IZMIR DEMOCRACY UNIVERSITY SOCIAL SCIENCES JOURNAL (IDUSoS)
Cilt/Volume: 7 Sayı/Issue: 1 Sayfa/Page: 56-74

THE FORCED EQUILIBRIUM: GROWTH, INFLATION, AND INVESTMENT: EMPIRICAL EVIDENCE FROM TURKIYE

Assoc. Prof. Gülgün Çiğdem[1]

ABSTRACT

This study embarks on a comprehensive exploration of the intricate dynamics between economic growth, inflation, and investment within the unique economic landscape of Turkiye. Spanning from the years of 1998 to 2022, the analysis meticulously delves into a repository of data sourced from reliable datasets. Leveraging a sophisticated analytical toolkit, including Narayan and Popp (2010)'s Unit Root Test, Lee and Strazicich's Unit Root Test, as well as VAR Model and VAR Granger Causality Test methodologies, the study aptly accommodates the multifaceted nature of structural breaks inherent within the Turkish economy. The culmination of this rigorous analysis unveils compelling insights into the complex interplay among these pivotal economic variables. Notably, the findings elucidate the presence of distinct unidirectional causality relationships, highlighting the profound impact of both investment and economic growth on shaping the trajectory of inflation within Turkiye. This revelation serves to underscore the pressing imperative for Turkiye to meticulously navigate a delicate equilibrium between its ambitious developmental aspirations and the pressing need to effectively combat inflationary pressures. Situated within this intricate balance lies a formidable challenge for Turkiye, necessitating the formulation of astute policy interventions aimed at reconciling this inherent paradox. It becomes abundantly clear that any policy measures devised must strike a delicate balance, effectively addressing the dual objectives of fostering sustainable economic growth while simultaneously mitigating the adverse effects of inflation. Moreover, it is imperative for Turkiye to steadfastly adhere to the implementation of these policies, ensuring their efficacy in navigating the complex economic landscape. In essence, this study serves as a clarion call for Turkiye to adopt a holistic approach toward economic policymaking, one that not only acknowledges the multifaceted nature of economic interdependencies but also

[1] Istanbul Gelisim University, Faculty of Economics, Administrative and Social Sciences, Department of International Trade and Business Administration, E-mail: gulguncigdem@gmail.com, ORCID: 0000-0001-5353-8638.

Makale Gönderim Tarihi (Manuscript Submit Date): 28.04.2024, Kabul Tarihi (Accepted Date): 02.06.2024, Basım Tarihi (Published Date): 01.07.2024

embraces the imperative of striking a delicate balance between competing objectives. By charting a prudent course forward, Turkiye can effectively surmount the challenges posed by this intricate economic landscape, paving the way for sustained economic prosperity and resilience in the years to come.

Keywords: Growth, Investmet, Inflation, Narayan and Popp’s Unit Root Test, Lee and Strazicich's Unit Root Test, VAR Model, VAR Granger Causality Test.

Jel Codes: E22, E31, O47, C22.

1. INTRODUCTION

At the heart of a nation's economic health and stability lies the intricate interplay among economic growth, investment, and inflation. These factors collectively shape the vitality and prosperity of an economy, but they also pose challenges when their delicate balance is disrupted. Consider, for instance, while too little inflation can stifle economic activity and dampen investor confidence, excessive inflation can wreak havoc on price stability and hinder overall economic growth. Striking the right balance is essential, requiring a nuanced understanding of the intricate relationships at play. Crafting effective economic policies demands a careful approach that takes into account the unique economic structures and challenges faced by each nation. Macroeconomic strategies must navigate the complexities of managing inflationary pressures while simultaneously fostering growth and maintaining investor confidence. This involves prioritizing measures that not only promote economic development but also uplift the welfare of society as a whole. Building upon these foundations, this research endeavors to analyze the relationships between growth, investment, and inflation in Turkiye. To this end, a comprehensive review of the literature will precede the empirical analyses. Drawing insights from the findings, implications will be derived, culminating in policy recommendations to conclude the study.

2. LITERATURE

In this section, empirical studies analysing the links between growth, inflation and investment will be presented.

Table 1. Literature

Researcher	Method	Period	Result
Kormendi and Meguire (1985)	Horizontal Cross Section Data	1950-1977, 47 countries	Inflation rates shrink aggregate investments.
Khan and Shenhadji (2003)	Test for the Existence of Threshold Effects	1960-1998, 140 countries	Especially in industrialised countries, the increase in inflation rates reduces investments.
Kirmanoğlu (2001)	VAR Analysis	1964-2000, Turkiye	Inflation adversely affects total investments, especially private sector investments.
Valadkhani (2003)	Granger Causality Analysis	1968-2000, Iran	Real investments and inflation rates are negatively correlated.
Jangili (2011)	Granger Causality Analysis	1950 – 2007, India	Economic growth increases the volume of total investments, but there is no mutual causality between them.
Barro (2013)	Panel Regression Analysis	1960-1990, 100 countries	In the long run, rising inflation rates lead to a decline in aggregate investments.

