Comparing Macroeconomic Performance of the Union for the Mediterranean Countries Using Grey Relational Analysis and Multi-Dimensional Scaling

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Abstract

The aim of this study is to evaluate the economic performance of the Union for the Mediterranean (UfM) countries during 2006-2016 periods. The Union for the Mediterranean comprises the 28 EU Member States, the European Commission and 15 Mediterranean countries namely Albania, Austria, Bosnia and Herzegovina, Croatia, Czech Republic, Egypt, Finland, Germany, Hungary, Italy, Jordan, Lebanon, Luxemburg, Mauritania, Montenegro, The Netherlands, Poland, Romania, Slovenia, Sweden, Tunisia, United Kingdom, Algeria, Belgium, Bulgaria, Cyprus, Denmark, Estonia, France, Greece, Ireland, Israel, Latvia, Lithuania, Malta, Monaco, Morocco, Palestine, Portugal, Slovakia, Spain and Turkey. Syria has suspended its membership to the UfM on December 1, 2011. Libya has an observer status in the UfM. Grey Relational Analysis is used for the outranking of countries using macroeconomic indicators including total investment, gross national savings, inflation, average consumer prices, volume of imports of goods and services, volume of exports of goods and services, unemployment rate, general government revenue, general government total expenditure, general government gross debt, current account balance, gross product domestic (constant). Also annual macroeconomic indicators are converted to single data set by using arithmetic mean and weighted arithmetic mean (to be focused on recent years). This combined data was also used for another economic performance evaluation and Multidimensional Scaling Analysis has been used for weighted arithmetic mean to show countries' positions relative to each other in a two-dimensional plane. The results of the empirical analyses show that Ireland ranked as first according to the weighted arithmetic mean among 36 UfM countries. Egypt and Tunisia have been found as the countries with the worst economic performance.

Keywords: Economic Performance Evaluation, Macro-Economic Indicators, the Union for the Mediterranean, Grey Relational Analysis, Multi-Dimensional Scaling

Introduction

The main aim of economic policies is to increase the welfare of the people of the country and enable them to live their lives with confidence. For this reason, the most important criterion for competing at the global level is the level of success in the economic indicators. Therefore, assessing the economic performance of countries is a very important need. In assessing the economic performance of countries, it is possible to benefitting from many criteria (Eleren & Karagul, 2008). When assessing the economic performances of countries, it is almost indispensable to make a decision by looking at macroeconomic variables (Melkers & Malone, 2002). Indicators such as Gross National and Domestic Product (GNP & GDP), Growth Rate, Inflation Rate and Price Indicators, Unemployment Rate, Interest Rate, Balance of Payments, Exchange Rate, Public Deficit, Stock-Rate Ratios are among the main macroeconomic indicators (Parasiz, 2011). The success of the economic policies of the countries is measured by the positive developments in these indicators.

Performance analysis can be done in various dimensions. Methods such as rate analysis, regression analysis, examining changes in macroeconomic indicators of a country over time, comparing countries or regions with each other at various times, and to measuring efficiency in production processes where certain outputs are obtained with certain inputs are among the most commonly used methods in performance analysis (Demir & Bakirci, 2014).

As mentioned above, countries today are compared with various methods according to their economic performance, and the results obtained as a result of comparison can be regarded as economic performances of countries over certain periods. Multi-Criteria Decision Making (MCDM) methods are used in research as appropriate methods for sorting and selecting alternatives, selecting and classifying the results and alternatives used in the comparison of such organizations (Urfalıoglu & Genc, 2013).

The aim of this study is to perform performance rankings 36 member states of the Mediterranean Union with the help of Gray Relational Analysis, which is one of the MCDM techniques, in the frame of selected 11 macroeconomic indicators between 2006-2016 years. In addition, with the help of Multidimensional Scaling (MDS) analysis, we will try to reveal countries' positions relative to each other in a two-dimensional plane

