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THE RELATIONSHIP OF INFLATION, UNEMPLOYMENT AND ECONOMIC GROWTH PANEL DATA ANALYSIS IN SELECTED OECD COUNTRIES

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ABSTRACT

The aim of this study is to analyze the causality relationship between inflation, unemployment and economic growth variables for selected OECD (France, Australia, Canada, Germany, Iceland, Poland, Italy, Spain, Portugal, Turkey) countries using the data set for the years 2010-2020. In order to determine whether the economic growth variable has an effect on unemployment and inflation, unit root tests were first conducted for the variables used in the study. According to the results of the test, it was determined that the variables contained unit root. Considering the data obtained from this study, the hypothesis that there is no cointegration at the 5% significance level on average is rejected. According to Dumitrescu and Hurlin (2012) panel causality test, although a bidirectional causality relationship was detected between growth and unemployment variables, a unidirectional causality relationship was found between unemployment and inflation variables. In this context, it is known that there is a cointegration relationship between the variables (economic growth, inflation, unemployment) for at least one of the countries. It is expected that this study will contribute to the literature with current data and new generation econometric tests.

Keywords: *Inflation, Unemployment, Economic Growth, Panel Data, Stata.*

JEL Codes: *A10, A14.*

1. INTRODUCTION

To measure the economic satisfaction of a society, it is necessary to know both economic growth and unemployment, and inflation rates. At the same time, the economic discontent index, which was put forward by Artur Okun in 1962 to examine the relationship between unemployment and economic growth, is very important. The economic discontent index has an important place in giving information about the general state of an economy. At the same time, the economic discontent index explains the unemployment and inflation totals of p country in a given year. Expanding production capacity and increasing production in a country are indicators of economic growth. At the same time, increases in real Gross Domestic Product (GDP) or real Gross national product (GNP) are expressed as growth

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indicators. In the economy in question, expansions occur as well as contractions. As a result of these contractions and developments, concepts such as inflation, unemployment, and employment may occur. In the world economy, the concept of employment has great importance to increase the level of national income with macroeconomic indicators. The economic structure of a country shows the labor market of that country. If unemployment rates in a country are at very high levels, it shows that there is a problem with economic growth and development policies in that country. Necessary measures should be taken to avoid disruptions in the economy.

Gross Domestic Product (GDP)

One of the basic and most important criteria of the economy is to ensure price stability. Therefore, increases in the general level of prices are seen as an important macroeconomic problem of inflation. On the other hand, another important variable is expressed as unemployment. Unemployment can be explained as the situation where individuals who want to work in a country are not able to find a job even though they are looking for a job in line with their possibilities. In addition, the unemployment rate is obtained by dividing the number of unemployed people by the labor force. In general, in classical economic theory, labor market dynamics are not in a market position that can come into equilibrium with price elasticity. The reason why the labor market is not cleaned is; frictional unemployment caused mainly by solid structures as well as temporary elements. The natural rate of unemployment is consistent with the potential growth rate in the long run. Natural unemployment can also be expressed as unemployment that does not accelerate inflation. If the natural unemployment rate rises above the unemployment rate, the inflation rate rises and economic activities decrease. Therefore, it can be said that there is a negative relationship between unemployment and inflation. It is the Phillips curve that reveals this relationship. The reciprocal negative relationship improves in the long run when prices reach new equilibrium values. In this context, the study aims to reveal the relationship between economic growth, inflation, and unemployment variables among selected OECD (France, Australia, Canada, Germany, Iceland, Poland, Italy, Spain, Portugal, Turkey) countries by causality analysis. The countries selected in the OECD were selected by considering their development levels. The data used in the study were obtained from the OECD statistics website (stat.oecd.org)..

