analiz

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1. INTRODUCTION

Investment is the permanent use of money or capital in order to generate income or profit in the future. The resource used for investment should not be depleted and even appreciated after the investment is made. Inflation in Türkiye has started to rise since 2021. The aim of this study is to determine how investment instruments are affected in an inflationary environment. For this purpose, the relationship between inflation and investment instruments has been examined in two ways.

Recently the number of studies on inflation and investment instruments is few. It is also thought that this study will make important contributions both the literature and the finance sector. It differs from other studies in the literature both in terms of the selected model, data set and time interval.

If investors prefer to stay in cash, there is a risk of losing their purchasing power in real terms, especially in an inflationary environment. Both individuals and companies transfer their liquidity to different investment instruments in order to hedge the risk. Not only the relationship between the returns of financial instruments but also financial instruments' impact on inflation are important in terms of long-term investment portfolios as well as in the short-term.

Undoubtedly, in periods when there is no high inflation, since there will not be much loss of value in the purchasing power of individuals, serious attacks will not be made against these investment instruments.

From this point of view, the effect of inflation on investment instruments has become the focus of attention today. In addition, another important issue in the study is related to the foreign exchange return, which depends on the exchange rate, and the deposit return where the interests are effective. Accordingly, the effect of these returns on inflation is another matter of curiosity.

In the literature, the relationship between inflation and a specific investment instrument has been examined. However, today, depending on the development of financial markets, the diversity of investment instruments is quite wide. Inflation should not be thought to be related only to any investment instrument. In other words, inflation is effective on more than one investment instrument, and some investment instruments are also effective on inflation. In this study, it is aimed to examine the relationship between inflation and various investment instruments that have a significant share in financial markets. Here, the main starting point of the study is that while looking at the relationship of an investment instrument with inflation, the changes in the returns of other investment instruments are considered constant and not excluded from the analysis.

In this study, various financial instruments for the financial markets of the Turkish economy and the relationship between the returns of these instruments and inflation are discussed. Variables of financial instruments such as gold index return, currency basket index return, XU100 index return, private pension system index return, deposit index return, consumer price index data are also included in the study to represent inflation.

2. LITERATURE REVIEW

In the literature, there are studies in which various models are established with similar data used in this study. In this section, the selected sources closest to the study are included. However, no study has been found that has both the diversity of the data set and the use of this model.

Jinjarak, et al. (2011), in their studies; determined the characteristic of international fund investment and local market returns. They found that past stock returns contain useful information in predicting stock and bond flows and positively influence future equity returns.

Waqas, et al. (2015), in their studies; examined macroeconomic factors and foreign portfolio investment volatility. They found a significant relationship between these factors and investments. It is determined that stable macroeconomic policies are important in the decisions of foreign portfolio investors.

Hakeem and Suzuki (2017), in their studies; focused on the association between portfolio investment and economic indicators concerning the financial networks of the European Union. According to this study, a strong correlation between investment patterns with economic indicators of a particular economy was found.

Eom and Park (2018), in their studies; suggested a new method for better portfolio investment. They offered new insight into how to enhance the practical applicability of the mean-variance optimization function by controlling the property of the market factor in the sample correlation matrix.

Kuzucu (2018), in this study; evaluated the effects of foreign direct investment and portfolio investment on economic growth in developing countries. Foreign direct investment is positively associated with economic growth. The effect of portfolio investments on economic growth is statistically insignificant. Other variables affecting economic growth are the exchange rate and unemployment. Similar results were obtained with this study in terms of the relations between the variables themselves.

Gumusoglu and Alcin (2019), in their studies; analyzed the impact of short-term capital flows and foreign direct investment in Türkiye. They used the VAR model and found a positive and significant relationship.

Ordu-Akkaya and Soytas (2020), in their studies; examined the relationship between foreign portfolio investment and the stock market. They found a higher positive impact of foreign portfolio investment between stock markets. In this study, the same model was used with different variables.

Skare and Cvek (2020), in their studies; investigated the impact of foreign direct investments on competitiveness in Croatia. It is determined that foreign direct investments as a potential inefficiency growth factor among selected indicators. In this study, the same model was used with different variables.

Al-karasneh et al. (2021), in their studies; examined the impact of foreign portfolio investments on the economic growth of Jordan. It is founded that foreign portfolio investments had a long-term statistical positive impact on economic growth. In this study, the same variables was used with different model.

Guvercin and Gok, (2021), in their studies; analyzed foreign direct investment and portfolio investments on house prices. It is determined that an increase in house prices leads to a decrease in both investments. In this study, the same model was used with different variables.

Koycu and Kayali, (2021), in their studies; examined the effect of foreign direct investment and portfolio investment on stock market returns. According to this study, significant and positive relationship between portfolio investments and stock market return has been determined, while a significant relationship between foreign direct investment and the stock market return has not been determined.

Wijesinghe and De Silva (2021), in their studies; used various variables to evaluate the relationship between foreign portfolio investment and earnings quality. They analysed these variables with panel data regression model. They found significant relationship with the variables. In this study, the same variables was used with different model.

Pan et al. (2022), in their studies; examined the foreign portfolio investment patterns. They used the gravity model. They revealed the possibility of countries creating similar foreign portfolio investment models. According to this study, countries were found to be more likely to generate similar foreign portfolio investment with the three models. In this study, the same variables was used with different model.

Pu and Yang (2022), in their studies; used a historical basis strategy and analyze its profitability. They found three strategies are profitable in both markets and benefits in stock, bond and currency portfolios. They developed risk management strategies. In this study, the same variables was used with different model.