The Union for the Mediterranean or the Mediterranean Union is an organization established on 13 July 2008. The Union for the Mediterranean (UfM), which began in 1995 and is the continuation of the Euro Mediterranean Partnership (EUROMED), also known as the Barcelona Process, is an intergovernmental regional organization aimed at strengthening co-operation in the Mediterranean. UfM is a collaborative platform that covers a wide range of fields ranging from political dialogue and economics to social and cultural spheres. UfM should encourage the establishment of a zone of peace, stability, security and common economic prosperity in the region on the basis of the principles of respect for democracy, human rights and fundamental freedoms and the promotion of intercultural dialogue in the Euro-Mediterranean region by confirming its acquis with the objectives of EUROMED. The Union for the Mediterranean comprises the 28 EU Member States, the European Commission and 15 Mediterranean countries namely Albania, Austria, Bosnia and Herzegovina, Croatia, Czech Republic, Egypt, Finland, Germany, Hungary, Italy, Jordan, Lebanon, Luxemburg, Mauritania, Montenegro, The Netherlands, Poland, Romania, Slovenia, Sweden, Tunisia, United Kingdom, Algeria, Belgium, Bulgaria, Cyprus, Denmark, Estonia, France, Greece, Ireland, Israel, Latvia, Lithuania, Malta, Monaco, Morocco, Palestine, Portugal, Slovakia, Spain and Turkey. Syria has suspended its membership to the UfM on December 1, 2011. Libya has an observer status in the UfM (UfM, 2017).

I.
Literature Review

In recent years, it is possible to see some studies using multi-criteria decision making techniques such as TOPSIS, Analytic Hierarchy Process (AHP), Data Envelope Analysis (DEA), Grey Relational Analysis (GRA) and PROMETHEE, ELECTRE, MOORA etc. in assessing the macroeconomic performance of countries in the literature. Charnes, Cooper and Li (1989) studied the use of DEA (data envelopment analysis) as a tool for possible use in evaluating and planning the economic performance of China's cities (28 in all) which play a critical role in the government's program of economic development. They illustrated that DEA can be used to identify sources, and estimate amounts of inefficiencies in each city's performance (Charnes et all., 1989). In the study conducted by Urfalıoglu and Genc in order to determine the economic situation of Turkey in the European Union process and the applicability of the Multi Criteria Decision Making technics with economic data, the positions of the countries have been determined in the application of ELECTRE, TOPSIS and PROMETHEE in the EU countries and the results were compared for each of the three techniques (Urfalıoglu & Genc, 2013). Eleren ve Karagul have

evaluated the performance analysis of Turkish economy between 1986-2006 years with TOPSIS method and found that the best year was 1986, followed by 1990, 1987 and 1993 respectively according to TOPSIS score for each year, the worst years have been in 1999, 2001, 2006 and 2000 (Eleren & Karagul,2008). Cherchye (2001) compared three DEA-based performance indicators of the OECD to illustrate how DEA models allow to estimate policy priorities. Huang and Jane (2009) combined the moving average autoregressive exogenous (ARX) prediction model with grey systems theory and rough set (RS) theory to create an automatic stock market forecasting and portfolio selection mechanism (Cherchye, 2001). Kung and Wen (2007) used six financial indicators to classify twenty items of financial ratios as research variables through the globalization Grey Relational Analysis (GRA), to find the significant financial ratio variables and other financial indicators affecting the financial performance of venture capital enterprises from 2001 to 2003 in Taiwan (Kung & Wen, 2007). They found that GRA is suitable for testing the relationship between attributes and financial performance of venture capital enterprises, and is the important method for investors to find out the more objective and successful investment target. Yildirim, Hepsen and Onder have investigated Latin American and Caribbean Economies with Grey Relational Analysis in order to rank countries according to the selected macroeconomics indicators including total investment, gross national savings, inflation, average consumer prices etc. They have found that Mexico and Dominican Republic ranked as first and second position, Argentina, Bolivia and Venezuela were at the bottom and these countries encountered difficulties maintaining sustained growth (Yıldırım et all, 2015).

Macroeconomic Indicators

The aim of this study is to evaluate the economic performance of 36 the Union for the Mediterranean countries (Albania, Algeria, Austria, Belgium, Bosnia and Herzegovina, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Egypt, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Israel, Italy, Jordan, Latvia, Lithuania, Luxemburg, Morocco, Netherlands, Poland, Portugal, Romania, Slovenia, Slovakia, Spain, Sweden, Tunisia, Turkey, United Kingdom) during 2006-2016 periods. Libya, Lebanon, Mauritania, Montenegro, Malta, Monaco and Palestine were excluded from the study due to lack of data. Syria has suspended its membership to the UfM on December 1, 2011. So the study conducted with 36 Union for the Mediterranean countries.

Grey Relational Analysis is used for the outranking of those countries using macroeconomic indicators including gross domestic products, total investment, gross national savings, inflation, volume of imports of goods and

services, volume of exports of goods and services, unemployment rate, general government revenue, general government total expenditure, general government gross debt and current account balance. The data related to indicators was gathered from the International Monetary Fund world economic outlook data base (IMF-2016).

Table 1.Macroeconomics Indicators, Codes and Units.