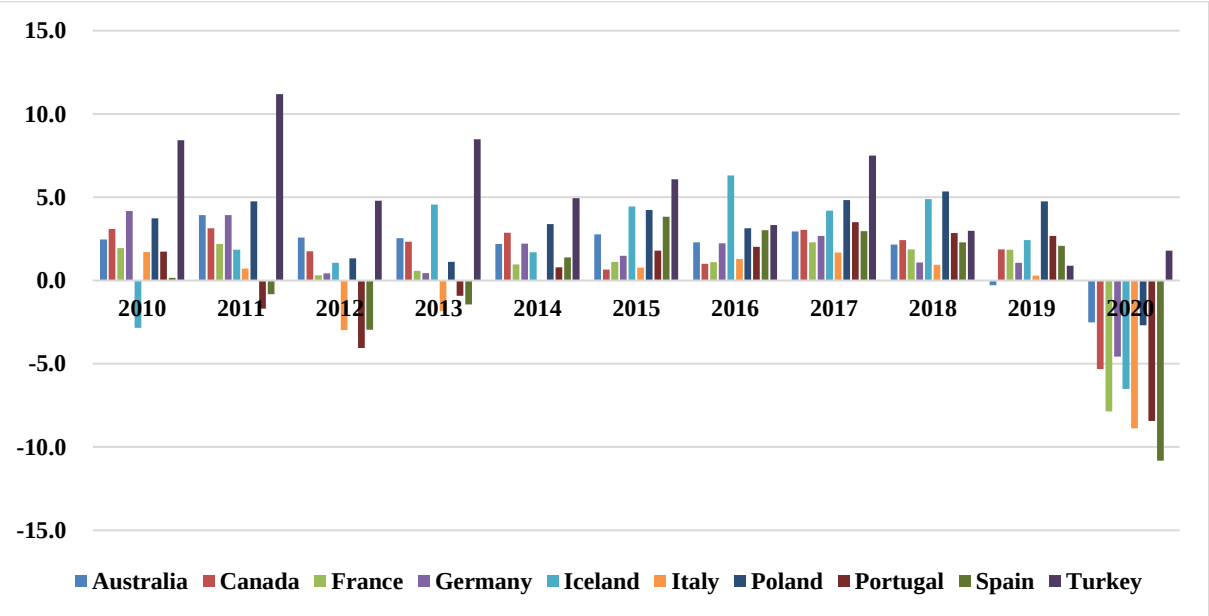
2. CONCEPTUAL FRAMEWORK^

2.1. Economic Growth

Economic growth is known as the increase in a country's production and goods capacity. In another definition; it can be defined as the increases seen in the gross national product of any country in a year the growth status of a country can be interpreted by looking at the increases in the country's national income (Parasız 1997--:4). Economic growth primarily affects GDP. In this context, the population growth rate occurring in the real income of the factors of production allows the per capita income to increase (Turkish Economy Congress). Since economic growth is generally called unbalanced

growth, it causes the growth rates to change between sectors. In this context, a labor flow starts towards the developed sectors. On the other hand, since economic growth causes increases in disposable income, it also causes changes in the consumption patterns of the society. At the same time, the change in consumption patterns causes a change in the structure of all products in the markets. In this context, the changes in the production and consumption of the society also change the socio-cultural structure of the society (Taban, 2011:1).