3. EMPIRICAL ANALYSIS

In the analysis part of the study, firstly, the explanation of the data is given. Then, the stationarity analysis of the variables in the study is performed with different unit root tests. Then, action-response, variance decomposition and causality analyzes were performed by establishing the VAR model.

3.1. Data Set

Sources of data with abbreviations and explanations are shown below.

Table 1. Descriptions of Variables

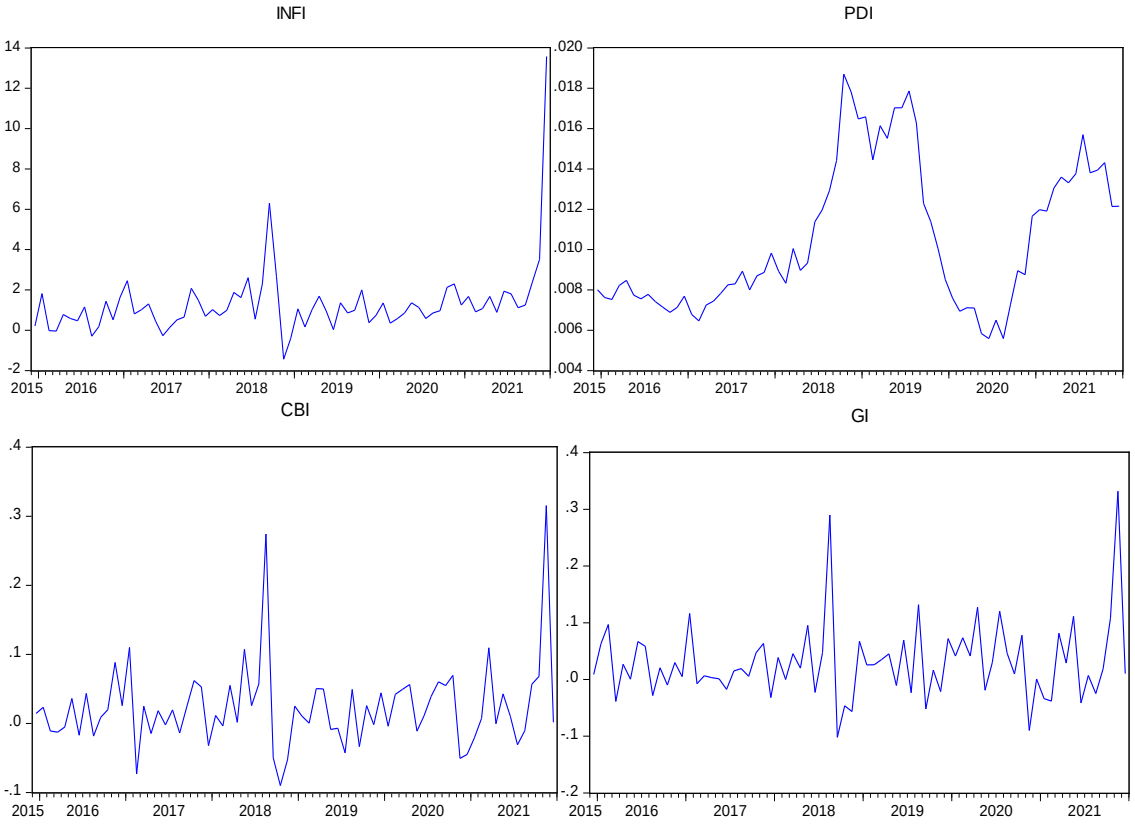
Variables: 2005.12-2021.12	Description	Source
GI	Gold Index Return	Pension Monitoring Center
CBI	Currency Basket Index Return	Pension Monitoring Center
XI	XU100 Index Return	Pension Monitoring Center
PSI	Private Pension System Index Return	Pension Monitoring Center
PDI	Deposit Index Return	Pension Monitoring Center
INFI	Consumer Price Index	Pension Monitoring Center

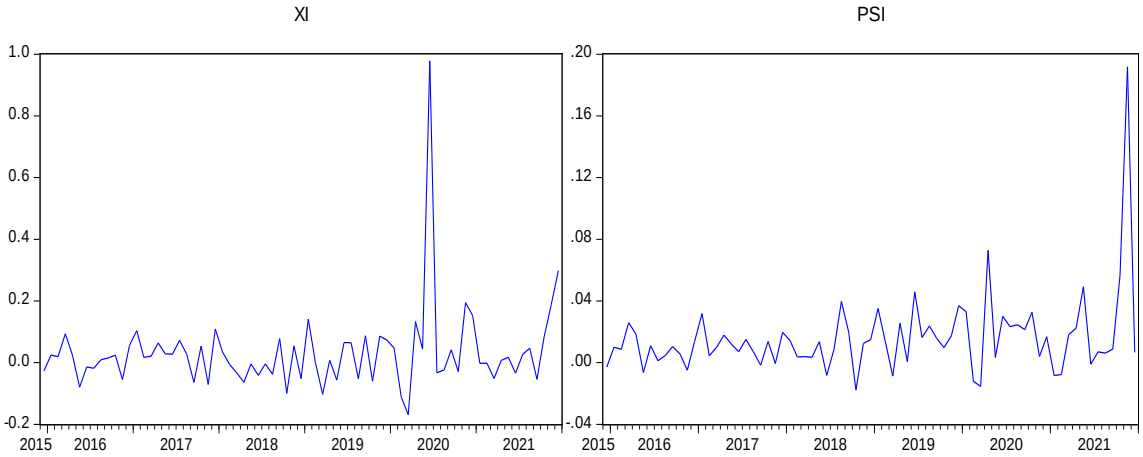
Kaynak: EGM, 2022.

