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THE TRIPLE HELIX: OIL PRICES, TRADE TERMS AND UNEMPLOYMENT: A DEVELOPMENTAL ANALYSIS OF TURKIYE

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ABSTRACT
Purpose- This study delves into the intricate dynamics surrounding oil prices, terms of trade, and unemployment, pivotal factors exerting profound effects on the developmental trajectories of developing countries.
Methodology- Employing the Vector Autoregressive Model and Granger Causality Test, the research scrutinizes data spanning from 1980 to 2021, with a focus on Turkey as a case study. Granger causality analysis reveals bidirectional causality between terms of trade and unemployment as well as between oil prices and unemployment.
Findings The findings underscore the significance of targeted policies to address challenges in developing nations. Strategies aimed at reducing energy dependence, diversifying energy sources, and implementing strategic foreign trade planning emerge as crucial components to steer these countries toward sustainable development. Furthermore, the study advocates for the implementation of employment policies to effectively tackle unemployment rates.
Conclusion- The reciprocal relationships observed between these variables highlight the need for comprehensive and multifaceted approaches to address the intricate interplay of economic factors influencing the developmental processes of developing countries. The insights gleaned from this research not only contribute to a nuanced understanding of these relationships but also provide a foundation for informed policy recommendations to promote robust and sustainable development in developing nations.

Keywords: Oil, terms of trade, unemployment, vector auto regressive model, Granger Causality
JEL Codes: O13, O11, Q43, E24, F14, F43, C32.

1. INTRODUCTION

For nations on the path to progress, development holds the key to enhancing the quality of life by reshaping their economic, social, and institutional foundations. It's a transformative journey that empowers countries to reach milestones like economic growth, poverty alleviation, improved access to education and healthcare, strategic infrastructure investments, and sustainable development. Hence, for developing countries, the pursuit of development is pivotal to enhancing both their economic prosperity and societal well-being. In this pursuit, the fluctuation of oil prices emerges as a critical factor influencing the trajectory of developing nations. Oil, a crucial resource, serves as the lifeblood for many countries, catering to their energy requirements. A surge in oil prices can escalate the import costs for developing nations, potentially casting a shadow on their economic advancement. Conversely, a dip in oil prices can alleviate the import burdens, offering a boon to the economic growth of these nations. However, it's essential to note that the repercussions of such shifts in oil prices on the development journey may vary, contingent on factors like a country's reliance on oil imports and exports.

Given that developing nations rely more heavily on foreign economic ties than their developed counterparts, the terms of trade play a crucial role in shaping their economic landscapes. These countries find themselves compelled to import capital goods and raw materials essential for their developmental pursuits. When the terms of trade take an unfavorable turn, it diminishes a nation's import capacity. Conversely, a positive shift in these terms can infuse additional resources, potentially accelerating the pace of economic development. The intricate dance between development and unemployment underscores a profound connection. Unemployment wields the potential to cast a shadow on a country's economic progress. In regions grappling with high unemployment rates, the path to economic growth and development becomes notably challenging. The ripple effect is profound; elevated unemployment rates can curtail a country's production capacity, exerting a dampening effect on overall economic growth. Furthermore, in nations marked by high unemployment, poverty rates often soar, exerting an additional adverse impact on their developmental trajectory. Consequently, the imperative of reducing unemployment rates emerges as a linchpin in fostering the economic development of a nation.

In the present day, delving into the intricate web of economic dynamics, particularly unraveling the intricate connections among pivotal variables like oil prices, foreign trade, and unemployment, stands as a paramount undertaking for economists and policymakers alike. Grasping the nuances of how oil prices, with their reverberating effects on development and growth, and the influence of foreign trade on unemployment, holds immense significance in steering economic decisions. The sway of oil prices, as a key player in the energy market, holds sway over economic performance, adding layers of complexity to the decision-making landscape. Simultaneously, the growing significance of foreign trade's impact on unemployment is particularly noteworthy within the broader canvas of the global economy. In this study, our aim is to navigate the intricacies that bind oil prices, foreign trade, and unemployment, seeking a deeper understanding of their interconnected nature.

Research has shown that oil price shocks can have a significant impact on unemployment rates, especially in times of financial distress (Adeosun et al., 2023). Positive oil price shocks have been found to contribute negatively to employment, while oil price declines have been found to have less impact on employment recovery (Shuddhasattwa Rafiq et al., 2018). In addition, oil price fluctuations have been found to affect unemployment forecasts in the long run, suggesting that oil prices are an important factor in determining employment levels [Ordóñez et al., 2019]. However, more research is needed to explore the relationship between oil prices, foreign trade and unemployment in more detail. Based on this need, these relationships will be analyzed for the period 1980-2021 by taking the case of Turkey. The study will first provide a literature review and then move on to empirical tests. In the last section, inferences will be drawn based on the findings.

2.LITERATURE REVIEW

The complex relationship between oil prices, foreign trade and unemployment has been the focus of many studies to understand and manage the dynamics of economic systems. While oil, as an important component of energy resources, has a direct impact on economies, it also has indirect effects on foreign trade and employment levels. In this context, studies in the literature provide important information on how oil price fluctuations affect trade balances and unemployment rates. In this section, we will review different empirical studies and their findings on the complex relationship between oil prices, foreign trade and unemployment.

2.1. Terms of Trade and Unemployment

Empirical studies have generally indicated that an expansion in international trade reduces a country's overall unemployment rate in the long run [Belenky and Riker, 2015]. However, there are also studies suggesting that trade liberalization policies have a positive impact on unemployment in the long run but have a negative impact in the short run [Hung and Peng, 2019]. It is generally accepted that there is a relationship between trade and unemployment. A study in South Asian countries found that trade openness is positively associated with unemployment along with GDP growth rate and foreign direct investment (FDI) [Nguyen, 2022]. Similarly, it has also been observed that trade openness has a negative and significant impact on the unemployment rate in Nigeria, but provides employment opportunities (Nwosa et al., 2020).