Table 1. Economic Growth Rates/Dollar in OECD Countries



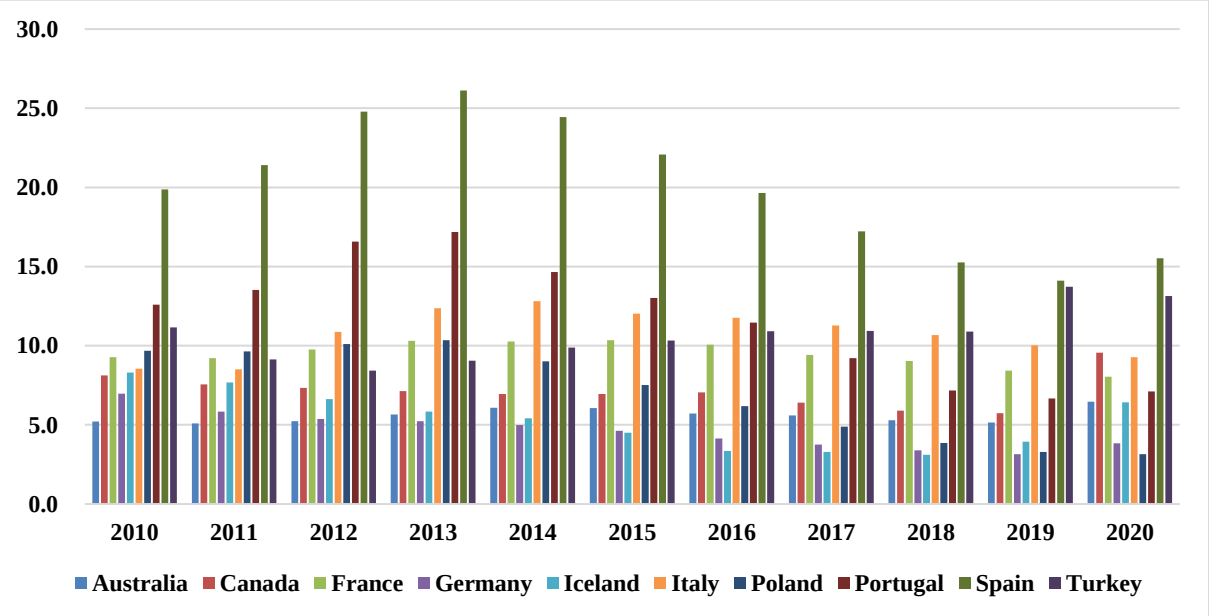
Source: OECD STAT

Table 1 shows the economic growth rates in OECD countries between 2010 and 2020. When the indicators in the table are examined, it can be said that there has been an increase in economic growth rates over the years. However, in some years, it is seen that the economic growth data decreased to negative values. In particular, with the onset of the Covid-19 pandemic epidemic, growth rates in the majority of the relevant countries decreased to negative values in 2020. It is seen that the country with the highest rate of contraction due to the Covid-19 epidemic is Spain with 10.8%. It is understood from the statistical data in the table that another country affected by the economic contraction in Italy by 8.9%. Turkey is seen as the country with the highest economic growth rate over the years. It can be said that the countries with the lowest economic growth rate are Iceland, Poland, and Italy. Looking at the data in the table, it is seen that the economic growth reached its highest levels in 2011, and at this rate, it was in Turkey. Even though most of the relevant years in the study fell to negative values in 2020 due to the pandemic, Turkey achieved economic growth of 1.8% (compared with the positive growth figures of other quarters, despite the -10.3% contraction in the second quarter) despite the pandemic conditions.

2.2. Unemployment

The unemployment rate expresses the ratio of people who are willing to work in a country but cannot find a job to the total workforce. Therefore, unemployment has an important place in the country's economy. From past to present, many countries have met with the problem of unemployment and have implemented various policies to solve this problem (Yüksel, 2016). Unemployment is one of the most important socio-economic problems that countries have to deal with. At the same time, unemployment affects the economic growth level of the country, the shrinkage of the production capacity, as well as the deterioration of the individual's health, the disintegration of the family concept, and the collapse of the society. Unemployment emerged especially in the 1929 crisis, which was called the Great Depression when the economic crisis was at its worst. On the other hand, in the stagnation periods after the wars, the crises that started with the 1994 Mexican crisis and extended to the present had even more severe consequences. According to 2019 data, the unemployment rate worldwide is known as approximately 13.7% (Tarı and Bakkal, 2017). Looking at the unemployment rate in 2020, it is seen as 13.2%. Compared to 2019, there was a slight decrease in unemployment rates 2020. As of September 2021, the unemployment rate was determined as 11.1%. The striking point in unemployment rates is that unemployment rates have tended to decrease in the last two years. It can be said that prohibiting the dismissal of workers during the Covid-19 pandemic process has been effective in reducing these unemployment rates

Table 2. Unemployment Rates in OECD Countries



Source: OECD STAT

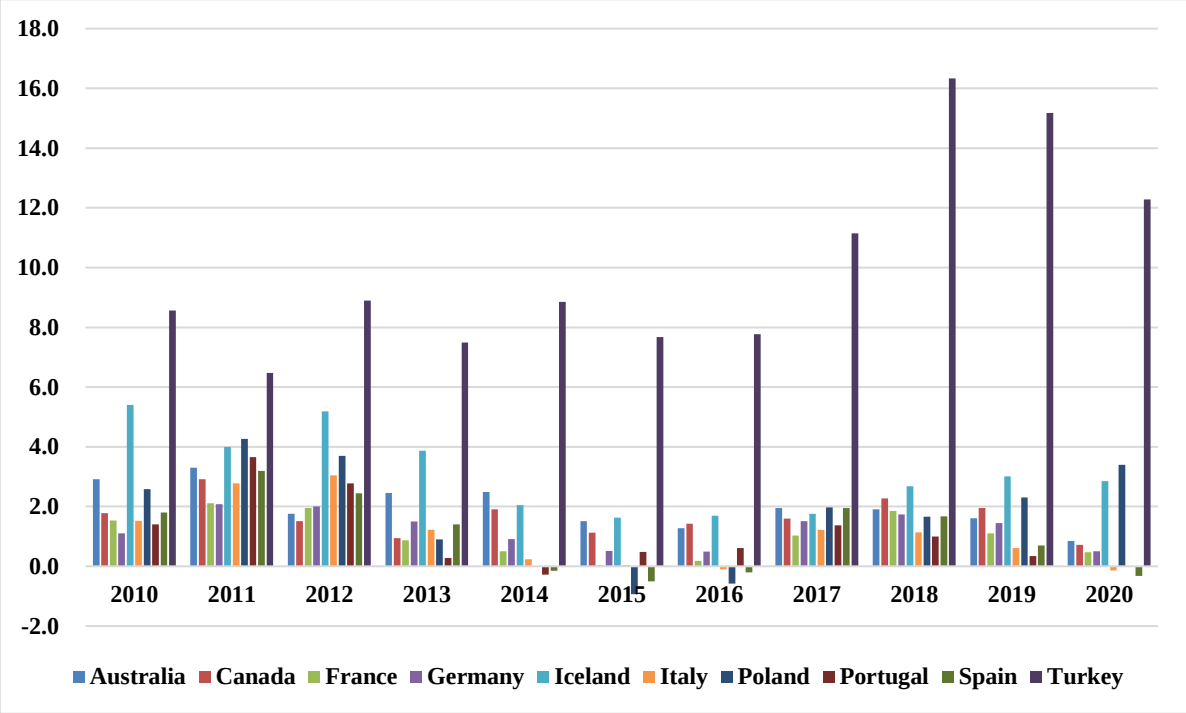
Table 2 shows unemployment rates in OECD countries between 2010 and 2020. When the indicators in the table are examined, it can be said that there has been an increase in unemployment rates over the years. However, after 2013, there has been a noticeable decrease in the unemployment rate in