Between the period 2015.12-2021.12, the study was carried out with monthly data for a 6-year period. All data in the study were obtained from the official website of the Pension Monitoring Center of the Ministry of Treasury and Finance of Türkiye.

The graphical views of the variables found in the study are shown in Figure 1.

Figure 1. Representation of Variables





The unit root test model types were determined by considering the above graphical conditions of the data used in the stationarity analysis.

3.2. Stationarity Analysis

In the empirical analysis of the time series, the fact that the changes in macroeconomic variables occur depending on a random process has become the basic condition of the stationarity analysis (Maddala and Lahiri, 2009:482). There are two types of methods generally used in testing whether the data is stationary or not. One of them is the correlogram method, while it is a graphical method; The other method is unit root tests used as statistical methods (Johnston and Dinardo, 1997:215).

According to the δ=0 hypothesis in stationarity test estimations, if the calculated value is greater than the McKinnon probability value as an absolute value, the H1 hypothesis is accepted and there is no unit root in this case. In this case, the data is considered stationary. However, if the H0 hypothesis is accepted, there is a unit root in the data. In this case, it is decided that the data is not stationary (Gujarati, 2003:815).

In this study, Dickey-Fuller (1979) unit root test, which is the traditional stationarity test, and Perron (1989) and Zivot-Andrews (1992) tests of breakage unit root tests were used as unit root tests in stationarity analysis. While the Perron 89 unit root test is a stasis test with an exogenous break and a known break time; The Z&A 92 test, on the other hand, is an endogenous unit root test with an unknown break time (Zivot and Andrews, 1992:40).

In Table 2, the results of the unit root tests for the stability analysis of the variables are given.

Table 2. Unit Root Test Results

Değişken		Perron 89	ADF 79	Z&A
GI	Model	Model A	No constant + No trend	Model A
	Test	-11.06	-7.75	-9.54
	Prob	0,00	0,00	
	Break Date	2021.10		2018.09
PSI	Model	Model A	No constant+ No trend	Model A
	Test	-9.67	-5.95	-6.12
	Prob	0.00	0.00	
	Break Date	2021.08		2017.08
XI	Model	Model B	Constant + Trend	Model B
	Test	-8.71	-8.33	-8.41
	Prob	0.00	0.00	
	Break Date	2021.11		2018.08
CBI	Model	Model A	No constant + No trend	Model A
	Test	-9.20	-7.21	-9.04
	Prob	0.00	0.00	
	Break Date	2021.09		2018.09
PDI	Model	Model C	Constant + Trend	Model C
	Test	-6.04	-1.56	-4.826
	Prob	0.00	0.79	
	Break Date	2018.05		2019.09
D(PDI)	Model		No constant + No trend	
	Test		-7.75**	
	Prob		0.00	
INFI	Model	Model B	Constant + Trend	Model B
	Test	-2.04	-2.10	-2.84
	Prob	0.76	0.53	
	Break Date	2017.07		2021.01
D(INFI)	Model	Model B	Constant + Trend	Model B
	Test	-6.42**	-5.99**	-6.67**
	Prob	0.00	0.00	
	Break Date	2018.09		2020.12

Note: Critical values according to PP 89 unit root test are for Model A: 1%: -4.94, 5%: -4.44 and 10%: -4.19; for Model B: 1%: -5.06, 5%: -4.52 and 10%: -4.26; for Model C: 1%: -5.71, 5%: -5.17 and 10%: -4.893. Critical values according to ADF 79 unit root test are; Constant: 1%: -3.57, 5%: -2.92 and 10%: -2.59. Constant + Trend: 1%: -4.09, 5%: -3.47 and 10%: -3.16'dir. No constant + No trend: 1%: -2.61, 5%: -1.94 and 10%: -1.61. Critical values according to the Z&A unit root test are for Model A: 1%: -5.34, 5%: -4,93, and 10%: -4.58'. For Model B: 1%: -4.80, 5%-4.42 and 10%: -4.11. For Model C: 1%:-5.57, 5%:-5.08, and 10%:-4.82'dir. * stationary data at the level. **data made stationary by differencing. Optimal lag lengths were determined according to Akaike and Schwarz information criteria.

According to the table 2, the variables in the study were examined with three different unit root tests. Accordingly, INFI and PDI variables from the series were found to be stationary at the I(1) level. As other variables, GI, PSI, XI and CBI series were found to be stationary at I(0) level. INFI and PDI variables are made stationary by the difference method and they are stationary with 1st difference. In addition, the break dates of the series are given in the table.

3.3. VAR Analysis

VAR analysis is one of the forward-looking time series analysis methods developed by Sims (1980), in which various macroeconomic aggregates are the subject of analysis, and the relations between internal and external variables (Baltagi, 2008: 360).

The main purpose of the VAR analysis is to reveal the mutual effect between the variables instead of the parameter estimates in the model (Enders, 2004: 270). The bivariate VAR model is represented below with equations (Gujarati, 2003: 849).

$$M_{1t} = \alpha_0 + \sum_{i=1}^{k} \beta_{1i} M_{t-i} + \sum_{i=1}^{k} \gamma_{2i} R_{t-i} + u_t$$

$$R_t = \alpha_1 + \sum_{i=1}^{k} \theta_{1i} M_{t-i} + \sum_{i=1}^{k} \gamma_{2i} R_{t-i} + u_{2t}$$

In table 3 below, the critical values taken into account in determining the lag value of the model in the VAR analysis are shown.