VARIABLE	CODE	UNIT
X1: Gross domestic product	NGDP_RPCH	Percent change
X2: Total investment	NID_NGDP	Percent of GDP
X3: Gross national savings	NGSD_NGDP	Percent of GDP
X4: Inflation	PCPIPCH	Percent change
X5: Volume .of imports of goods and services	TM_RPCH	Percent change
X6: Volume .of exports of goods and services	TX_RPCH	Percent change
X7: Unemployment rate	LUR	Percent of total labor force
X8: General government revenue	GGR_NGDP	Percent of GDP
X9: General government expenditures	GGX_NGDP	Percent of GDP
X10: General government gross debt	GGXWDG_NGDP	Percent of GDP
X11: Current account balance	BCA_NGDPD	Percent of GDP

Gross Domestic Product is one of the most important macroeconomic indicators showing the total value of the final goods and services produced within the country in one year. It presents a sum of a country's production which consists of all purchases of goods and services produced by a country and services used by individuals, firms, foreigners and the governing bodies. GDP consists of consumer spending, investment expenditure, government spending and net exports hence it portrays an all-inclusive picture of an economy because of which it provides an insight to investors which highlights the trend of the economy by comparing GDP levels as an index. GDP is not only used as an indicator for most governments and economic decision-makers for planning and policy formulation; but also it helps the investors to manage their portfolios by providing them with guidance about the state of the economy. On the other hand, it is good measure for an economy and with improvement in research and quality of data, statisticians and governments are trying to find out measures to strengthen GDP and make it a comprehensive indicator of national income (Yıldırım et all, 2015).

Savings are the portion of revenue that is not spared, and investment is the means of spending on production capacities that will generate future income. If savings in one country are more than investments or equal to investments, there is no need to borrow in that country. If the savings are low

when investing, then importing savings from the outside is required. In a short term, the saving gap of a country can be closed in two ways. Either by attracting foreign capital or through external borrowing. Another criterion that reflects the stability of the economies is inflation, which is a constant increase in the general level of prices. It is not possible for any economy with inflation to sustain a healthy cycle. Therefore, while the performance criteria of the economies are established, it is useful to consider the continuity of the inflation rate as well as the high rate.

The volume of foreign trade is an important indicator that gives an idea about the general economics of a country. Trade in goods and services is defined as change in ownership of material resources and services between one economy and another. The indicator comprises sales of goods and services as well as barter transactions or goods exchanged as part of gifts or grants between residents and non-residents. The rate of unemployment is the ratio of the active population to those who do not find jobs when they are in the labor market. The high unemployment rate means the failure of economic policies. The high level of unemployment in a country leads to different negative effects, both economic and social. For this reason, the unemployment rate must use as indicator in evaluating the economic performance of countries (Eleren & Karagul, 2008).

Governments collect revenues mainly for two purposes: to finance the goods and services they deliver to citizens and businesses and to fulfil their redistributive role. Comparing levels of government revenues across countries, as a share of GDP or per capita, provides an indication of the importance of the public sector in the economy in terms of available financial resources. Similarly, general government expenditures, as a share of GDP or per person, provides an indication of the size of the government across countries. General government expenditures generally consists of central, state and local governments, and social security funds. The large variation in this indicator highlights the variety of countries' approaches to delivering public goods and services and providing social protection, not necessarily differences in resources spent. So both indicators are used usually in the economic performance analysis of the countries (OECD, 2015).

General government debt-to-GDP ratio is the amount of a country's total gross government debt as a percentage of its GDP. It is an indicator of an economy's health and a key factor for the sustainability of government finance. So this indicator also often used in the economic performance analyisis. "Debt" is commonly defined as a specific subset of liabilities identified according to the types of financial instruments included or excluded. Debt is thus obtained as the sum of the following liability categories (as applicable): currency and deposits; securities other than shares,

except financial derivatives; loans; insurance technical reserves; and other accounts payable. Changes in government debt over time reflect the impact of government deficits. Finally, Current account balance have been used in the study in order to see the difference between a nation's savings and its investment. The current account is an important indicator about an economy's health. It is defined as the sum of the balance of trade (goods and services exports less imports), net income from abroad and net current transfers (OECD, 2015).