the related years. As seen in the chart over the years, it is seen that the peak of the unemployment rate is Spain. The year with the highest unemployment rate in these years was 2013 with 26.1%. Besides, looking at the figure of the unemployment rate in the graph, it is understood that the lowest point is in Australia. The year in which Australia's unemployment rate was the lowest was 5.1% in 2011. When the economic growth and unemployment table are compared, it can be said that as a country grows economically, there is a decrease in unemployment rates. In other words, it can be said that there is a negative relationship between the variable of economic growth and the variable of unemployment. It can be said that the increase in unemployment rates in Spain in 2020 compared to 2019, the effects of the covid-19 pandemic process on Spain are quite large.

2.3. Inflation

The increase in the general level of prices in a country in a given year is defined as inflation (Eroğlu, 2002: 285). Increases in inflation figures can create negative situations for the country's economy. Inflation also affects the investments necessary for the development of the country's economy. It can be said that the rates of inflation affect the investments made in the country as well as the interest rates. When we look at the studies in the literature, it is generally seen that there is inflation swelling. In other words, it is the increase of prices in the market by intervention. However, in order for inflated inflation to take place, the money in force must be in the position of unrequited money. In this context, the total amount of goods should show a course below the total money supply. At the same time, due to the increase in the amount of demand, it will turn into competition among the producers of goods and this competition process will increase inflation. (First, 1990).

Table 3. Annual Inflation in OECD Countries



Source: OECD STAT

Table 3 shows inflation rates in OECD countries between 2010 and 2020. When the indicators in the table are examined, it can be said that there has been a decrease in inflation rates over the years. But the same cannot be said for the country of Turkey. It is seen that inflation values have almost doubled between the relevant years in Turkey. Turkey is seen as the country with the highest inflation rate over the years. When we look at the highest inflation rate in Turkey, it was realized as 16.3% in 2018. It is understood from the data in the table that the country with the lowest inflation rate in Portugal. In Portugal, the year with the lowest inflation rate was -0.3% in 2014. When the economic growth and unemployment and inflation table are compared, it is seen that the unemployment rates are high and the economic growth rates are low in countries with high inflation rates. In this context, it can be said that there is a positive relationship between inflation and unemployment, but there is a negative relationship between economic growth and inflation.

3. LITERATURE REVIEW

In their study, Altıntaş and Koçbulut (2019) aimed to analyze the causality relationship between economic growth and inflation, in a way to cover 27 OECD countries, by taking the data between 2000 and 2014. In this context, it has been stated that there is a non-linear relationship between economic growth and inflation, according to the results obtained after the panel analysis made from the data collected in the relevant years. As their findings, they put forward that economic growth varies depending on the inflation rate. According to the analysis results; It has been stated that if the inflation rate in 27 OECD countries rises above 3.2%, inflation will cause negative results on economic growth,