The literature on trade and unemployment also acknowledges the impact of trade liberalization on unemployment by identifying various channels and mechanisms (Nwosa, 2020). It has also been emphasized that the effects of trade liberalization on unemployment can be influenced by factors such as labor search frictions and fair wages [Hung and Peng, 2019]. It has been determined that imports and exports have different effects on the unemployment rate depending on the economic development and industrial structure of each country [Jin et al., 2019]. Therefore, although the impact of foreign trade on unemployment is generally accepted, the nature and direction of this relationship may vary depending on specific factors and contexts.

According to Caligagan (2022), there is a significant relationship between unemployment and trade openness. However, Ersungur et al. (2021) found no significant relationship between the square of imports and exports and unemployment in the long-run perspective. Abugamea (2018) found that foreign trade has no effect on unemployment. According to Cütcü and Cenger (2017), there is no long-run relationship between imports, exports and unemployment; there is only a relationship from imports to exports.

Studies conducted in developed and developing countries indicate that there is no causal relationship between unemployment and imports and exports. However, Gül and Kamacı (2012) find that there is a causal relationship between imports and exports and unemployment.

According to Gibson (2010)'s analysis, imports reduce employment. Dutt et al. (2009), on the other hand, found the existence of an inverse relationship between openness and unemployment. The different findings in the literature on the relationship between unemployment and foreign trade emphasize that this complex relationship may vary depending on various factors and contexts.

2.2. Oil Prices and Unemployment

There is a relationship between oil prices and unemployment. Research has shown that changes in oil prices can affect the unemployment rate (Ananjeva, 2023). The relationship between oil prices and unemployment is bidirectional, meaning that they affect each other [Adeosun et al., 2023]. However, the impact of oil price changes on unemployment may vary depending on the state of the economy and the level of oil price uncertainty (Raifu et al., 2020). In some cases, an increase in oil prices may worsen the unemployment situation, while a decrease may have a negligible mitigating effect (Bildirici and Sonüstün, 2019). In addition, the response of unemployment to oil shocks may be different in times of financial distress compared to normal periods [Ordóñez et al., 2019]. Overall, these findings suggest that policymakers should consider the relationship between oil prices and unemployment and adopt a nuanced approach to policies aimed at mitigating the negative effects of oil price fluctuations on the labor market.

Regarding the long-term impact of oil price shocks on unemployment, Bjornland's (2000) research supported Fernandez (2011)'s findings by suggesting that oil price fluctuations have no clear relationship with unemployment. Trang et al. (2017) also emphasizes that the effect of oil prices on unemployment is uncertain. On the other hand, Sinan (2018) finds a long-run and bidirectional causality relationship between oil prices and unemployment. Alkhateeb et al. (2017) find that oil prices have a positive effect on the employment rate. According to Senzangakhona (2015), oil prices have an increasing effect on the unemployment rate in the long run, while they have a negative effect in the short run perspective. These various findings emphasize the complexity of the effects of changes in oil prices on unemployment and reveal the different perspectives on this issue in the literature.

2.3. Oil Prices and Foreign Trade

There is a relationship between oil prices and foreign trade. Changing oil prices have a significant impact on macroeconomic variables and can affect a country's foreign trade. An increase in oil prices can have a greater impact on the economy, while a decrease in oil prices can lead to a greater decline in foreign trade turnover (Brancaccio et al., 2022; Beşer, 2019). In addition, as oil prices increase, international trade becomes more localized, and countries trade more with their neighbors. On the other hand, when oil prices fall, trade becomes more dispersed and the distance between countries becomes less relevant (Brancaccio et al.,2022). The elasticity of foreign trade with respect to ship fuel costs is also influenced by oil prices (Perstenyova and Zaychikova, 2020), indicating a noticeable asymmetry, especially at low and high oil prices.

3. DATA, METHODOLOGY AND RESULTS

This study examines the relationship between unemployment, oil prices, and terms of trade using data obtained from the World Bank for the years 1980-2021(Table-1). The first and most important step in this process is to run stationarity tests. In unit root tests, in addition to the traditional methods, methods that deal with structural breaks were also used. Since the variables are stationary at the level, the analysis is continued with the VAR model. Then, autocorrelation and normality tests were applied to the model and no problems were encountered. In the next stage, variance decomposition and impulse response analyses were conducted. Finally, the Granger causality relationship is investigated.

Table 1. Data Used in Analysis

Variables	Abbreviation	Source
Terms of Trade	DTH	World Bank
Oil	PET	World Bank
Unemployment	UNEMP	World Bank

Figures 1, 2 and 3 show the course of the variables over the period 1980-2021.

Figure 1: Unemployment in Turkey (1980-2021)

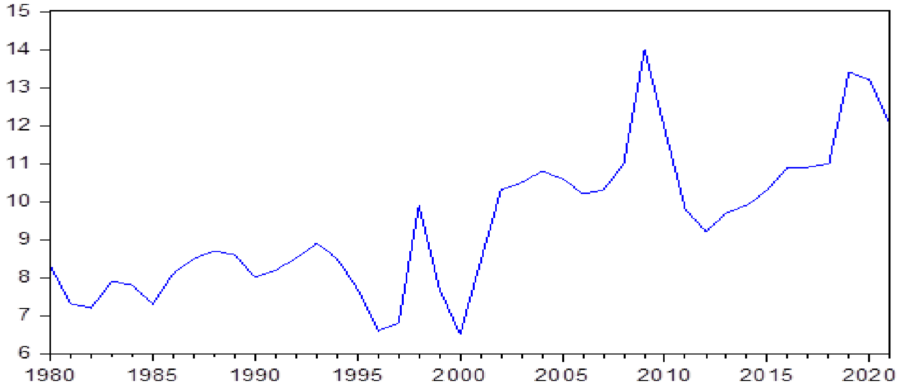


Figure 2: Terms of Trade in Turkey (1980-2021)