Bağcı and Ergüven (2016)	Granger Causality Analysis	2002-2015, Turkiye	Investment and inflation as well as investment and growth are not causally related.
Kaygısız et al. (2016)	Granger Causality Analysis	1980- 2014	Economic growth is not found statistically significant in explaining total investments and there is no causality relationship between them.
Kartikasari (2017)	Panel Regression Analysis	2009-2016, Indonesia	Economic growth has an increasing effect on total investments.
Bakari (2018)	VECM	1970-2017, Brazil	Investment→Economic Development
Bjelić et al. (2021)	Panel Analysis	2005-2020, Albania, Bosnia and Herzegovina, Croatia, Montenegro, North Macedonia, Serbia	Economic Growth →Investment
Denano and Sibera (2022)	VECM, ADF, Johansen Cointegration Test		Investment→Economic Growth (Short & Long Run)
Hordofa (2023)	ARDL	1976-2018, Ethiopia	Economic Growth↔Investment (Short Term) Economic Growth → Investment (Long Term)

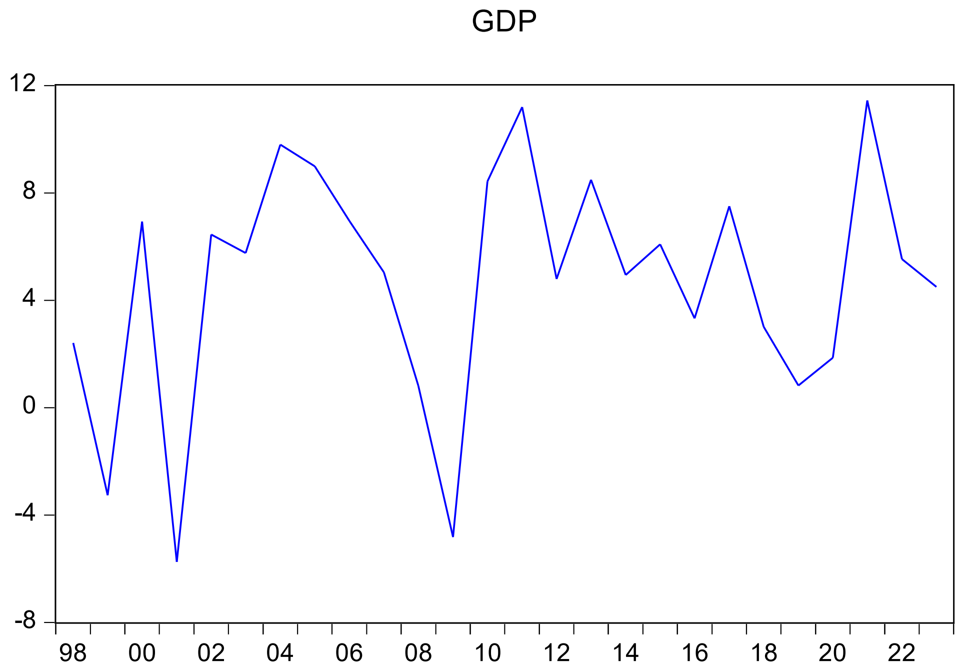
3. DATA SET AND METHODOLOGY

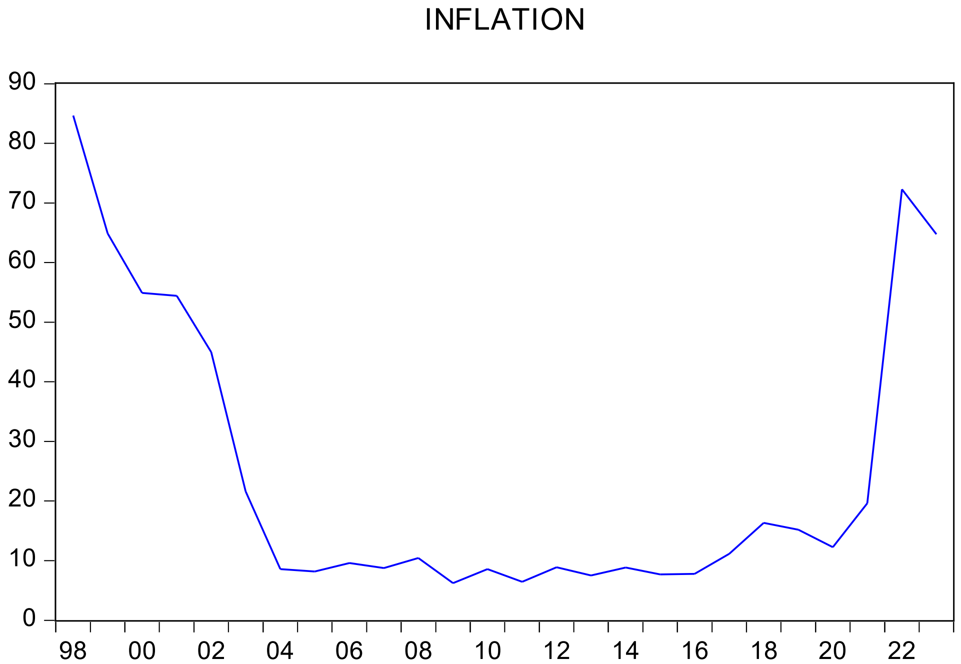
Understanding the intricate connections between Turkiye's GDP, inflation, and investment is the primary goal of this study. In this section, first a detailed description of the analytical methods used will be presented and then the findings will be analysed. The World Bank provided data for the years 1998 -2022 so that the link between Turkiye's growth, inflation, and investment could be examined (Table 2). 59

Table 2. Introduction of Macroeconomic Variables

Variables	Data Frequency	Abbreviation	Unit	Database
Total Investments	*Annually*	*TI*	GDP %	World Bank
Growth Rates	*Annually*	*GDP*	Rate	World Bank
Inflation Rates	*Annually*	*ENF*	Index	World Bank

Before starting the analyses, the graphs of the variables were examined. The behavior of the variables during the analytical process is depicted in Figure 1.