Table 3. Determining the Lag Length of the VAR Model

VAR Lag Order Selection Criteria				Sample: 2015M12 2021M12		
Endogenous variables: INFI PSI PDI XI GI CBI				Exogenous variables: C		
Date: 04/23/22 Time: 02:31				Included observations: 69		
Lag	LogL	LR	FPE	AIC	SC	HQ
0	608.0383	NA	1.06e-15	-17.45038	-17.25611	-17.37331
1	763.9941	280.2685*	3.30e-17*	-20.92737*	-19.56747*	-20.38785*
2	785.0148	34.12051	5.21e-17	-20.49318	-17.96767	-19.49123
3	812.3258	39.58113	7.12e-17	-20.24133	-16.55019	-18.77693
4	844.9909	41.65992	8.84e-17	-20.14466	-15.28791	-18.21783
* indicates lag order selected by the criterion				FPE: Final prediction error		
LR: sequential modified LR test statistic (each test at 5% level)				AIC: Akaike information criterion		
SC: Schwarz information criterion				HQ: Hannan-Quinn information criterion		

As seen in Table 3., it has been determined that the VAR model should be selected with 1 lag.

Table 4 shows results of VAR model estimation

Table 4. VAR Model Estimation Results

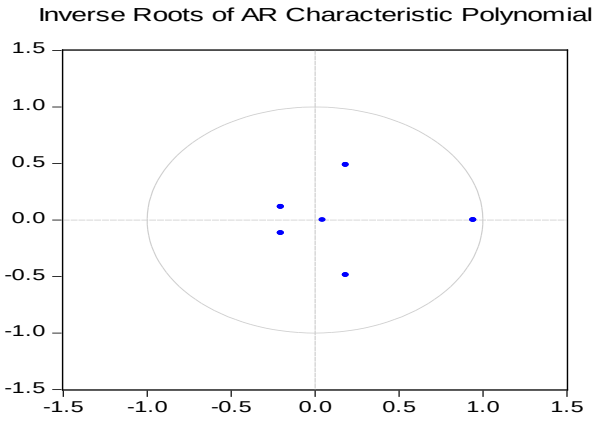
Vector Autoregression Estimates						
Date: 04/08/22 Time: 14:08			Sample (adjusted): 2016M01 2021M12			
Included observations: 72 after adjustments			Standard errors in ( ) & t-statistics in [ ]			
	INFI	PSI	PDI	XI	GI	CBI
INFI(-1)	0.24	-0.002	0.0003	0.007	-0.01	-0.01
	(0.11)	(0.003)	(0.001)	(0.01)	(0.008)	(0.007)
	[2.17]	[-0.67]	[2.28]	[0.42]	[-1.33]	[-1.44]
	INFI	PSI	PDI	XI	GI	CBI
PSI(-1)	39.50	-0.01	-0.006	1.27	0.03	0.02
	(6.37)	(0.19)	(0.008)	(0.99)	(0.50)	(0.45)
	[6.19]	[-0.08]	[-0.76]	[1.28]	[0.07]	[0.05]
	INFI	PSI	PDI	XI	GI	CBI
PDI(-1)	18.20	1.42	0.94	-5.56	1.27	0.006
	(31.04)	(0.95)	(0.03)	(4.85)	(2.45)	(2.22)
	[0.58]	[1.49]	[23.78]	[-1.14]	[0.51]	[0.002]
	INFI	PSI	PDI	XI	GI	CBI
XI(-1)	-1.17	0.009	0.0007	-0.11	0.07	0.002
	(0.93)	(0.02)	(0.001)	(0.14)	(0.07)	(0.06)
	[-1.25]	[0.32]	[0.59]	[-0.78]	[1.07]	[0.04]
	INFI	PSI	PDI	XI	GI	CBI
GI(-1)	-7.93	-0.001	-0.009	-0.18	-0.33	-0.18
	(3.29)	(0.10)	(0.004)	(0.51)	(0.26)	(0.23)
	[-2.40]	[-0.01]	[-2.20]	[-0.35]	[-1.29]	[-0.76]
	INFI	PSI	PDI	XI	GI	CBI
CBI(-1)	18.25	0.07	0.01	0.11	0.32	0.24
	(3.41)	(0.10)	(0.004)	(0.53)	(0.27)	(0.24)
	[5.34]	[0.67]	[2.34]	[0.22]	[1.19]	[0.98]
	INFI	PSI	PDI	XI	GI	CBI
C	0.07	0.002	0.0004	0.06	0.03	0.03
	(0.34)	(0.01)	(0.0004)	(0.05)	(0.02)	(0.02)
	[0.21]	[0.20]	[0.99]	[1.25]	[1.13]	[1.44]
R-squared	0.77	0.04	0.91	0.06	0.06	0.03
F-statistic	37.55	0.56	110.35	0.71	0.71	0.43
	Test	Prob.				
LM (1)	30.13	0.74				
LM (2)	44.34	0.16				
White	0.78	0.66				
J.Bera	0.26	0.87				

In the table above, the VAR Model estimation results and the autocorrelation, heteroscedasticity, and normality test results of the VAR model are given. It has been determined that there are no errors in the VAR model with 1 lag.

Table 5. Roots of Characteristic Polynomial

Roots of Characteristic Polynomial	
Endogenous variables: INFI PSI PDI XI GI CBI	
Exogenous variables: C	Date: 04/08/22
Lag specification: 1 1	Time: 14:09
Root	Modulus
0.943930	0.943930
0.185281 - 0.487383i	0.521413
0.185281 + 0.487383i	0.521413
-0.202659 - 0.116787i	0.233902
-0.202659 + 0.116787i	0.233902
0.046358	0.046358
No root lies outside the unit circle.	
VAR satisfies the stability condition.	

Figure 2. Inverse Roots of AR in VAR



As can be seen from table 5 and figure 2 above, the VAR model has been revealed to be stable and significant. With the fulfillment of this condition, the VAR model has an interpretable feature.