while if the inflation rate stays below this value, inflation will have positive effects on economic growth. Özçelik and Uslu (2017) aimed to examine the relationship between inflation, unemployment, and economic growth in their study. In this context, he used monthly data from 2007-2014. They used the vector autoregressive (VAR) econometric model as an econometric analysis. At the same time, they tested whether there was a cointegration relationship between the variables using the Johansen cointegration test. According to the Granger causality test results, they revealed that there is a bidirectional causality relationship between economic growth and unemployment. However, they concluded that there is no causal relationship between inflation and economic growth and unemployment. Turan (2010) aimed to examine the relationship between economic growth and inflation in his study. As is generally the case in the literature, unit root, regression, and cointegration analyzes were also carried out in this study in econometric analyzes that deal with such issues. However, since the study is a study on Turkey, a Cobb-Douglas type analysis was not included. The data used in the study are the data between 1968 and 2008. In the study, first of all, a unit root test was performed, and economic growth and unemployment became stationary at the first difference, while the inflation variable became stationary at the second difference. According to the data obtained as a result of the analysis; In the relations between economic growth and inflation, it has been seen that inflation has a negative effect on economic growth. However, this relationship was found to be positive in a lagged period. As a general model, it has been seen that the bet effect causes neutrality by canceling each other out. Yüksel (2016) aimed to examine the relationship between unemployment, economic growth, and inflation in Russia between 1992 and 2014. In this context, Granger, Toda Yamamoto, and cointegration tests were applied with the data obtained. According to the data obtained as a result of the analysis, it has been revealed that there is a causality relationship from the unemployment variable to the growth variable in Russia. Köse (2016) aimed to examine the relationship between unemployment, inflation, and economic growth in Turkey. In this context, the data between the years 2002-2014 was used in the study. Using this data, Regression Analysis, ADF Unit Root Test, and Granger Causality Analysis tests were used. According to the data obtained as a result of the analysis, it has been determined that there is a negative relationship between unemployment and inflation. It has been seen that a 1% change in the inflation rate reduces the unemployment rate by 0.001%. If unemployment changes by 1%, inflation decreases by 0.003%. In summary, it has been observed that there is a bidirectional causality relationship between unemployment and inflation. Akay, et al. (2016) aimed to examine the relationship between output level and unemployment within the framework of Okun's Law. In this context, they investigated the validity of the law of the arrow using the data between 1969 and 2014 in Turkey. Markov Regime Change Model was used as econometric analysis in the study. According to the results obtained as a result of the analysis, it has been revealed that there is both a short-term and a long-term relationship between the level of output and unemployment in Turkey. At the same time, it has been determined that the relationship between unemployment and economic growth is stronger in the contraction period of the economy than in the expansion period. Therefore, it is mentioned that there is asymmetric

information in the study. Sekmen and Topuz (2019) aimed to investigate the relationship between economic growth and inflation in OECD countries. In this context, they used the panel cointegration method as econometric analysis using the data between 1996-2016. According to the results of the analysis with these data obtained, they determined that there is a linear relationship between economic growth and inflation. For OECD countries, the inflation threshold is accepted as 3.6%. If the inflation rate falls below this value, it can be said that there is a positive relationship between economic growth and inflation, and a negative relationship between economic growth and inflation when the inflation rate rises above this value. Pata (2017) aimed to examine the relationship between savings, inflation, and economic growth by using the data between 1983 and 2015. In this context, causality tests were used by using the autoregressive distributed lag model (ARDL) as an econometric analysis using the data of the related years. According to the data obtained as a result of the ARDL model, it was determined that when the inflation rate increased by 1% in the short term, the economic growth decreased by 0.07% and decreased by 0.23% in the long term. At the same time, it has been seen that when saving increases, it affects economic growth positively both in the short and long term. On the other hand, when looking at the results of the analysis, they suggested that there is a reciprocal causality relationship between negative shocks and positive shocks in inflation and savings. Bölükbaş (2019) aimed to measure the effects of unemployment, economic growth, and inflation on the Turkish economy. Therefore, data between 2005 and 2017 were used in the study. Panel ARDL and Dumitrescu-Hurlin panel causality tests were used as econometric analysis. According to the results obtained as a result of the analysis, it has been determined that there is a positive relationship between economic growth and inflation. It has been observed that the unemployment variable contains negative but significant results. At the same time, the relations between unemployment, economic growth, and inflation in the 17 regions in the study produced significant results. On the other hand, they stated that the direction of causality varies from region to region. The causality relationship between inflation and economic growth was seen in 7 regions and the causal relationship between unemployment and economic growth was seen in 17 regions. Yaşar (2008) aimed to examine the relationship between economic growth and unemployment by using the data on Turkey between 1994 and 2007. In this context, unemployment and employment data were used both separately and together. According to the data obtained as a result of the analysis, it has been argued that the unemployed growth trend seen in the world economy is valid in Turkey. In addition, despite the high rate of growth that emerged after 2002, it was observed that unemployment did not decrease and employment did not increase. Üzar and Akyazı (2018) aimed to examine the relationship between economic growth and unemployment by making an econometric analysis with the data between 2000-2016 using 34 OECD countries. In this context, the analysis was tested with the Dumitrescu and Hurlin causality tests. According to the results obtained as a result of the analysis, it has been seen that there is a bidirectional causality relationship between unemployment and economic growth. It has therefore been argued that Okun's Law is valid. Şentürk and Akbaş (2005) aimed to examine the relationship between unemployment, economic growth, and inflation rate in the 2005 period. For this purpose, the stationarity

of the series was tested with PP and KPSS unit root tests. At the same time, Zivot–Andrews unit root test with structural break was applied to find the breaks in the series. Then, the Toda-Yamamoto test was applied to understand whether there is a causal relationship between the series. According to the data obtained as a result of the analysis, it is accepted that there is a bidirectional causality relationship between the inflation rate, industrial production index, and unemployment..