GDP
12
8
4
0
-4
-8
98
00
02
04
06
08
10
12
14
16
18
20
22


INFLATION
90
80
70
60
50
40
30
20
10
0
98
00
02
04
06
08
10
12
14
16
18
20
22

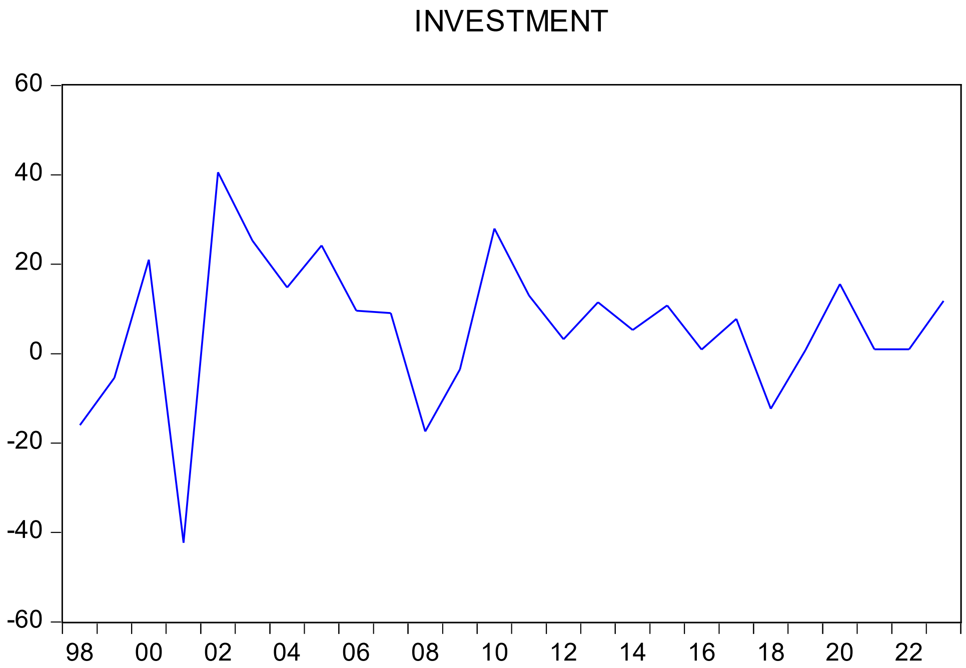


Figure 1. Variables

Secondly, stationarity tests, which are the first and mandatory step, have been performed. The unit root tests developed by Narayan and Popp (2010) and Lee and Strazicich (2003, 2004) will be used to determine whether there are any breaks in the serial data. Then, VAR Model and VAR Granger Causality test will be applied to analyse the causal relationships between the variables. These analytical approaches will help us better understand the dynamic relationships between inflation, economic growth, and investments in Turkiye. Gauss and E-Views 10 programme was used in the analyses.

3.1. Narayan and Popp (2010) Unit Root Test

I use the unit root test in the analysis that Narayan and Popp (2010) established to examine the potential of numerous structural fractures. The unit root test developed by Narayan and Popp (2010), Lumsdaine and Papell (1997), and Lee and Strazicich (2003) allows for multiple structural breaks.

Narayan and Popp (2010) have a superior size, high power, and more reliably detect structural break dates, according to Narayan and Popp (2013), who looked at the limited sample size and power properties of these tests. To do the Narayan and Popp (2010) unit root test, it is necessary to estimate equations 1 and 2.

Model 1

$$y_t = \rho y_{t-1} + \alpha_1 + \beta * t + \phi_1 D(T'_B)_{1,t} + \phi_2 D(T'_B)_{2,t} + \theta_1 DU'_{1,t-1} + \theta_2 DU'_{2,t-1} + \sum_{j=1}^{k} \beta_j \Delta y_{t-j} + \varepsilon_{1t} \quad (1)$$

Model 2

$$y_t = \rho y_{t-1} + \alpha_2 + \beta * t + \delta_1 D(T'_B)_{1,t} + \delta_2 D(T'_B)_{2,t} + \theta_1 DU'_{1,t-1} + \theta_2 DU'_{2,t-1} + \varphi_1 DT'_{1,t-1} + \varphi_2 DT'_{2,t-1} + \sum_{j=1}^{k} \beta_j \Delta y_{t-j} + \varepsilon_{2t} \quad (2)$$

In Model 1, two structural breaks in the level are allowed, but in Model 2, two structural breaks in the level and slope are allowed. The alternative hypothesis, ρ<1, is evaluated against the unit root hypothesis, ρ=1. The t-statistic of $\hat{\rho}$ is denoted as $t_{\hat{\rho}}$. $T'_{B,i}, i = 1, 2$ denotes break dates, $DU'_{i,t} = 1(t > T'_{B,i}), DT'_{i,t} = 1(t > T'_{B,i})(t - T'_{B,i})$. Grid search and sequential process can be used to find the dates of structural breaks. The sequential technique is less computationally demanding, but the break dates are not significantly different (Narayan and Popp 2010).