3.3.1. Impulse – Response Function and Variance Decomposition

Since it is difficult to interpret the coefficients when estimating the model in VAR analysis, the method commonly used by estimators is the impulse-response function (Verbeek, 2012: 353). In the graphics below, the mutual impulse-response status of the variables in the VAR model is given. Another analysis technique that reveals the interpretable feature of the VAR model is Variance Decomposition. This analysis tests that a variable can be effective in its shocks as well as its changes in other variables (Sevuktekin and Cinar, 2015: 515).

Annex 1 shows the impulse response functions of INFI and other index returns. INFI has responded strongly and positively for four periods to the impulse of the PSI index. It has been observed that the PSI index has responded strongly and positively to the impulse of INFI. It has been observed that the PDI has responded strongly and positively to the impulse of INFI. INFI has responded negatively for 3 periods to the impulse of XI stock index return. On the other side, the XI stock index return has responded positively to the impulse of INFI on the XI stock index return in the short run. INFI has responded positively for 3 periods to the impulse of GI. On the other side, GI has responded positively in the short run and negatively in the period between the 2nd and 3rd to the impulse of INFI. INFI has responded positively to the impulse of the CBI Index in the short run. On the other side, the CBI has responded positively in the short run and negatively in the period between the 2nd and 4th to the impulse of INFI.

According to annex 2, the results of impulse response functions of PSI and other index returns. The PDI has responded strongly and negatively in the short run to the impulse of the PSI. XI has responded strongly and positively in the short run to the impulse of PSI. GI has responded positively in the short run. On the other side, it has responded negatively in the period between the 2nd and 5th to the impulse of PSI. CBI has responded strongly positively in the short run. On the other side, it has responded negatively in the period between the 2nd and 5th to the impulse of PSI.

Annex 3 shows the impulse response functions of PDI and other index returns. PDI has responded negatively to the shock effect of the XI index return, especially in the long run. There is no impulse-response function determined between the PDI and GI. PDI has responded strongly and positively to the shock effect of the CBI.

Annex 4 reports the results of impulse response functions of XI and other index returns. The GI has responded negatively to the shock effect of the XI. CBI return has responded negatively to the shock effect of the XI in the short run.

Table 6. shows variance decomposition of variables.

Table 6. Variance Decomposition

Cholesky Ordering: INFI PSI PDI XI GI CBI													
Variance Decomposition of INFI:							Variance Decomposition of PSI:						
Period	INFI	PSI	PDI	XI	GI	CBI	Period	INFI	PSI	PDI	XI	GI	CBI
1	100.00	0.00	0.00	0.00	0.00	0.00	1	0.06	99.93	0.00	0.00	0.00	0.00
2	30.08	54.35	0.01	4.25	1.39	9.89	2	0.09	98.43	0.20	0.01	0.61	0.63
3	27.54	54.05	0.16	4.83	2.08	11.31	3	0.15	98.03	0.42	0.07	0.67	0.64
4	27.25	54.44	0.34	4.77	2.05	11.11	4	0.19	97.79	0.57	0.08	0.69	0.65
5	26.91	54.72	0.45	4.76	2.08	11.05	5	0.32	97.51	0.69	0.08	0.69	0.68
6	26.95	54.62	0.53	4.75	2.08	11.03	6	0.39	97.26	0.79	0.10	0.69	0.75
7	26.95	54.53	0.60	4.75	2.08	11.06	7	0.43	97.07	0.89	0.11	0.69	0.79
8	26.94	54.46	0.67	4.75	2.07	11.08	8	0.46	96.92	0.99	0.11	0.68	0.81
9	26.93	54.40	0.73	4.75	2.07	11.09	9	0.49	96.79	1.07	0.11	0.68	0.83
10	26.93	54.35	0.79	4.74	2.07	11.09	10	0.52	96.67	1.14	0.11	0.68	0.85
Ort.	**34.65**	**48.99**	**0.43**	**4.24**	**1.80**	**9.87**	**Ort.**	**0.31**	**97.64**	**0.68**	**0.08**	**0.61**	**0.66**
Variance Decomposition of PDI:							Variance Decomposition of XI:						
Period	INFI	PSI	PDI	XI	GI	CBI	Period	INFI	PSI	PDI	XI	GI	CBI
1	4.48	6.23	89.27	0.00	0.00	0.00	1	1.77	11.81	1.13	85.27	0.00	0.00
2	13.69	9.92	72.53	0.13	0.34	3.36	2	1.77	14.72	1.15	82.16	0.10	0.06
3	19.10	6.49	66.72	0.74	0.22	6.71	3	1.76	15.29	1.20	81.30	0.29	0.13
4	20.75	5.18	63.09	1.24	0.22	9.50	4	1.85	15.29	1.23	81.18	0.29	0.14
5	21.18	4.32	61.88	1.46	0.21	10.92	5	1.89	15.34	1.26	80.99	0.29	0.19
6	21.45	3.76	61.46	1.53	0.19	11.57	6	1.90	15.33	1.30	80.93	0.29	0.21
7	21.71	3.38	61.15	1.58	0.18	11.98	7	1.91	15.33	1.33	80.89	0.29	0.22
8	21.94	3.09	60.85	1.62	0.17	12.30	8	1.92	15.32	1.36	80.86	0.29	0.22
9	22.11	2.88	60.61	1.65	0.16	12.57	9	1.93	15.32	1.38	80.82	0.29	0.23
10	22.23	2.71	60.43	1.68	0.15	12.78	10	1.94	15.31	1.41	80.79	0.29	0.24
Ort.	**18.86**	**4.79**	**65.79**	**1.16**	**0.18**	**9.16**	**Ort.**	**1.86**	**14.90**	**1.27**	**81.51**	**0.24**	**0.16**
Variance Decomposition of GI:							Variance Decomposition of CBI:						
Period	INFI	PSI	PDI	XI	GI	CBI	Period	INFI	PSI	PDI	XI	GI	CBI
1	1.56	48.17	0.17	7.91	42.17	0.00	1	5.30	36.01	0.10	10.52	24.43	23.62
2	2.38	45.60	0.16	9.47	40.44	1.91	2	6.75	34.96	0.10	10.22	23.70	24.23
3	2.60	46.90	0.16	9.04	38.60	2.67	3	7.00	37.54	0.09	9.64	22.17	23.53
4	2.59	46.93	0.16	9.10	38.44	2.75	4	6.91	37.76	0.11	9.68	21.99	23.51
5	2.61	46.95	0.16	9.10	38.40	2.75	5	6.92	37.79	0.14	9.67	21.96	23.49
6	2.61	46.98	0.16	9.09	38.38	2.76	6	6.91	37.85	0.16	9.66	21.94	23.46
7	2.61	46.97	0.16	9.09	38.38	2.76	7	6.92	37.84	0.17	9.65	21.93	23.46
8	2.61	46.98	0.16	9.09	38.37	2.76	8	6.93	37.83	0.19	9.65	21.92	23.45
9	2.61	46.98	0.16	9.09	38.37	2.76	9	6.93	37.82	0.20	9.65	21.92	23.45
10	2.61	46.98	0.16	9.09	38.37	2.76	10	6.93	37.81	0.21	9.65	21.91	23.45
Ort.	**2.47**	**46.94**	**0.16**	**9.01**	**38.99**	**2.38**	**Ort.**	**6.75**	**37.26**	**0.14**	**9.79**	**22.38**	**23.56**