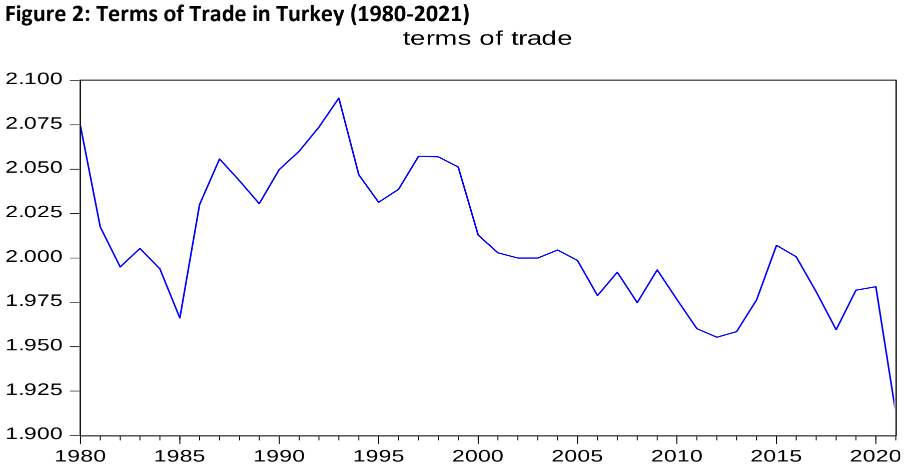
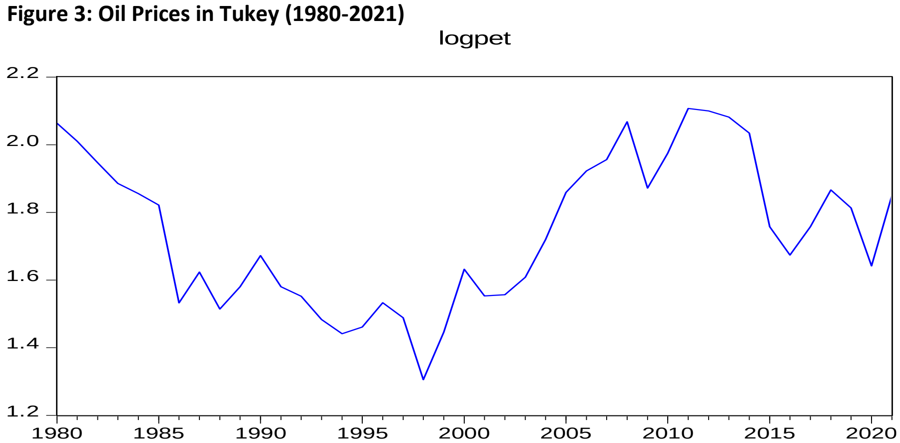


Figure 3: Oil Prices in Tukey (1980-2021)



Graphical analysis reveals that the variables have a trended structure.

3.1. Vector Autoregressive Models

Models in which each variable in an equation system is defined as a linear function of its lagged values and the lagged values of other variables are known as Vector Autoregressive Models (Çil Yavuz, 2015).

The bivariate p-th order standard vector autoregressive VAR (p) model for t=1,2,3,..T can be written as follows (Sevüktekin & Çınar, 2017):

$$Y_{1t} = \delta_{1t} + \sum_{i=1}^{p} \beta_{1i} Y_{1t-i} + \sum_{i=1}^{p} \beta_{1i} Y_{2t-i} + \varepsilon_{1t} \quad (1)$$

$$Y_{2t} = \delta_{1t} + \sum_{i=1}^{p} \beta_{2i} Y_{1t-i} + \sum_{i=1}^{p} \beta_{2i} Y_{2t-i} + \varepsilon_{2t} \quad (2)$$

Here Y_{1t} and Y_{2t} are stationary variables and both ε_{1t} and ε_{2t} IID(0,σ^2) are assumed to be clean sequences.

The results obtained from the estimation of the VAR model are sensitive to the correct determination of the appropriate lag length. The most common information criteria used in determining the lag length are Akaike information criterion (AIC), Schwarz-Bayesian information criterion (BIC), and Hannan-Quinn information criterion (HQ) (Çil Yavuz, 2015). The model with the lag length with the smallest information criterion is selected as the most appropriate model.

The purpose of VAR analysis is not to make parameter estimation, but to reveal the interaction between variables and to make predictions for these variables. The stable nature of the VAR model is related to whether the shocks are permanent or temporary. Therefore, for a stable model, the roots of the inverse characteristic equation must be outside the unit circle. In this case, past shocks can be calculated and shocks are temporary. If the roots of the inverse characteristic equation are less than or equal to 1, in other words, if the stability condition is not met, the process exhibits an exploding process and the shocks show a permanent feature. In this case, it will not be possible to accurately measure the relationships between the relevant variables.

In order for the results obtained in the estimated VAR model to be valid, assumptions such as the residuals complying with the normality assumption, the absence of autocorrelation in the order in which the VAR model was estimated, the absence of the problem of changing variance, the roots of the inverse characteristic equation must be provided (Özdemir, Doğaner & Çetin 2022).

The dynamic features of the VAR model are used in structural analyzes such as impulse response functions, variance decomposition and Granger Causality.

In the multivariate system, impulse response analysis and variance decomposition methods are used to examine the relationships between economic variables and the effect of shocks. It is possible to see the effect of a shock applied to a variable in the VAR model on other variables with impulse response analysis.

The variance decomposition, in other words, the prediction error variance decomposition, shows the ratio of the movements caused by the shocks of a variable and the changes caused by the shocks of other variables (Sevüktekin & Çınar, 2017). In the impulse response function, if a variable responds to the shocks of another variable, it means that there is a causal relationship between the related variables.

3.2.Granger Causality

One of the purposes of using VAR models is the prediction of the future, because the variable or group of variables in the system helps to make inferences about the predictive adequacy of other variables. Thus, Granger causality measures predictive adequacy, not actual causality. The direction of causality of the relationship between the series is determined by the analysis of Granger (1969). This test is used to determine the causal relationship between two or more variables (Çil Yavuz, 2015). In order to apply the Granger causality test, the variables must be stationary in the same order (Altinay & Karagöl, 2005). In addition, the same variables should be in equal lag lengths in the equations where the test will be applied.