3.2. LM Test

In order to determine the critical values, the ZA and LP unit root tests make the assumption that the null hypothesis, which proves the presence of a unit root, does not contain any structural breaks. According to Lee and Strazicich (2003, 2004), "stationary with structural breaks" should not be the alternative null hypothesis utilized in these studies. This is due to the possibility that structural breaks exist, which suggests that there might be a unit root with structural breaks in the series being studied and offers an alternative to the null hypothesis. Stated differently, rejecting the null hypothesis does not automatically mean rejecting the existence of a unit root; rather, it implies rejecting a unit root devoid of structural breakdowns. This finding implies that care should be taken when interpreting test findings from empirical research. Researchers may mistakenly believe that the series they are studying is trend stationary with structural breaks if the null hypothesis is rejected, while in actuality, the series is difference stationary with breaks. To address this issue, as an alternative to the ZA unit root test with one break and the LP unit root test with two breaks, Schmidt and Phillips (1992) introduced the Lagrange Multipliers (LM) unit root test, which Lee and Strazicich (2003, 2004) developed based on that test.

For the LM unit root test, the following regression is considered;

$$y_t = \delta Z_t + e_t \qquad e_t = \beta e_{t-1} + \varepsilon_t \tag{3}$$

Where Z_t denotes the vector containing the exogenous variables, ε_t *iid N* $(0,\sigma^2)$ denotes the residuals with N characteristics. For the unit root test that allows a single break in the level, Model A can be obtained by substituting [1, *t*, D_t] for Z_t in model (1) to denote the shadow variable that takes the value 1 when D_t, t≥TB+1 and 0 otherwise.

TB denotes the time of the break. For the unit root test that allows two breaks in the level, Model AA replaces Z_t with [1, *t, D_t, DT_t*], where D_{jt} is the shadow variable that takes the value 1 when $_{tTBj+1}$ for $j=1$,2 and 0 otherwise.

Model C, which allows a single break in both level and slope, shows the shadow variable that takes the value 0 in *DT*, $t \geq T_B+1$ while $t-T_B$ takes the value 0 in other cases. It is obtained by adding [1, *t*, D_t, D_t]′ instead of Z_t.

To obtain Model CC, which allows for two breaks in the constant term and trend, j=1,2 is replaced by DT_{jt}, t≥T_{Bj}+1 by $t-T_{Bj}$, and [1, t, D_{1t}, D_{2t}, DT_{1t}, DT_{2t}] by replacing Z_t with the shadow variable, which takes the value 0 in other cases. 63

Breaks occur throughout the data creation process under the null hypothesis (β=1), while the alternative hypothesis is (β<1). The LM unit root test statistic is produced by the subsequent regression:

$$\Delta y_t = \delta' \Delta Z_t + \phi \tilde{S}_{t-1} + u_t \tag{4}$$

In this expression, $\tilde{S}_{t-1} = y_t - \tilde{\psi}_x - Z_t \tilde{S}_{t-1}$ is t=2, …, T (2). The coefficients derived from Δy_t's regression on Δz_t are $\tilde{\delta}$. $\tilde{\psi}_x$ is obtained by $y_1 - Z_1\delta$. The t statistic, $\tilde{\tau}$, which evaluates a unit root's null hypothesis, yields the LM test statistic. The points where the t test statistic is minimum are chosen in order to calculate the break times:

$$LM_\tau = \inf_\lambda \tilde{\tau}(\lambda) \tag{5}$$

For $j=1,2$, the T observations are $j=T/TBj$, where TBj represents the break point. The region of the clipping *(0.15*T - 0.85*T)* is searched for the structural break point.

For the one-break LM unit root test, Lee and Strazicich (2004) provides crucial values; for the two-break LM unit root test, Lee and Strazicich (2003) provide critical values. If the test statistic exceeds the critical value, the null hypothesis on the unit root with structural break is rejected.

3.3. VAR Model

The Granger causality test model serves as the foundation for Sims (1980)'s model, in which two endogenous variables are linked, up to a certain time, to the lagged values of both their own and the other endogenous variable. Sims challenges the structural model's use of the terms endogenous and exogenous. Furthermore, he claims that this distinction is unnatural. The VAR model (Ertek, 2000: 404) is defined as follows when we take into account the Y_t and X_t series:

$$Y_t = \alpha + \sum_{j=1}^{m} \beta_j Y_{t-j} + \sum_{j=1}^{m} \delta_j X_{t-j} + \varepsilon_{1t} \quad (6)$$

$$X_t = \alpha + \sum_{j=1}^{m} \theta_j Y_{t-j} + \sum_{j=1}^{m} \vartheta_j X_{t-j} + \varepsilon_{2t} \quad (7)$$

where the error terms are $\varepsilon 1t$ and $\varepsilon 2t$. Both the X and Y variables are impacted by the lags in their respective values. The values that are determined by the least squares approach in this model will be consistent because the right-hand side of the equations only include lag variables.

3.3.1.Impulse-Response Analysis

Impulse-response functions are obtained once the proper lag lengths in the VAR system have been determined. With the use of tables or graphs, impulse-response functions show how the shocks affect the variables and when those effects occur. This procedure makes it clear which variables experience shocks and how they will affect the variables. First, the movements of the variables within ten periods are analyzed to identify how the shocks will happen. Graphs and tables are used to show how other series respond to a one-unit change in the shocks that occur in the series. The rows display how the variables react to these shocks, whilst the columns describe the variables in which shocks occur. Graphs and tables are used to show how other series respond to a one-unit change in the shocks that occur in the series. The variables that experience shocks are represented in columns, and their reactions to these shocks are displayed in rows (Tarı, 2010: 465–468).