4. DATA SET, ECONOMETRIC METHOD, AND EVALUATION OF FINDINGS

4.1. Data Set and Econometric Model

The data used in this study were compiled from statistics presented by OECD STAT for the period 2010-2020. The data set in this study consists of data from selected OECD (France, Australia, Canada, Germany, Iceland, Poland, Italy, Spain, Portugal, Turkey) countries. In this study, the causal relationship between economic growth, inflation, and unemployment was analyzed. Table 4 includes the definition of the variables.

Table 4. Definition of Variables

Name of Variables	Definition of Variables	Source
Economic Growth (GRW)	Gross domestic product (expenditure approach)/Growth Rate	OECD
Inflation (ENF)	Consumer Price Index/percentage of change in the past year	OECD
Unemployment (UNP)	Annual unemployment rate: all persons/ Level, rate	OECD

Table 5. Descriptive Statistics of Variables

Variable	Observation	Average	Standard Value	Minimum	Maksimum
ID	110	5.5	2.885427	1	10
Growth	110	1.54	3.37071	-10.8	11.2
Inflation	110	2.406364	2.990513	-.9	16.3
Unemployment	110	9.25	4.847997	3.1	26.1
Time	110	2015	3.17675	2010	2020

In Table 5, the number of observations, standard values, min. and max. Values are given. In the literature, there is more than one method to reveal the cross-section dependence in cases where T < N, that is, the time series is smaller than the number of observations. These methods are;

(i) Pesaran test (2004)

(ii) Friedman statistics (1937)

(iii) tests such as the Frees test (1995).

4.1.2. Econometric Model

The mathematical function of the model to be used in econometric analysis can be written as follows:

The econometric model to be estimated from Equation (1) can be expressed as:

$$GRW_{it} = \beta_0 + \beta_1 ENF_{it} + \beta_2 UNP_{it} + u_{it} \quad (1)$$

In the model in Equation (2), β_0 coefficient constant represents the GRW emission that occurs independently of the explanatory variables. β_1 ve β_2 parameters to be estimated; GRW dependent variable represents economic growth, while ENF and UNP represent the independent variables of Inflation and Unemployment, respectively. u stands for the error term. At the same time, i represents the cross-sectional dimension of the panel data, and t the time dimension.

4.2. Econometric Method

4.2.1. Cross Section

According to this test, $T \to \infty \; ve \; N \to \infty$ assumes the case where the cross-section dependency disappears. However, in cases where N>T, CD_{LM} test causes significant distortions and deviations in analysis results. At the same time, as N increases, deviations increase. Since such situations can occur in some specific studies, Pesaran (2004) developed the CD test for cross-section dependence in cases where N>T. In the following equation, the equation used in case N is greater than T (N>T) is written.

$$CD_{LM} = \sqrt{\frac{1}{N(N-1)}} \sum_{i=1}^{N-1} \sum_{j=i+1}^{N} (Tp_{ij}{}^2 - 1) \quad (2)$$

According to this test, it is assumed that there is no cross-sectional dependence when $T \to \infty$ and $N \to \infty$. However, in cases where N>T, the CD_{LM} test shows significant distortions and the deviations increase as N gets larger. (Demir And Görür, 2020:21) This may occur in some empirical studies. Therefore, Pesaran (2004) developed the CD test for cross-section dependence in cases where N>T. This test seen in equation (3) is used when N is greater than T (N>T).

$$CD = \sqrt{\frac{2T}{N(N-1)}} \sum_{i=1}^{N-1} \sum_{j=i+1}^{N} P_{ij} \quad (3)$$

This test is based on the sum of the correlation coefficients between cross-section residuals. Under the H_0 hypothesis, which shows that there is no relationship between cross-sections, this test statistic shows a standard normal distribution (Pesaran, 2004: 9). This study was tested with the Pesaran test

since it was thought that more reliable results would be obtained. The hypotheses for this test are expressed as

H_1 =There is a horizontal section dependency,

H_0 =There is no horizontal section dependence.