In the Granger causality test, the equations and hypotheses can be expressed as follows:

$$Y_t = \alpha_1 + \sum_{i=1}^{n} \beta_i X_{t-i} + \sum_{j=1}^{m} \gamma_j Y_{t-j} + e_{1t} \quad (3)$$

H_0: X is not the granger cause of Y.
H_1: X is the granger cause of Y.

$$X_t = \alpha_2 + \sum_{i=1}^{n} \theta_i X_{t-i} + \sum_{j=1}^{m} \delta_j Y_{t-j} + e_{2t} \quad (4)$$

H_0: Y is not the granger cause of X.
H_1: Y is the granger cause of X.

According to the Granger test, if the prediction of the Y variable is more successful than the case where the past values of the X variable are used, X is the Granger cause of Y (Gujarati, 2006).

It shows the delay coefficients of β_i, γ_j, θ_i, δ_j used in the equations. e_{1t} and e_{2t} are uncorrelated error terms in the White-noise feature.

If the β_i coefficients are different from zero at a certain significance level, the null hypothesis is rejected and a causal relationship is obtained from one-way X variable to Y variable. Likewise, if the null hypothesis for δ_j is rejected, one-way causality from variable Y to variable X is determined.

If both β_i and δ_j coefficients are different from zero, this time there is a bidirectional causality between the X variable and the Y variable. Finally, if all values of the coefficients β_i and δ_j are found to be zero, no causal relationship can be found between variable X and variable Y.

3.3. Analysis and Findings

In this study, data for the years 1980-2021 were used to examine the relationship between terms of trade (DTH), unemployment (UNEMP) and oil prices (PET). The data used in the study were compiled from the World Bank database. The terms of trade and logarithm of oil prices were included in the study.

The data of the variables to be analyzed with the VAR model must be stationary. In this context, firstly, Augmented Dickey-Fuller, Phillips-Perron and Lee-Strazicich unit root tests were conducted to determine whether the stationarities of the series were achieved. ADF test results for the unemployment series are presented in Table 2.

Table 2: Augmented Dickey-Fuller Unit Root Test Results for Series

	UNEMP		LogDTH		LogPET	
	Fixed	**Fixed Trend**	**Fixed**	**Fixed Trend**	**Fixed**	**Fixed Trend**
Test Statistic	-1,878326	-4,128989	-0,942153	-3,604162	-2,033289	-2,412965
%1	-3,600987	-4,205004	-3,600987	-4,198503	-3,600987	-4,198503
%5	-2,935001	-3,526609	-2,935001	-3,523623	-2,935001	-3,523623
%10	-2,605836	-3,194611	-2,605836	-3,192902	-2,605836	-3,192902

As it can be seen from Table 2, since the test statistic calculated in the fixed model for the unemployment, logDTH and logPET series is greater than the critical values calculated for 1%, 5% and 10%, the basic hypothesis suggesting that the series has unit root could not be rejected. However, in the fixed and trended model for unemployment and logDTH series, the unit root hypothesis was rejected at 5% and 10% significance levels, and the series were found to be stationary. For both models of the LogPET variable, the unit root hypothesis could not be rejected. Phillips-Perron Unit Root Test Results for the series are presented in Table 3.

Table 3: Phillips-Perron Unit Root Test Results for Series

	UNEMP		LogDTH		LogPET	
	Fixed	**Fixed Trend**	**Fixed**	**Fixed Trend**	**Fixed**	**Fixed Trend**
Test Statistic	-1,749579	-3,475623	-0,310196	-3,328963	-2,050407	-2,376838
%1	-3,600987	-4,198503	-3,600987	-4,198503	-3,600987	-4,198503
%5	-2,935001	-3,523623	-2,935001	-3,523623	-2,935001	-3,523623
%10	-2,605836	-3,192902	-2,605836	-3,192902	-2,605836	-3,192902

According to the results, the unit root hypothesis could not be rejected in the fixed model for unemployment and logDTH series. Unemployment and logDTH series were found to be stationary only at 10% level in the fixed and trend model. The LogPET series, on the other hand, was found to be unit rooted according to the Phillips-Perron test. Although there is a structural break in the time series, if the break is not taken into account, it is known that the stationary series tend to have a unit root. In this framework, a unit root test was performed with the Lee-Strazicich test, which takes into account two structural breaks. The Lee-Strazich Unit Root Test results for the series are provided in Table 4.

Table 4: Lee-Strazich Unit Root Test Results for Series

	UNEMP	LogDTH	LogPET
Lag Length	11	8	8
Min.Test Statistic	-6,9994	-6,6382	-5,9205
Break Dates	1997-2016	1998-2015	1998-2003
%1 Critical Values	-6,42	-6,42	-6,45
%5 Critical Values	-5,65	-5,65	-5,67
%10 Critical Values	-5,32	-5,32	-5,31

According to the Lee-Strazich unit root test results, the hypothesis suggesting that the series is unit rooted under two structural breaks for the trend model for unemployment, logDTH and logPET series was rejected at the 5% significance level, and unemployment, logDTH and logPET series were accepted to be stationary with two structural breaks.

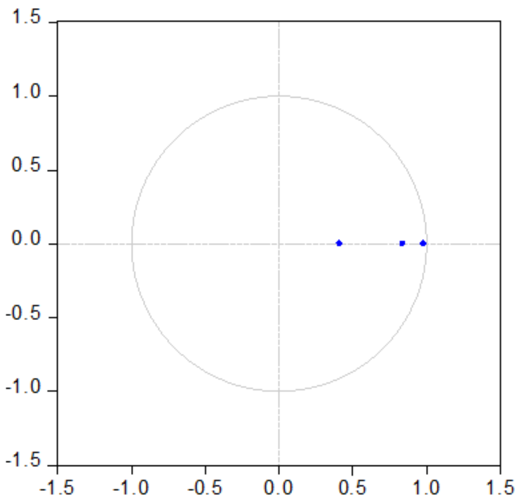
All series used in the study were at I(0) level. Since the endogenous variables in the VAR model are considered as a function of the lagged values of all the endogenous variables in the system, it is necessary to determine the optimum lag length. In this framework, first of all, the VAR model was estimated. The lag length of the VAR model was found to be 1 using information criteria. The estimation of the VAR model established with a delay of 1 is given in Table 5.