According to annex 5, the impulse response functions of GI and CBI. GI has responded positively to the shock effect of the CBI. It was observed that this response was negative in the 2nd and 3rd periods. In the short run, the return on the foreign CBI has responded strongly and positively to the shock effect of the gold return.

According to the results obtained from the variance decomposition table above; the reason for the changes in the INFI, excluding itself; approximately 50% is due to the returns from PSI, 10% is due to the returns in the CBI and 5% is due to the XI. As can be seen, PDI and GI don't have a strong influence on INFI.

INFI and other financial instruments don't have a strong influence on PSI.

Excluding the source of the change in PDI, approximately 20% is due to INFI, 10% is due to CBI and 5% is due to PSI. It has been determined that the GI and XI don't have a strong influence on PDI.

Excluding the source of the change in the XI, approximately 15% is due to PSI. The effects of other investment instruments and INFI on the change in the XI were found to be very low.

Excluding the source of the change in GI, approximately 47% is due to PSI and 9% to the XI. The other investment instruments and INFI don't have a strong influence on gold index return.

Excluding the sources of the change in the CBI itself, approximately 38% resulted from PSI, 23% from GI, and 10% from XI, while approximately 7% resulted from changes in INFI. The return on PDI doesn't have a strong influence on CBI.

3.3.2. VAR Causality Analysis

Causality tests are examined in the cause and effect relationships between the variables. These tests, developed by Granger, are widely used especially for long-term time series (Granger, 1969: 425).

Causality tests are divided into two classical and Granger causality. While the lag numbers of the variables in the analysis may be different in classical causality, it is accepted that they are the same in Granger causality (Tari, 2005: 421).

In table 7. below, the results of the VAR Causality analysis used in the study will be shown.

Table 7. Causality Test Results

VAR Granger Causality/Block Exogeneity Wald Tests							
Date: 04/08/22 Time: 14:27		Sample: 2015M12 2021M12				Included observations: 72	
Dependent variable: INFI				Dependent variable: PSI			
Excluded	Chi-sq	df	Prob.	Excluded	Chi-sq	df	Prob.
PSI	38.36	1	0.00	INFI	0.45	1	0.49
PDI	0.34	1	0.55	PDI	2.24	1	0.13
XI	1.56	1	0.21	XI	0.10	1	0.74
GI	5.80	1	0.01	GI	0.0003	1	0.98
CBI	28.52	1	0.00	CBI	0.46	1	0.49
All	179.61	5	0.00	All	2.86	5	0.72
Dependent variable: PDI				Dependent variable: XI			
Excluded	Chi-sq	df	Prob.	Excluded	Chi-sq	df	Prob.
INFI	5.20	1	0.02	INFI	0.18	1	0.67
PSI	0.58	1	0.44	PSI	1.63	1	0.20
XI	0.35	1	0.54	PDI	1.31	1	0.25
GI	4.84	1	0.02	GI	0.12	1	0.72
CBI	5.49	1	0.01	CBI	0.04	1	0.82
All	16.99	5	0.00	All	4.27	5	0.51
Dependent variable: GI				Dependent variable: CBI			
Excluded	Chi-sq	df	Prob.	Excluded	Chi-sq	df	Prob.
INFI	1.78	1	0.18	INFI	2.08	1	0.14
PSI	0.006	1	0.93	PSI	0.003	1	0.95
PDI	0.26	1	0.60	PDI	0.0001	1	0.99
XI	1.14	1	0.28	XI	0.001	1	0.96
CBI	1.43	1	0.23	GI	0.58	1	0.44
All	3.55	5	0.61	All	2.53	5	0.77

According to the table above; According to the VAR causality test results; It has been determined that private pension funds, gold, and foreign exchange basket returns are the one-way cause of CPI. In addition, it has been seen that gold and foreign exchange basket returns and CPI are one-way causes of deposit returns. Apart from this, there is no unidirectional or reciprocal causality relationship between other investment instruments and CPI.