3.3.2. Variance Decomposition Analysis

By using variance decomposition, one can determine what proportion of a variable's change is due to the variable itself and what proportion is due to other variables. An exogenous variable is defined as one that, when taken alone, accounts for almost 100% of the variance change. The arrangement of the variables is crucial to this analysis. From exogenous to endogenous is the sequence. The second function in VAR that is being targeted is variance decomposition. It looks at the proportion of each variable's analyzed variance change that can be accounted for by its own lags and the proportion that can be accounted for by other variables. In addition, it can serve as a supplementary evaluation to determine if the variables are endogenous or exogenous (Tarı, 2006: 452-453).

3.4. VAR Granger Causality Test

"The use of past values of one variable improves the predictive performance of the other variable" is the fundamental tenet of Granger Causality. Granger (1969) identified three key components of this theory, which are as follows:

- There is no instantaneous causality. Consequently, there is never "simultaneous causality" because independent movements always occur at different times.

- The present cannot be the result of the future. When determining if a causal relationship exists, this definition is crucial.

Granger (1969) developed the operational definition of causation in econometrics that is currently most commonly employed. Sims (1972) developed it later.

4. EMPIRICAL FINDINGS

This section presents the results of the Narayan and Popp (2010) Unit Root Test, the Lee and Strazicich Unit Root Test with two breaks, the VAR model analysis and the VAR Granger Causality Test in the research conducted to understand the complex relationships between growth, inflation and investments, focusing on the period 1998-2022 in Turkiye. The findings of the Narayan and Popp (2010) unit root test, which permits numerous structural fractures, are shown in Table 3.

Table 3. Narayan and Popp (2010) Unit Root with two structural breaks

Model Type **M1**			
First Break	9.000	9.000	0.3600
Second Break	17.00 (2014)	17.00 (2014)	0.6800
phi = rho-1	-1.731		
T value	-12.56		
Optimal Lag	0.0000		
Variance	185.6		
Model Type **M2**			
First Break	9.000 (2006)	9.000 (2006)	0.3600
Second Break	17.00	17.00	0.6800
phi = rho-1	-1.758		
T value	-14.59		
Optimal Lag	0.0000		
Variance	138.2		

The results of the LM unit root test with two structural fractures are displayed in Table 4. Table 4 displays test statistics that are less than the pertinent critical values in both models. As a result, it is appropriate to reject the unit root with two breaks null hypothesis.

Table 4. Lee and Strazicich Min LM t-stat with two breaks

Model: 2 Model (1=A, 2=C)		
Min. Test Statistic	-10.0148	
Estimated break point	16.0000 (2013)	21.0000 (2018)
Selected lag	0.0000	
Est. coeff. of dummy	49.3171	-73.0826
t-stat	4.4314	-4.8358
Standard error	18.1189	
Standardized dummy	2.7219	-4.0335

Table 5. Critical Values

Test	**%1**	**%5**
Lee-Strazicich	-6,32	-5,73
Narayan-Popp (M1)	-5,259	-4,514
Narayan-Popp (M2)	-5,949	-5,181

All tests have critical values (Table 5) that are less than the test statistics, according to the findings. The test statistics is greater than all test critical values, the variables are stationary time series.

Finding the ideal latency is necessary when developing a VAR model. In order to determine the ideal latency, consideration was given to the information standards of Hannan Quinn (HQ), Schwarz (SC), and Akaike (AIC). Any delay that causes the aforementioned statistics to acquire the lowest value is regarded as the model's ideal lag. According to (AIC) (Table 6), this model was chosen.

Table 6. VAR optimum lag selection criteria

Lag	Lag L	LR	FPE	AIC	SC	HQ
0	-268.5069	NA	1345244.	22.62557	22.77283	22.66464
1	-242.3121	43.65789*	323988.5*	21.19268*	21.78170*	21.34895*
2	-234.9828	10.38329	388709.1	21.33190	22.36269	21.60537

Appropriate lag length: 1

The optimum is chosen for the VAR model after testing the Final Prediction Error (FPE), Likelihood-ratio (LR), Akaike Information Criterion (AIC), and Schwarz Information Criterion (SC). Given macroeconomic factors, the AIC standard recommends a lag of 1 as the ideal value for the VAR model. Accordingly, the test shows that there is no statistical error in the VAR model at lag 1. As a result, the statistical tests of the VAR model in Table 7 are reliable.

Table 7. VAR model at the selected optimum lag (1) - Vector Autoregression Estimates

Model	Investment	GDP	Inflation
INVESTMENT(-1)	0.090942	0.118521	-0.403854
	(0.25797)	(0.06856)	(0.18068)
	[0.35253]	[1.72869]	[-2.23513]
GDP(-1)	-1.740264	-0.354686	1.708117
	(0.97276)	(0.25853)	(0.68133)
	[-1.78900]	[-1.37191]	[2.50702]
INFLATION(-1)	-0.086390	-0.059601	0.788548
	(0.14540)	(0.03864)	(0.10184)
	[-0.59414]	[-1.54229]	[7.74271]
C	16.57128	7.095916	-1.497840
	(6.51497)	(1.73151)	(4.56319)
	[2.54357]	[4.09810]	[-0.32824]

Note: Standard errors in ( ) & t-statistics in [ ]

Causal testing between variables is one of the frequent applications of the VAR model. Table 8 and Figure 2 show the causality between the variables and its direction.