Table 5: VAR Model Estimation

	UNEMP	LogPET	LogDTH
UNEMP(-1)	0.623735	0.032852	-0.003619
	(0.11452)	(0.01109)	(0.00190)
	[5.44648]	[2.96123]	[-1.90962]
LogPET(-1)	0.478654	0.794622	0.004294
	(0.81869)	(0.07931)	(0.01355)
	[0.58466]	[10.0194]	[0.31692]
LogDTH(-1)	-16.22460	0.556453	0.811211
	(6.52759)	(0.63234)	(0.10804)
	[-2.48554]	[0.87998]	[7.50870]
C	35.82138	-1.088315	0.407821
	(14.3475)	(1.38988)	(0.23746)
	[2.49669]	[-0.78303]	[1.71742]

The significance of the model can be tested according to the position of the roots of the inverse polynomial in the circle, since it is extremely important that the entire model considered within the framework of the analysis is meaningful. In order for the constructed model to be stable, the inverse roots of the AR characteristic polynomial must be inside the unit circle. Figure 4 illustrates this situation.

Figure 4: Inverse Roots of the AR Characteristic Polynomial



The inverse roots of the characteristic polynomial AR are inside the unit circle. In addition, as it can be seen in Table 6, since all modulus values are below 1, it is understood that the stability condition of the model is met.

Table 6: Modulus Values

Root	Modulus
0.979893	0.979893
0.838351	0.838351
0.411324	0.411324

In this context, the analysis continued by testing the assumptions of the model and the results are given in Table 7.

Table 7: LM Autocorrelation Test Results

Normality Test				
Jarque-Berra	**Probability**			
8.530825	0.2017			
LM Autocorrelation Test				
Lag	**LRE* statistic**	**Prob.**	**Rao F statistic**	**Prob.**
1	6.022590	0.7377	6.664016	0.7382
2	5.807935	0.7590	0.639380	0.7595
3	4.325436	0.8887	0.471227	0.8890
Heteroscedasticity Test				
Chi-sq	**Probability**			
49.98627	0.0606			

Since the lag length of the established model is 1, considering the probability value for 1 lag, the LM autocorrelation test, varying variance test and normality test probability values are greater than 0.05, so there is no autocorrelation, varying variance and normality problem in the model. Thus, the assumptions necessary for the results obtained in the estimated VAR model to be valid have been provided.

The variance decomposition method was applied in order to examine the effect of the independent variables used in the model on the dependent variable and to determine how much of the change in this framework was caused by the change in the independent variables and the results applied for 10 periods are given in Table 8.

Table 8: Variance Decomposition Results

		LogDTH		
Period	**S.E.**	**LogDTH**	**LogPET**	**UNEMP**
1	0.017572	100.0000	0.000000	0.000000
2	0.022546	96.83003	0.959805	2.210167
3	0.025992	93.03860	2.057634	4.903769
4	0.028767	89.82382	2.940683	7.235497
5	0.031131	87.31013	3.590641	9.099233
6	0.033202	85.36522	4.061053	10.57373
7	0.035047	83.84110	4.404362	11.75454
8	0.036711	82.62312	4.659232	12.71765
9	0.038224	81.63001	4.852143	13.51785
10	0.039611	80.80528	5.000962	14.19376
		LogPET		
Period	**S.E.**	**LogDTH**	**LogPET**	**UNEMP**
1	0.102849	12.85238	87.14762	0.000000
2	0.123744	10.25336	83.70250	6.044145
3	0.136941	8.995829	76.98004	14.02413
4	0.147276	8.655031	70.17132	21.17365
5	0.156147	9.132580	63.99541	26.87201
6	0.164248	10.33218	58.49149	31.17633
7	0.171960	12.10001	53.59819	34.30180
8	0.179476	14.25654	49.26243	36.48104
9	0.186879	16.63304	45.44100	37.92596
10	0.194185	19.09179	42.09144	38.81677
		UNEMP		
Period	**S.E.**	**LogDTH**	**LogPET**	**UNEMP**
1	1.061694	2.064466	21.85607	76.07946
2	1.254361	4.217943	20.07485	75.70720
3	1.383454	10.09570	18.04104	71.86327
4	1.496104	16.39286	16.25869	67.34845
5	1.599301	21.92836	14.83059	63.24104
6	1.694707	26.52244	13.71369	59.76387
7	1.783225	30.29186	12.83931	56.86884
8	1.865583	33.39993	12.14759	54.45248
9	1.942405	35.98921	11.59291	52.41788
10	2.014225	38.17103	11.14187	50.68710