Grey Relational Analysis

In decision making problem, in order to make comparisons and rankings among the alternatives GRA method can be used. This analysis consists of six steps. These steps are (Wu, 2002; Yıldırım, 2014; Yıldırım, Hepşen, Önder, 2015):

Step 1. *Data set preparation and decision matrix creation*
Step 2. *Creation of reference series and comparison matrix*
Step 3. *Normalization operation and creation of the normalization matrix*
Step 4. *Formation of the absolute value table*
Step 5. *Creation of gray relational coefficient matrix*
Step 6. *Calculation of gray relational ratios*

Multi-Dimensional Scaling

Multidimensional scaling (MDS) is a multivariate statistical technique which can display the dissimilarity relationship of data as a distance in lower dimensional. Multidimensional scaling (MDS) is one of the interdependence techniques that are used when one or more group variables are not dependent on one another and can not be explained by another, when they are concerned with the mutual relationship between all variables. MDS contains complex mathematical, geometric and statistical operations from which models that visually represent the structure of the data can be obtained (Kurt, 1992).

MDS has become more and more popular as a technique for both multivariate and exploratory data analysis (Wickelmaier, 2003). Although the roots of the MDS analysis are based on studies in the field of psychophysics and psychometrics, it is not limited only to these areas today and it has applications in a wide range of fields such as sociology, economics, biology, business, education, chemistry, archeology, etc. (Yenidogan, 2008).

Multidimensional Scaling (MDS) Analysis is an alternative method to factor analysis. MDS is an analysis that helps observers to explain similarities or differences between observed units, objects, and reveals

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meaningful structures underlying dimensions. While the variables and correlations between them are used in the factor analysis, the similarities or differences between the units are used in MDS in order to graphically explain the objects in fewer dimensions (Ozdamar, 2004, Isler, 2014).

The MDS method is a analysis technic involving many methods. There are several steps in conducting MDS research. These steps can be summarized in 6 steps (Kalaycı, 2014);

1.   First, the appropriate one of the standardization methods according to the data type is selected and the data is converted. It is necessary to apply for data obtained from different scales.

2.   Calculation of the appropriate distance matrix depending on the data type

3.   It is decided how many dimensional space an object or unit with p variable p-dimensional data matrix can show. In practice, dimensions such as 2, 3, 4 are usually chosen and MDS solutions are obtained for each of these dimensions. For each k-dimension determined, the stress measure of the solutions obtained (conformity to the original distance matrix) is calculated. It is decided at what size the appropriate solution will take place and what solution will be applied.

4.   The configuration distances (dij) according to data distances are calculated according to the type of regression. According to the regression method data type, one that is suitable for the regression methods (linear, polynominal or monotonic) is selected. Estimated configuration distances are determined by means of the specified regression equation. These estimated distances are called disparities. The matrix obtained from these distances is called the difference matrix.

5.   A stress statistic, which is an appropriate statistic, is calculated to determine the appropriateness between the configuration distances and the estimated distances. Stress statistics are calculated in different ways; such as Kruskal Stress Statistics, Young Stress Statistic. Kruskal stress is calculated by taking the square root of the ratio of the differences between the statistical configuration measurements and the estimated configuration measurements to the estimated configuration distances and expresses the fit between the data distances and the configuration distances. The stress value is used in determining whether the number of dimensions used in the graphical arrangement obtained as the result of analysis is appropriate.

6.   Coordinates of units or objects are obtained according to K dimension. These coordinates are displayed in a k-dimensional space (map) and the position of each unit or object relative to other units or units is displayed. These images are interpreted and relations between the units are tried to be determined. When these interpretations are made, there is an ideal point in graphical representation in k-dimensional space. Usually the ideal

point is near the origin. In this context, while graphical representation interpretation is made, comments are made according to the distance or closeness of the objects to the ideal point.

The desired stress statistic in the MDS solution is close to zero. Dimensional analyzes with near-stress values are considered appropriate. According to this;

- Stress ≥ 0.20 poor compliance
- $0.10 \leq$ stress <0.20 moderate compliance
- $0.05 \leq$ stress <0.10 good fit
- Stress <0.05 perfect fit
- $0 <$ stress <0.025 full compliance

Finally, the coordinates of the units or objects at the appropriate dimension level are obtained. These coordinates are shown in space so that each unit or object relations are interpreted.