4. CONCLUSION

In this study, the relationship between inflation and various investment instruments was examined by VAR analysis and VAR causality test methods. Exchange rate, deposit interest, gold, borsa istanbul and private pension system fund returns, which are predicted to be related to inflation, are included in the study. Here, although the relationship between inflation and investment instruments is the main target, the relationship between the investment instruments themselves is also a matter of curiosity. For this purpose an analysis has been made

According to the results of the analysis of the study, inflation; it is concluded that the private pension system, XU100 index, is not strong to the shocks of gold and foreign exchange returns, and the changes in inflation are mostly caused by the private pension system, XU100 index, and foreign currency returns.

It was determined that the most sensitive investment instrument against the private pension system fund returns is the XU100 index return, and the changes in the XU100 index are also caused by the private pension system fund returns.

It was found that deposit is strong against inflation, foreign exchange, and private pension system returns. It is moderately sensitive to XU100 index returns. In addition, it can be said that the changes in deposit returns are mostly caused by inflation, foreign exchange, and private pension system fund returns.

It was determined that the changes in the gold return are caused by the private pension system and XU100 index returns, and the gold return is strong against the private pension system funds, while it is moderately sensitive to the XU100 index, inflation, and foreign exchange returns.

It was determined that the changes in the foreign currency return are caused by the private pension system, gold, XU100 index returns, and inflation, and it was observed that the foreign currency return is also sensitive to these 4 variables.

According to the VAR causality test of the study, gold and foreign exchange returns are the causes of both inflation and deposit returns; In addition, it has been determined that inflation is the cause of deposit returns, and private pension system fund returns are also the cause of inflation.

This study differs from other studies in the literature in terms of determining the relationships between a large number of investment instruments and inflation in the context of inflation. In particular, it has been acted on from the rationality that conscious investors form their portfolio by looking at the situation of many investment instruments.

In summary, the magnitude and importance of the relationship between inflation and all investment instruments cannot be denied. Accordingly, the importance of the relationship between inflation, which is the most important indicator of economic stability along with unemployment in an economy, and the stability of financial markets has been tried to be revealed. As a result, the most important determinant of the stability of financial markets is minimizing the fluctuations in the prices of financial instruments. This will undoubtedly be instrumental in ensuring economic stability by establishing an environment of trust in that economy.

It is thought that both the data set and the model used his study will contribute to the literature and the economic and financial sector.

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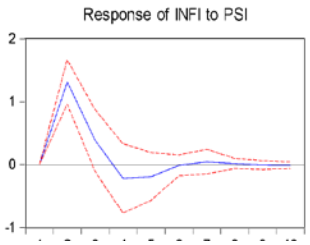
Annex 1. The impulse response functions of INFI and other index returns

Response to Cholesky One S.D. Innovations ± 2 S



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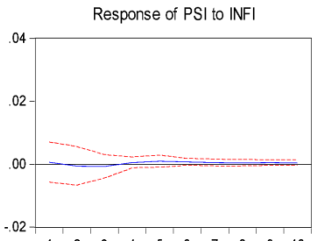

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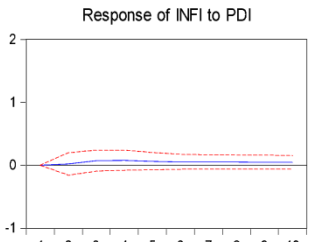

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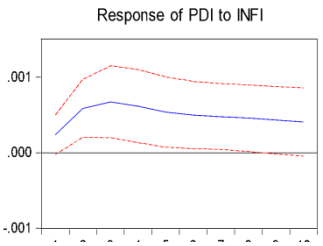

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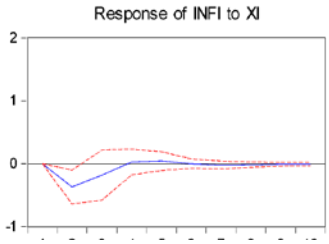

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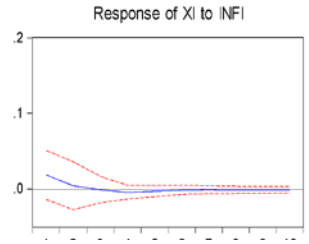

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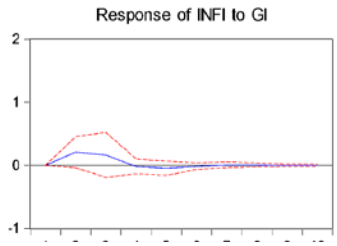

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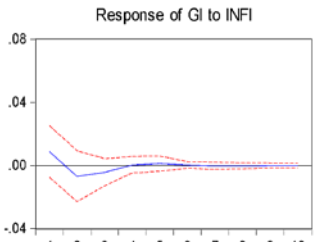

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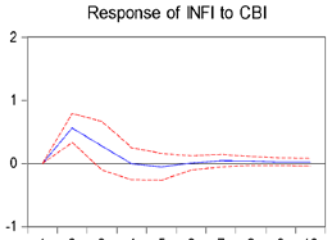

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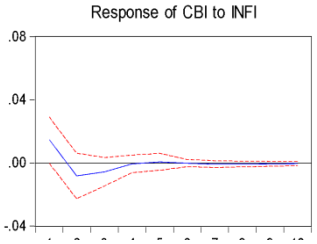
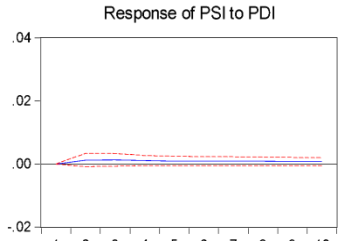


Annex 2. The impulse response functions of PSI and other index returns.