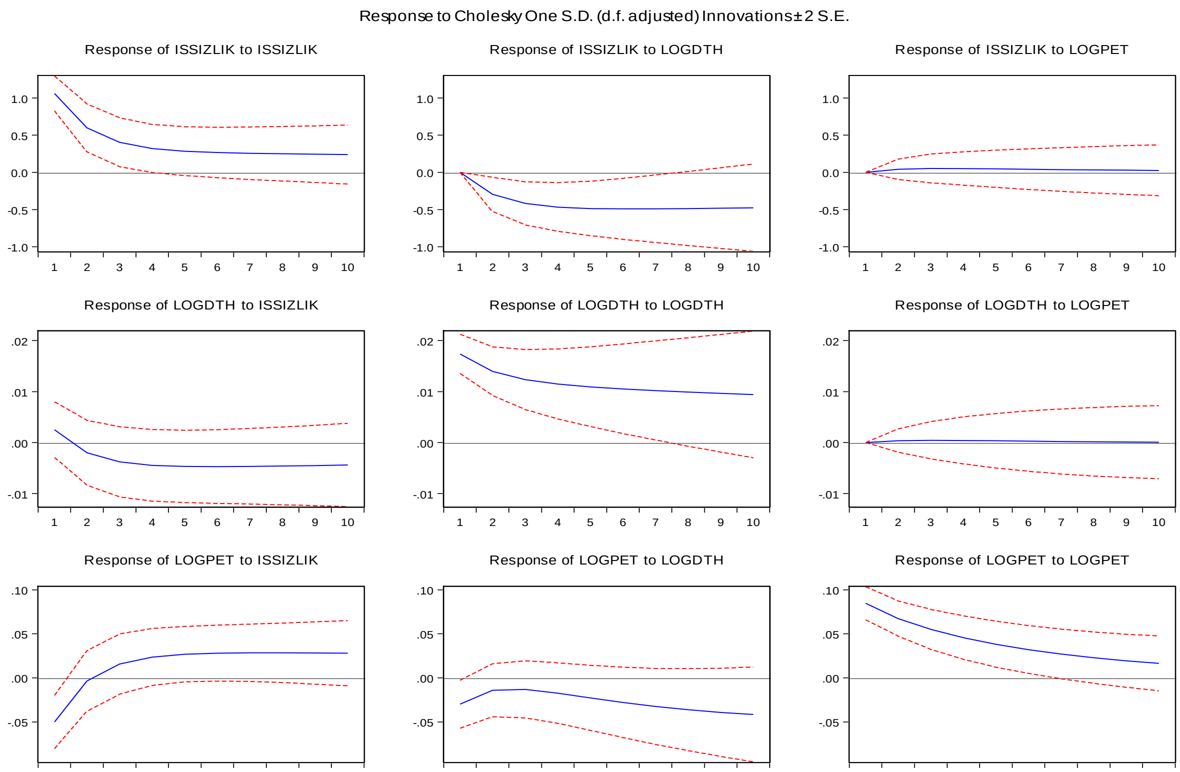
It is seen that the power to explain a change in the logDTH variable by the logPET variable is quite weak. Accordingly, 80% of a change in LogDTH at the end of 10 periods is explained by itself, while approximately 14% is explained by the unemployment variable.

While the self-explanatory power of a change in the LogPET variable was 87% in the first period, this rate became 42% at the end of 10 periods. About 39% is explained by the unemployment variable. In the first period, the unemployment variable has no explanatory power. According to this result of variance decomposition, it can be said that the unemployment variable better explains the changes in logPET at the end of 10 periods.

While the self-explanatory power of a change in the unemployment variable was 76% in the first period, it decreased to 50% at the end of 10 periods. About 38% of this change is explained by the logDTH variable, while only 11% is explained by the LogPET variable. At the end of 10 periods, it can be said that the logDTH variable better explains the changes in the unemployment variable.

The effect of stochastic shocks in independent variables on growth can be evaluated with impulse response analysis. The graphical representation of the said effects is shown in Figure 5.

Figure 5: Impulse-Response Analysis Charts



When a one-unit shock is given to the unemployment error term, unemployment is positively affected by this shock. The said positive effect continues to decrease for four periods, but it does not disappear. After 4 periods, the decreasing trend disappears and the positive effect remains constant. When a unit shock is given to the LogDTH error term, unemployment is negatively affected by the shock. The said effect gradually increases, but becomes stable after three periods. When a unit shock is given to the LogPET error term, unemployment gives a very low positive response. However, this reaction disappears later. When a unit shock is given to the unemployment error term, logDTH is affected positively at first, but this effect disappears after a period.

When a unit shock is given to the LogDTH error term, the variable itself is positively affected, but the positive effect decreases over time. When a unit shock is applied to the LogPET error term, LogDTH gives a very small positive response, but this effect soon disappears. LogPET reacts negatively when a unit shock is given to the unemployment error term, but this effect disappears after 2 periods. LogPET is negatively affected when a unit shock is applied to the LogDTH error term. When a unit shock is given to the LogPET error term, LogPET is positively affected, but the said positive effect gradually decreases.

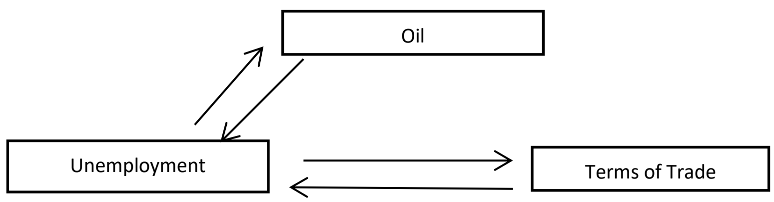
At this stage of the study, the causal relationship between the variables was investigated. The results of Granger causality analysis are summarized in Table 9.

Table 9: Granger Causality Analysis Results

H_0 Hypothesis	F statistic	Prob.
H_0: Unemployment is not the cause of Oil prices Granger	8.17972	0.0012
H_0: Unemployment is not the Granger cause of the terms of trade	5.59350	0.0078
H_0: The terms of trade are not the Granger cause of unemployment.	8.81530	0.0008
H_0: The terms of trade are not the Granger cause of oil prices.	0.38227	0.6851
H_0: Oil prices are not the Granger cause of the terms of trade.	0.21745	0.8056

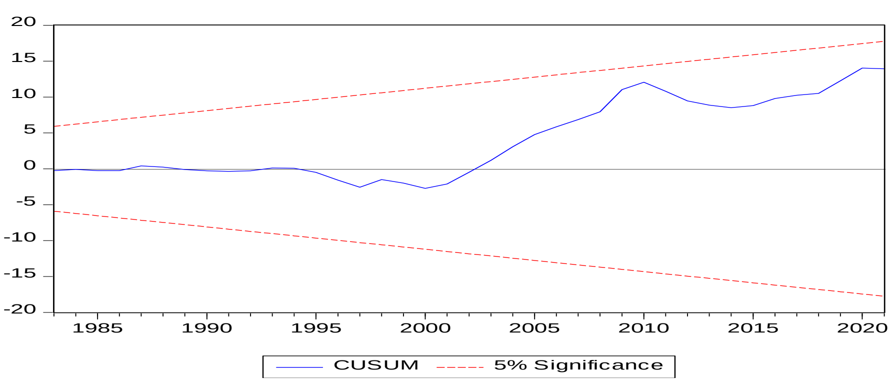
According to the results of Granger causality analysis, bidirectional causality was found between terms of trade and unemployment, and between oil prices and unemployment (Fig. 6).