4.2.2. Unit Root

While performing panel data analysis, first or second-generation tests of unit root tests are applied according to whether there is any connection between the cross-sections. First-generation tests are tests that can be applied in cases where there is no connection between cross-sections. Second-generation tests are tests that can be applied in case of any connection between cross-sections. Levin, Lin and Chu (2002), Breitung (2005), Hadri (2000), Maddala and Wu (1999), I'm, Pesaran and Shin (IPS, 2003), Choi (2001) are examples of first-generation unit root tests. CADF/CIPS tests can be given as an example of second generation tests. In this study, the CADF/CIPS unit root test was applied because the cross-section dependency was revealed.

$$Y_{i,t} = (1-\phi_i)u_{,} + \phi_i y_{i,t-1} + u_{i,t} \qquad \text{i=1,2.....,N ve t=1,2....,T} \tag{4}$$

$$u_{it} = y_{,} f_t + \varepsilon_{it} \tag{5}$$

f_t the unobservable common effects of each country ε_{it} shows individual-specific errors. Unit root hypothesis tests can be written as:

$$\Delta y_{it} = \alpha + \beta_t y_{it-1} + y_i f_t + \varepsilon_{it} \quad \text{t=1,2.....N ve t=1,2....,T} \tag{6}$$

$H_0 : \beta_t = 0$ for all i's (The Series Is Not Stationary.)

$H_1 : \beta_t < 0$ i:1,2,...N_1, $\beta_t = 0$ i=$N_1+1, N_1+2,...N$. (The series is stationary.) (7)

After the unit root tests of each cross-section are performed, the average of these test statistics is taken to reach the general unit root test statistic, CIPS (Cross-Sectionally Augmented IPS) test (Pesaran, 2006). The CIPS statistic can be expressed as:

$$CIPS = N^{-1}\sum_{t=1}^{n} CADF_t \tag{8}$$

4.2.3. Cointegration

The cointegration test is an LM statistical test and was introduced by Westerlund Basher (2009). This test is a test that can generally be used when there is structural break and cross-section dependencies. The equation estimation of the test is shown in equation 5 below.

$$y_{it} = z'_{it}\gamma_{ij} + x'_{it}\beta_i + e_{it,}$$
$$e_{it} = rit + uit,$$
$$r_{it} = r_{it} + \theta_i u_{it} \quad (9)$$

In this estimated model (y_{it}) is the time series model. In the model, t=1,…T represent the time period, I=1,…N represent the horizontal section of the panel. Case (observation) = 3 assumption is estimated in the application of the test (Çınar; 2011).

4.2.4. Dumitreschu-Hurlin Panel Causality

In the study of Dumitrescu and Hurlin (2012), it is assumed that the causality relationship for the countries in question within the framework of the panel data is also valid for different countries. At the same time, Dumitrescu and Hurlin (2012) panel causality test is a test that can reach effective results even though the time dimension is smaller than the cross-section size and/or. The model in which the stationary x and y values are expressed is shown in equation 10 Dumitrescu and Hurlin, 2012:1457):

$$Y_{i,t} = \alpha_i + \sum_{k=1}^{k} Y_i^{(k)} Y_{i,t-k} + \sum_{k=1}^{k} \beta_i^{(k)} X_{i,t-k} + \varepsilon_{i,t} \quad (10)$$

As seen in Equation 10, it is used to determine whether the variable x is the cause of the variable Y. At the same time, the causality relationship is based on an F test H_0 can be tested using the hypothesis. In this context H_0 when the hypothesis is rejected, the variables are replaced and a bidirectional causality relationship can be observed by changing the direction of causality (Lopez and Weber, 2017: 2).

4.3. Econometric Findings

The results of the analysis are shown in the tables in detail, respectively.

Table 4. Cross-Section Dependency Test

Variables	CD-Test	P-Value	Average Joint T	Average P	Average Abs(P)
Growth	23.407	0.000	10.00	1.00	1.00
Unemployment	20.113	0.000	10.00	0.86	0.86
Inflation	21.344	0.000	10.00	0.86	0.86

Considering the data obtained as a result of the peseran test in Table 4, the hypothesis that there is no cross-section dependence between the sections is rejected, since the probability (p) values are significant at the 1% level. Therefore, due to the cross-section dependence in the data, new generation unit root tests can be applied.