Table 8. VAR Model

Dependent variable: INVESTMENT				
Excluded	**Chi-sq**	**df**	**Prob.**	**Direction of Causality**
GDP	3.200531	1	0.0736	None
INFLATION	0.352998	1	0.5524	None
Dependent variable: GDP				
Excluded	**Chi-sq**	**df**	**Prob.**	**Direction of Causality**
INVESTMENT	2.988383	1	0.0839	None
INFLATION	2.378645	1	0.1230	None
Dependent variable: INFLATION				

Excluded	Chi-sq	df	Prob.	Direction of Causality
INVESTMENT	4.995812	1	0.0254	Investment→Inflation
GDP	6.285133	1	0.0122	GDP→Inflation

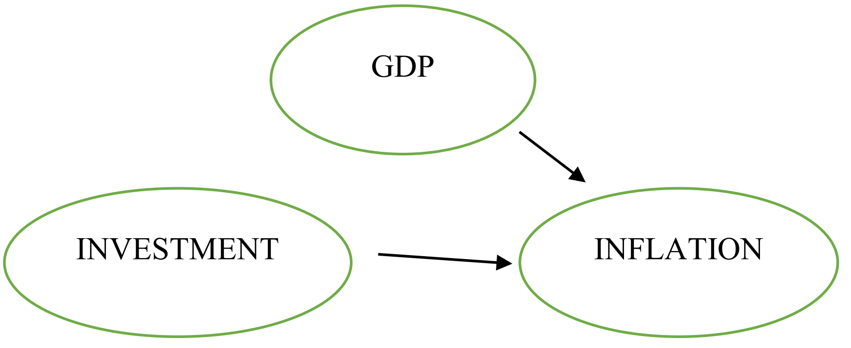


Figure 2. VAR Granger Causality Test Result

It is well known that one residual can anticipate the next if there is a correlation between neighboring residuals. This is referred to as autocorrelation in statistics. Explanatory data not described by the independent variables is represented by this correlation. Time-series data-based models are vulnerable to this issue. Thus, a helpful group of methods for assessing the quality of fit of a model is residual analysis.

It is crucial to verify the fundamental presumptions since the majority of linear regression estimators depend on an accurately stated regression function as well as independent, identically distributed errors in order to perform consistently.

Table 9. VAR Residual Serial Correlation LM Tests

Lag	LRE* stat	df	Prob.	Rao F-stat	df	Prob.
1	11.43143	9	0.2473	1.337218	(9, 39.1)	0.2499
2	12.18735	9	0.2030	1.438941	(9, 39.1)	0.2054
Null hypothesis: No serial correlation at lags 1 to h						
Lag	LRE* stat	df	Prob.	Rao F-stat	df	Prob.
1	11.43143	9	0.2473	1.337218	(9, 39.1)	0.2499
2	17.99023	18	0.4563	1.010324	(18, 37.3)	0.4711

*Edgeworth expansion corrected likelihood ratio statistic.

The presence of serial correlation in the residuals of the estimated VAR model was tested by Lagrange multiplier (LM) test. No serial correlation was found among the residuals (Table 9).

Table 10. Variance Decomposition

Variance Decomposition of INVESTMENT				
Period	S.E.	INVESTMENT	GDP	INFLATION
1	16.02507	100.0000	0.000000	0.000000
2	17.36263	90.46456	9.290485	0.244955
3	17.47301	90.22722	9.505968	0.266813

4	17.50887	90.09617	9.628334	0.275500
5	17.51023	90.08586	9.638684	0.275461
6	17.51079	90.08620	9.638233	0.275571
7	17.51093	90.08476	9.639419	0.275818
8	17.51096	90.08465	9.639471	0.275877
9	17.51096	90.08463	9.639473	0.275898
10	17.51096	90.08460	9.639490	0.275912
Variance Decomposition of GDP				
Period	**S.E.**	**INVESTMENT**	**GDP**	**INFLATION**
1	4.259056	56.88758	43.11242	0.000000
2	4.569658	52.95281	45.36399	1.683193
3	4.679066	52.37945	45.42626	2.194288
4	4.682503	52.31180	45.36701	2.321188
5	4.686909	52.24482	45.35443	2.400755
6	4.689940	52.17890	45.37669	2.444407
7	4.690949	52.15778	45.37934	2.462880
8	4.691375	52.14831	45.38023	2.471457
9	4.691606	52.14317	45.38116	2.475668
10	4.691715	52.14077	45.38158	2.477650
Variance Decomposition of INFLATION				
Period	**S.E.**	**INVESTMENT**	**GDP**	**INFLATION**
1	11.22423	2.204347	19.25859	78.53706
2	16.36469	3.010301	37.06974	59.91996
3	18.59351	2.795438	41.97681	55.22775
4	19.32179	2.677043	42.65511	54.66785
5	19.65728	2.586695	42.97535	54.43796
6	19.82791	2.546234	43.17630	54.27747
7	19.90631	2.529899	43.26024	54.20986
8	19.94245	2.521719	43.29665	54.18163
9	19.95970	2.517784	43.31465	54.16757
10	19.96788	2.515970	43.32322	54.16081

Cholesky Ordering: INVESTMENT GDP INFLATION

According to the results of the analysis, investments are determined by their own shocks in the short run. At the end of 10 months, 90.08460% of investments are explained by itself, 9.639490% by GDP and 0.275912% by inflation. On the other hand, in the short run, 43% of GDP is determined by its own shocks and 56.9% by investments. At the end of 10 months, these ratios are 45.38% and 52.14%, respectively. In the short run, 78.53% of inflation is determined by own shocks, 19.26% by GDP and 2.2% by investments. At the end of 10 months, the rates are 54.16%, 43.32% and 2.52%, respectively (Table 10).