Figure 6: Results of the Analysis



Finally, the presence of structural stability in the model was investigated with the Cusum test. The main hypothesis of the Cusum test suggests the existence of structural stability. The alternative hypothesis is structural break. The test result is shown in Figure 7.

Figure 7: Cusum Test Result



In Figure 7, the blue graph falls between the red dashed lines. In this case, the basic hypothesis suggesting that there is structural stability in the model could not be rejected.

5. CONCLUSION

Development in a process of developing countries must be aimed at changing a certain institutional, social, and economic infrastructure for improving living standards. The process has some targets which include promoting economic growth, reduction of poverty, improving health and education system, making infrastructure investments, and advancing on sustainable development In order for the backward countries' economies to rise, they need to focus on development. Oil prices have a major impact on their development process. Oil is one of the main resources that many emerging countries depend on since it is used to fuel energy requirements. Oil price fluctuation affect economic growth of developing countries as it increases cost of imported goods and services into these countries. However, the impact of oil price change on development would vary greatly depending on if a country is net importer or exporter of oil. The developing countries' external economic relations are vital part of the process of development. These nations are net importers of most raw materials and the capital goods they require. However, any deterioration in their trade conditions would cap their ability to import more goods which in turn could hinder their development. Nevertheless, there are prospects for speeding up this process through positive advancements. Another important factor is unemployment, which needs to be considered in the development process of developing countries. The decline in production capacity caused by high unemployment rates can have a negative impact on economic growth. Therefore, reducing unemployment rates is critical for a country's economic development. In this context, understanding the complex interactions among economic factors, especially analyzing the relationships among critical variables such as oil prices, foreign trade and unemployment, is of great importance today. This research explores how oil prices and international trade impact joblessness. It aims to reveal how developing nations grow by untangling the complicated relationships between these different factors.

In this study, various analyses were applied to examine the relationship between terms of trade, unemployment and oil prices using data from 1980-2021. According to the variance decomposition results, while 80% of a change in the terms of trade is explained by itself at the end of 10 periods, about 14% is explained by the unemployment variable. While the self-explanatory power of a change in the oil variable is 42% at the end of 10 periods, approximately 39% of it is explained by the unemployment variable. While the self-explanatory power of a change in the unemployment variable is 50% at the end of 10 periods, 38% of it is explained by the terms of trade variable. According to the results of impulse response analysis, when a one-unit shock is given to the unemployment error term, unemployment is positively affected by this shock. When a unit shock is given to the terms of trade error term, unemployment is negatively affected by the shock. When a unit shock is given to the Oil error term, unemployment gives a very low positive response. When a unit shock is given to the unemployment error term, terms of trade is affected positively at first, but this effect disappears after a period of time. When a unit shock is given to the terms of trade error term, the variable itself is positively affected, but the positive effect decreases over time. When a unit shock is applied to the Oil error term, terms of trade give a very small positive response, but this effect soon disappears. Oil reacts negatively when a unit shock is given to the unemployment error term, but this effect disappears after 2 periods. Oil is negatively affected when a unit shock is applied to the terms of trade error term. When a unit shock is given to the Oil error term, Oil is positively affected, but the said positive effect gradually decreases. According to the results of Granger causality tests, there is a bidirectional causality between terms of trade and unemployment. In addition, bidirectional causality was found between oil prices and unemployment.

Terms of trade are highly important for economic growth and employment. An improvement in the country's volume of foreign trade supports economic growth by expanding exports and contributes positively to employment. A deterioration in the volume of foreign trade, on the other hand, increases imports, negatively affects domestic production and leads to an increase in unemployment rates. Another point to be taken into account is the effect of unemployment rates on the terms of trade. In case of high unemployment, imports are also adversely affected as the amount of consumption decreases. Moreover, high unemployment rates also negatively affect the volume of production and exports. Therefore, there is a bidirectional causality relationship between unemployment and terms of trade. Increasing unemployment rates negatively affect the terms of trade, while a decline in the terms of trade increases unemployment rates by reducing the level of employment. As a result of rising production costs brought on by rising oil prices, production volume is decreased, and unemployment rates rise. Reduced consumption results from higher unemployment rates, which also lowers the demand for oil. Production capacity declines in nations with high unemployment rates, which has an adverse effect on the demand for oil. As a result, the relationship between oil prices and unemployment is reciprocal. Higher oil prices lead to higher unemployment rates, while higher unemployment rates have an impact on higher oil prices.

This study makes an important contribution to understanding the complex relationships between oil prices, terms of trade and unemployment, which play a critical role in the development processes of developing countries. In light of the findings, first of all, policies to reduce the energy dependence of developing countries and strategies to diversify energy sources should be implemented. Moreover, careful planning and management of foreign trade policies are critical to keep import costs under control and support economic growth. It is also important to develop and implement employment policies to reduce unemployment rates. Future research needs to analyze the relationships in these areas in more detail and depth. In particular, examining the effects of economic activity and industrial structures in specific sectors on oil prices, terms of trade and unemployment could provide further insights. In addition, studies that take into account the specific conditions and economic structures of different developing countries can provide a broader perspective and better guide policy recommendations.

REFERENCES

Abugamea, G. (2018). Determinants of Unemployment: Empirical Evidence from Palestine (No. 89424). University Library of Munich, Germany.

Adeosun, O. A., Olayeni, R. O., Tabash, M. I., Anagreh, S. (2023). The dynamics of oil prices, uncertainty measures and unemployment: a time and frequency approach. China Finance Review International, 13(4), 682-713.