Table 5. Panel Unit Root Test (Peseran)

LEVEL	Growth	Unemployment	Inflation
Fixed Statistics	-1.093	-0.923	2.610
Stable+ Trend	-0.923	1.700	1.700
FIRST DIFFERENCE	**Δ Growth**	**ΔUnemployment**	**Δ Inflation**
Fixed Statistics	**-2.805*** **	**-3.777*** **	**-2.985*** **
Stable+ Trend	**-3.115** **	**-152.373*** **	**-3.458*** **

***, **, * denote statistical significance levels of 1%, 5% and 10%, respectively.

Table 5 presents the statistical results of the unit root test. Accordingly, the p values of the series; cannot reject the null hypothesis that the series at level have a unit root. That is, at level values, both series are not stationary and contain a unit root. The situation does not change at the lag lengths determined as 2 according to the Akaike information criterion (AIC). However, when the first differences of the series are taken, it is concluded that at the 1 percent statistical significance level, all three variables become stationary in I(1), that is, they do not carry a unit root. As a result, since the causality approach of Dumitrescu and Hurlin (2012) stipulates that the variables in the system must be stationary, the first difference of the series (Δ) was used for further analysis.

Table 6. Westerlund Co-Integration Test

Statistics	Value	Z-value	P-value	Robust P-value
Gt	-3.433	-4.802	0.000	0.080
Ga	-4.001	2.583	0.000	0.040
Pt	-10.404	-4.829	0.000	0.000
Pa	-7.386	-0.860	0.195	0.000

The results of the cointegration test are shown in Table 6. Since all series are stationary at the 1st difference, it is understood that there is a cointegration relationship between the series. In this context, the Westerlund test should be applied to reveal this cointegration relationship. The results of the test are shown in detail in Table 8 above. Considering the test statistical results, the hypothesis that there is no

cointegration at the 5% significance level on average is rejected. In this context, it is known that there is a cointegration relationship between the variables (economic growth, inflation, unemployment) for at least one of the countries. In summary; It can be said that there is a cointegrated relationship between inflation and unemployment or between unemployment and economic growth.

The null hypothesis:	W-Stat Value	Zbar-Stat Value	Prob. Value
There is causality from Growth to Unemployment.	4.7659	8.8317	0.0000***
There is no causality from Growth to Inflation.	1.1307	0.3066	0.7592
There is causality from Unemployment to Growth.	18.9501	42.0967	0.0000***
There is causality from unemployment to inflation.	17.1215	37.8083	0.0000***
There is no causality from Inflation to Growth.	1.5707	1.3383	0.1808
There is no causality from Inflation to Unemployment.	0.2788	-1.6913	0.0908

***, **, * denote statistical significance levels of 1%, 5% and 10%, respectively.

In this study, Dumitrescu and Hurlin's (2012) panel causality test was applied to the stationary series and the results are presented in Table 7. According to Table 7, a statistically 1% (0.001) causality relationship was found from the growth variable to the unemployment variable. On the other hand, a statistically 1% (0.001) causality relationship was found from the unemployment variable to the growth variable. As a result of the analysis, it has been determined that there is a bidirectional causality relationship between growth and unemployment, as can be seen in the table. Probe as we look from the growth variable to the inflation variable. Since the value (0.7592) was insignificant, no causality finding could be found. On the other hand, when we look at the table, probe from the inflation variable to the growth variable. Since the value (0.1808) was insignificant, no causal relationship could be found. Looking at the other variables in the table, when looking from the unemployment variable to the inflation variable, it has been determined that there is a causal relationship at the level of 1% (0.001). However, on the other hand, the probe from the inflation variable to the unemployment variable. No causality relationship was found because the value (0.0908) was meaningless. A one-way causality relationship was determined between unemployment and inflation variables

5. CONCLUSION

In the economic literature, it is seen that there are stronger effects in Okun's Law at the point of the relationship between unemployment and economic growth. In this context, the increase in economic growth will increase the economic services, and therefore the investments will increase and these positive developments will create a place for employment. Expansion of employment areas will reduce unemployment rates. With the help of policymakers, the determination of whether the Okun Law has the authority to explain the growth opportunities that occur without employment has gained great

importance. In this study, the causality relationship between unemployment, economic growth, and inflation variables was tested.

In this context, first of all, unit root tests were applied to understand the effects of the variables on each other. As a result of these tests, it was determined that the variables in the study contain unit-roots. Considering the data obtained from this study, the hypothesis that there is no cointegration at the 5% significance level on average is rejected. In this context, it is known that there is a cointegration relationship between the variables (economic growth, inflation, unemployment) for at least one of the countries. According to Dumitrescu and Hurlin's (2012) panel causality test, although a bidirectional causality relationship was detected between growth and unemployment variables, a unidirectional causality relationship was found between unemployment and inflation variables. Due to the increase in uncertainties about the future in an environment where inflation is high, no investment can be made, and if there is no investment, there can be no economic growth. Different from the studies discussed in this study, analyzes were carried out with both current data and new generation economic tests. In this respect, it contributes to the literature.

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