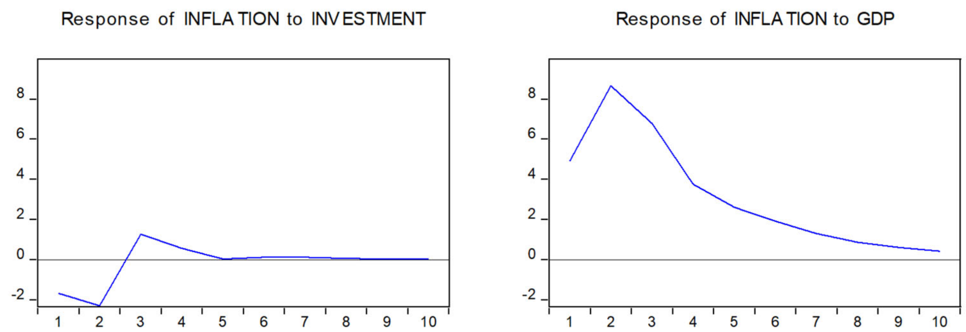


Figure 3. Impulse Response Analysis Results

A one standard deviation shock to the investment variable first affects the inflation variable negatively for 1 period, then positively for 1.5 periods, then negatively for 2 periods and fades after the 5th period. A one standard deviation shock to the GDP variable, on the other hand, affects inflation positively for 2 periods, then negatively for 2 periods and diminishes slowly after the 4th period (Figure 3).

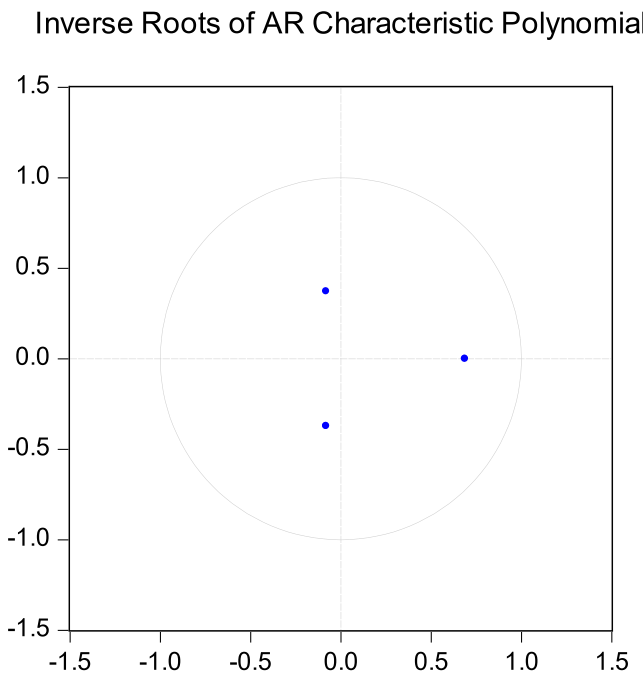


Figure 4. Dynamically Stable Test Result

The stability requirements are satisfied by the calculated VAR model. The autoregressive characteristic polynomial's inverse roots are dispersed around the unit circle (Figure 4).

Table 11. VAR Residual Heteroskedasticity Tests (Levels and Squares)

Chi-sq	df	Prob.
40.46112	36	0.2798

Since the prob value is greater than 5%, H0 is accepted, there is no problem of varying variance, there is no deviation from the assumption (Table11).

CONCLUSION

The intricate interplay among economic growth, investment, and inflation forms the bedrock of a nation's economic vitality and stability. While economic growth and investment inject vigor and prosperity into the economy, inflation looms as a threat to price stability and consumer purchasing power. This delicate equilibrium presents a formidable challenge, wherein excessively low inflation can stifle economic activity and dampen investor confidence, while hyperinflation risks destabilizing prices and hindering economic growth. Consequently, the crafting and execution of effective economic policies demand a nuanced comprehension of this intricate balance. Macroeconomic strategies must navigate the complexities of managing inflationary pressures while fostering growth and nurturing investor confidence. Nevertheless, recognizing the diverse economic landscapes and exigencies of each nation underscores the necessity for adaptable methodologies in achieving this equilibrium. Therefore, a prudent and deliberative approach to policymaking is imperative, with a focus on initiatives that enhance the welfare of society at large. Through such endeavors, the delicate equilibrium among economic growth, investment, and inflation can be preserved, paving the path toward sustainable economic development.

In this study, Turkiye's data for the period 1998-2022 were obtained from Worldbank and Narayan and Popp (2010) Unit Root Test, Lee and Strazicich Unit Root Test, VAR Model and VAR Granger Causality Test were applied. The results of the analyses revealed unidirectional causality from economic growth to inflation and from investments to inflation. Increases in the growth rate and investments trigger inflation by increasing demand pressure. The findings of the study differ from other studies in the literature. No causality was found between investment and GDP and only unidirectional causality was found between other variables.

Based on the findings, the policy recommendations to be implemented in Turkiye, which is in a paradox, can be listed as follows;

-Balancing Monetary and Fiscal Policies: By tightening monetary policy, central banks can keep demand under control and try to reduce inflation. At the same time, they can reduce demand pressure by restricting expenditures through fiscal policies.

-Structural Reforms: Structural reforms to strengthen the economic structure can be effective in combating inflation. These reforms include tax reforms, activating public expenditures, increasing the flexibility of the labour market and improving the competitive environment.