Response to Cholesky One S.D. Innovation



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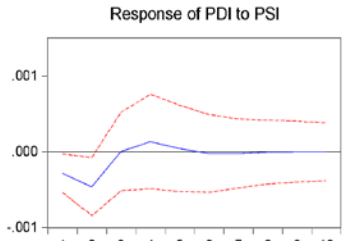

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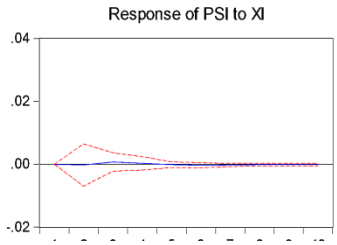

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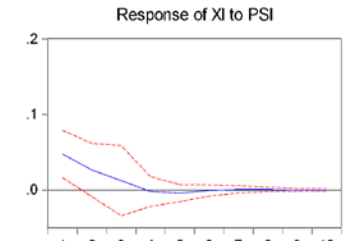

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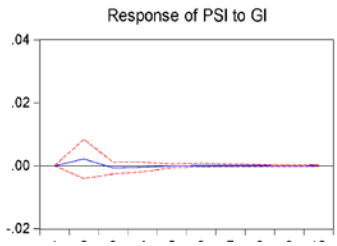

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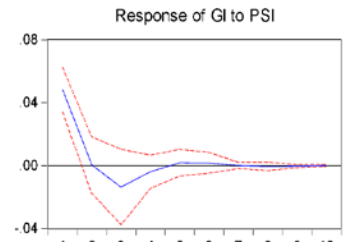

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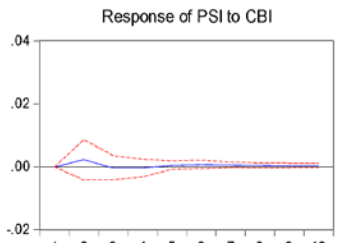

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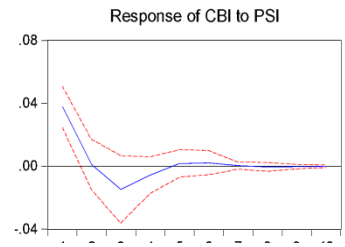
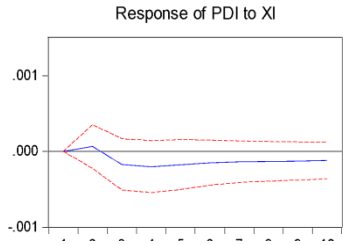


Annex 3. The impulse response functions of PDI and other index returns.

Response to Cholesky One S.D. Innovations



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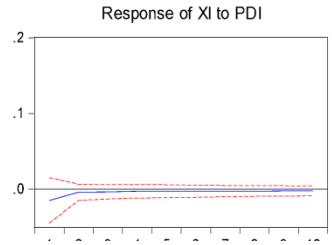

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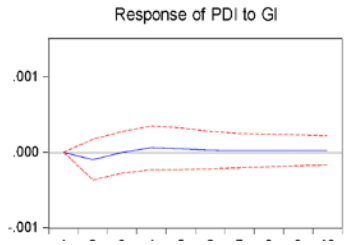

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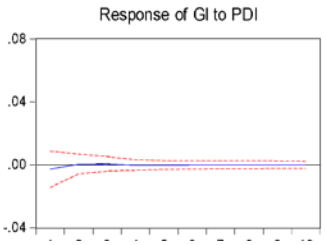

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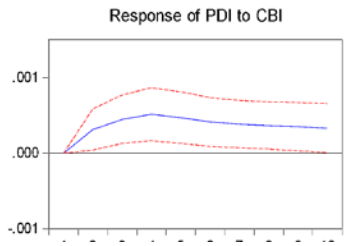
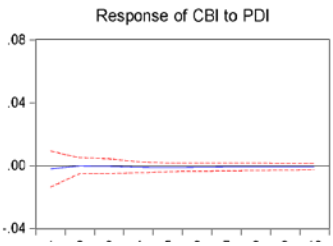
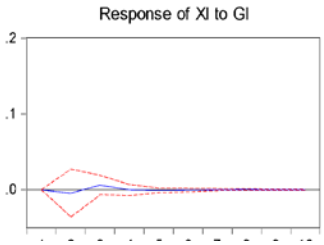


Response to Cholesky One S.D. Innovations

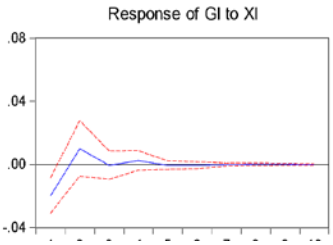


Annex 4. The impulse response functions of XI and other index returns.

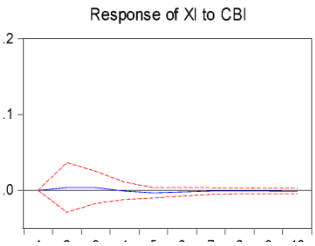
Response to Cholesky One S.D. Innovations



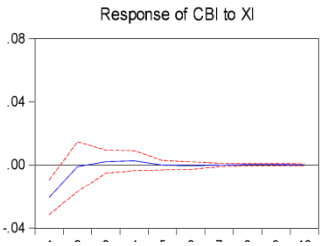
Response to Cholesky One S.D. Innovations



Response to Cholesky One S.D. Innovations



Response to Cholesky One S.D. Innovations



Annex 5. The impulse response functions of GI and CBI