Alkhateeb, T. T., Mahmood, H., Sultan, Z. A., & Ahmad, N. (2017). Oil price and employment nexus in Saudi Arabia. International Journal of Energy Economics and Policy, 7(3), 277 - 281.

Altinay, G., & Karagol, E. (2005). Electricity Consumption and Economic Growth: Evidence from Turkey. Energy Economics, 27, 849-856.

Ananjeva, N.B. (2023). Oil price uncertainty and unemployment dynamics: Nonlinearities matter. Energy Economics, 106806-106806.

Belenky, M., Riker, D. (2015). Theory and empirical evidence linking international trade to unemployment rates. Journal of International Commerce and Economics, 5(3), 166-181.

Beşer, N. Ö. (2019). The effect of oil prices on foreign trade deficit in the economics of Bulgaria. Theoretical and Applied Economics, 26(3), 159-170.

Bildirici, M., Özaksoy Sonüstün, F. (2019). Chaotic structure of oil prices, inflation, and unemployment. Nonlinear Dynamics, Psychology, and Life Sciences, 23(3), 377-394.

Bjornland, H.C. (200b0) The dynamic effects of aggregate demand, supply and oil price shocks: a comparative study. The Manchester School, 68(5), 578-607.

Brancaccio, G., Kalouptsidi, M., Papageorgiou, T. (2022). The impact of oil prices on world trade. Review of International Economics, 31(2), 444-463.

Caligagan, Angelica Anne M, Ching, R. R., & Suin, Kristine April. (2022). An analysis on the economic factors affecting the unemployment rate in the Philippines from 1993-2018. Journal of Economics, Finance and Accounting Studies, 4(2), 01–17.

Cütcü, İ., Cenger, H. (2017). The relationship between foreign trade and unemployment in Turkey: time series analysis with structural breaks. III. International Entrepreneurship, Employment and Career Congress, October 12-15, 2017, Muğla, Türkiye.

Çil Yavuz, N. (2015). Financial Econometrics. Istanbul: DER Publications.

Dutt, P., Mitra, D., & Ranjan, P. (2009). International trade and unemployment: Theory and cross-national evidence. Journal of International Economics, 78(1), 32-44.

Ersungur Ş. M. Özdemir D., Tığtepe E. (2021). The effect of foreign trade on employment: a panel data analysis on OECD countries. Atatürk University Journal of Economics and Administrative Sciences, 35(4), 1335-1368.

Fernandez., K.M., Jha., K., & Jam'an., N.F. (2011). Oil price fluctuations and macroeconomic performance in Asian and Oceanic economies. Retrieved from http://hdl.handle.net/10356/44331

Granger, C. W. (1969). Investigating causal relations by econometric models and cross-spectral methods. Econometrica, 424-438.

Gujarati, N. (2006). Basic Econometrics. Istanbul: Literatür Publishing.

Gibson, B. (2011). Assessing the impact of trade on employment. Trade and Employment: From Myth to Facts, https://citeseerx.ist.psu.edu/document?repid=rep1&type=pdf&doi=62ed8bf9f086596054386253feb975f4678a2a70

Gül, E., Kamacı, A. (2012). The effects of foreign trade on employment: A panel data analysis. 4(3), 81-91.

Hung, L. W., Peng, S. K. (2019). Unemployment with trade and firm heterogeneity. International Journal of Economic Theory. 16(1), 62-81.

Jin, C., Lee, S., Hwang, J. (2019). The impact of import and export on unemployment: a cross-national analysis. International Journal of Sustainable Economy, 11(4), 347-363.

Nanovsky, S. (2019). The impact of oil prices on trade. Review of International Economics, 27(1), 431-447.

Nguyen, A.T. (2022). The relationship between economic growth, foreign direct investment, trade openness, and unemployment in South Asia. Asian Academy of Management Journal, 27(2), 21–40.

Nwosa, P., Keji, J., Adegboyo, S., Fasina, O. (2020). Trade openness and unemployment rate in Nigeria. Oradea Journal of Business and Economics, 5(2), 52-62.

Ordóñez, J., Monfort, M., Cuestas, J. C. (2019). Oil prices, unemployment and the financial crisis in oil-importing countries: The case of Spain. Energy, 181, 625-634.

Özdemir, Z., Doğaner, A., Çetin, G. (2022). Economic growth and carbon relationship: the case of Germany. Journal of Süleyman Demirel University Faculty of Economics and Administrative Sciences, 27(3), 509-521.

Perstenyova, N. P., Zaychikova, N. A. (2021). Analyzing Oil Prices Impact on Russian Foreign Trade. In: Ashmarina, S.I., Horák, J., Vrbka, J., Šuleř, P. (eds) Economic Systems in the New Era: Stable Systems in an Unstable World. IES 2020. Lecture Notes in Networks and Systems, vol. 160. Springer, Cham. https://doi.org/10.1007/978-3-030-60929-0_90

Raifu, I. A., Aminu, A., Folawewo, A. O. (2020). Investigating the relationship between changes in oil prices and unemployment rate in Nigeria: linear and nonlinear autoregressive distributed lag approaches. Future Business Journal, 6, 28-41.

Senzangakhona, P., & Choga, I. (2015). Crude Oil Prices and Unemployment in South Africa: 1990 – 2010. Mediterranean Journal of Social Cciences, 6(2), 407.

Sevüktekin, M., Çınar, M. (2017). Econometric Time Series Analysis. Bursa: Dora Publishing.

Shuddhasattwa, R., Ruhul, S., Pasquale, M. S. (2018). Energy, unemployment, and trade. Applied Economics, 50(47), 5122-5134.

Sinan, B. (2018). International oil prices in Turkey: 1980-2016. Journal of Finance, Economics and Social Research, 3(4), 681-695.

Trang, N. T. N., Tho, T. N., & Hong, D. T. T. (2017). The impact of oil price on the growth, inflation, unemployment, and budget deficit of Vietnam. International Journal of Energy Economics and Policy, 7(3), 42-49.