-Price Stabilisation: Policies to ensure price stability are important in keeping inflation under control. In order to maintain price stability, central banks may adopt an inflation targeting strategy when determining monetary policies.

-Improvement of the Investment Environment: In order to increase investor confidence and encourage investments, the economic environment needs to be improved. This requires a predictable and stable economic policy framework, rule of law, low operating costs and an efficient infrastructure.

-Investment in Education and Innovation: Education and innovation can support long-term growth and make the economy competitive. Therefore, it is important to improve education systems and invest in research and development activities to stimulate innovation.

These measures are some steps that can be taken to ensure economic stability and support a sustainable growth in case growth and investments lead to inflation. It is also important to create a long-term and stable economic environment to boost investor confidence. In this way, the Turkish economy can be built on a more solid foundation and provide a more solid basis for future development efforts. Future work in this area is important.

REFERENCES

Bağcı, E., and Ergüven, E. (2016). Relations Between Interest Rate, Inflation, Growth, and Investment in Turkey, 2002-2015. *ISOR Journal of Economics and Finance,* 7(5), 43-49.

Bakari, S. (2018). The Impact of Domestic Investment on Economic Growth New Policy Analysis from Algeria. *Bulletin of Economic Theory and Analysis,* 3(1), 35-51. https://doi.org/10.25229/beta.337367

Barro, R. J. (2013). Education and Economic Growth. *Annals of Economics and Finance*, 14(2), 301-328.

Bjelić, J., Erić, O., and Kovačević, S. (2021). Macroeconomic Determinants of Investment in the Balkan Countries . (2021). *Acta Economica*, 19(35), 19-33. https://doi.org/10.7251/ACE2135019B

Denano, T., and Sibera, S. (2022). The Causal Nexus between Economic Growth, Investment and Saving using Vector Error Correction Model in Ethiopia. *Estudios de Economía Aplicada*, 40(3), 25.

Ertek, T. (2000). *Ekonometriye Giriş*. İstanbul: Beta Yayıncılık, 2. Baskı.

Granger, C. W. J. (1969). Investigating Causal Relations by Econometric Models and Cross-spectral Methods. Econometrica, 37(3), 424-438.

Jangili, R. (2011). Causal Relationship Between Saving, Investment and Economic Growth for India–What Does the Relation Imply?.

Hordofa, D. F. (2023). Impacts of External Factors on Ethiopia's Economic Growth: Insights on Foreign Direct Investment, Remittances, Exchange Rates, and Imports. *Heliyon*, 28;9(12):e22847. doi: 10.1016/j.heliyon.2023.e22847.

Kartikasari, D. (2017). The Effect of Export, Import and Investment to Economic Growth of Riau Islands Indonesia. *International Journal of Economics and Financial Issues,* 7(4), 663-667.

Kaygısız, A. D., Dilek, G. Ö. Z. E., and Kösekahyaoğlu, L. (2016). Türkiye'de Tasarruf, Yatırım, Cari Açık ve Büyüme: 1980-2014 Dönemi Üzerine Bir Nedensellik İlişkisi

Analizi. *Çankırı Karatekin Üniversitesi Sosyal Bilimler Enstitüsü Dergisi,* 7(1), 273-300.

Khan, S., Shenhadji, A. (2003). Financial Development and Economic Growth: A Review and New Evidence. *Journal of African Economies*, 12, AERC Supplement 2: ii89-ii110.

Kirmanoğlu, H. (2001). Is There Inflation-Growth Tradeoff in the Turkish Economy?. Universitäts-und Landesbibliothek Sachsen-Anhalt.

Kormendi, R. C., and Meguire, P. G. (1985). Macroeconomic Determinants of Growth: Cross-country Evidence. *Journal of Monetary Economics*, 16(2), 141-163.

Lee, J., and Strazicich, M. C. (2003). Minimum Lagrange multiplier unit root test with two structural breaks. *Review of Economics and Statistics*, 85(4), 1082-1089.

Lee, J., Strazicich, and M. (2004). Minimum LM Unit Root Test. Working Paper, Department of Economics, Appalachian State University.

Schmidt, P., and Phillips, P.C.B. (1992). LM Tests for a Unit Root in the Presence of Deterministic Trends. *Oxford Bulletin of Economics and Statistics*, 54, 257-287.

Sims, C. A. (1980). Macroeconomics and Reality. *Econometrica: Journal of the Econometric Society*, 1-48.

Strazicich, M. C., Lee, J., and Day, E. (2004). Are Incomes Converging Among OECD Countries? Time Series Evidence with two structural breaks. *Journal of Macroeconomics*, 26(1), 131-145.

Lumsdaine, R. L., and Papell, D. H. (1997). Multiple trend breaks and the unit-root hypothesis. *Review of Economics and Statistics*, 79(2), 212-218.

Narayan, P. K., and Popp, S. (2010). A New Unit Root Test with Two Structural Breaks in Level and Slope at Unknown Time. *Journal of Applied Statistics*, 37(9), 1425-1438.

Narayan, P. K., and Popp, S. (2013). Size and power properties of structural break unit root tests. *Applied Economics*, 45(6), 721-728.

Tarı, R. (2010). *Ekonometri* (6th ed.). 2010: UmutTepe.

Valadkhani, A. (2003). Using Input-output Analysis to Identify Australia's High Employment Generating Industries. *Australian Bulletin of Labour,* 29(3), 199-217.