Results

In this study, Grey Relation Analysis has been used for ranking the economic performance of the countires and Multidimesional Scalling has been use in order to show countries' positions relative to each other in a two-dimensional plane. First, the weight of each variable was determined for use in gray relational analysis. The criteria priority weights have taken from Onder et al. (2014)'s paper. In that paper, researchers used Analytical Network Process (ANP) to determine the weights of macroeconomic indicators. According to expert's judgments based ANP analysis, "Gross domestic product, constant prices" (0.2567) was the most important macroeconomic indicator influencing countries' economies followed by "Current account balance" (0.1936) and "Inflation, average consumer prices" (0.1490). The least important priorities are "Gross national savings" (0.0145) and "General government revenue" (0.0185). Resulting weights obtained with expert judgments based ANP are shown on Figure 1.
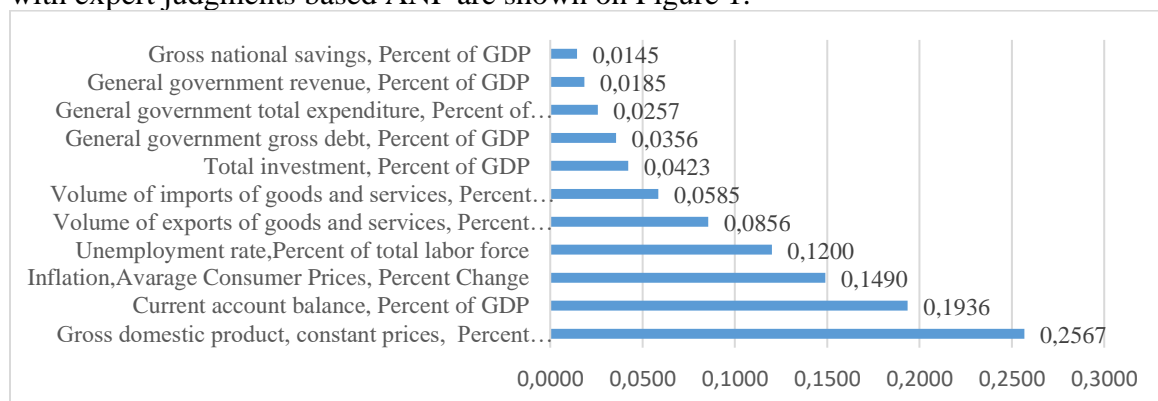

Figure 1. Weights obtained with expert judgments based ANP (Onder et. al., 2015)

Ranking on economic performance of The Mediterranean Countries
The proposed model of this paper uses a combined method. Calculated Analytical Network Process (ANP) based weights, implant to Grey Relational Analysis for ranking and show countries' positions relative to each other in a two-dimensional plane with MDS analysis of 36 Mediterranean Countries according to the 11 selected macroeconomic indicators between 2006 and 2016 years. Also annual period macroeconomic indicators are converted to single data set by using arithmetic mean and weighted arithmetic mean (to be focused on recent years). This combined data was also used for another economic performance evaluation. By using GRA method, the ranking of countries are calculated and shown on Table 2. According to the GRA results, some countries have undergone serious changes in the performance rankings over the past 11 years. For example, while Algeria ranks first in 36 countries in 2006, it fell to 19th place in 2016. Ireland and Germany have risen in performance rankings over the past 11 years. Germany, which ranks 16th in 2006, ranks third in 2016, and Ireland, which ranks 11th in 2006, ranks second in 2014, 2015 and 2016 years.

Table 2.The ranking of countries by using GRA

		2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	A. Mean	Weighted
VAR1	Albania	18	24	3	15	22	29	17	32	33	34	31	16	28
VAR2	Algeria	1	5	2	5	2	1	9	11	20	29	19	10	17
VAR3	Austria	12	13	7	7	9	11	11	14	15	15	21	13	11
VAR4	Belgium	24	23	24	16	13	20	15	22	22	22	29	21	20
VAR5	Bosnia And Her.	35	31	31	22	35	35	36	19	32	32	25	28	30
VAR6	Bulgaria	34	20	20	23	19	17	20	12	11	11	9	20	14
VAR7	Croatia	31	28	30	32	27	27	31	35	26	16	16	34	26
VAR8	Cyprus	19	17	16	13	29	24	34	36	34	26	15	31	27
VAR9	Czech Rep.	9	14	14	20	16	12	21	20	13	9	10	12	9
VAR10	Denmark	6	12	8	8	8	9	10	7	3	4	13	11	7
VAR11	Egypt	29	33	6	17	25	33	33	26	36	36	34	19	35
VAR12	Estonia	3	10	34	24	11	3	2	15	8	7	17	25	16
VAR13	Finland	8	8	15	25	12	18	25	27	23	18	26	23	22
VAR14	France	23	25	21	19	20	15	18	23	25	24	27	24	21
VAR15	Germany	16	19	13	9	5	5	4	8	4	2	3	7	4
VAR16	Greece	32	34	33	36	36	36	35	31	31	27	35	36	34
VAR17	Hungary	27	36	32	33	31	21	29	13	9	10	12	26	18
VAR18	Ireland	11	21	29	14	14	23	27	16	1	1	1	3	1
VAR19	Israel	17	6	19	6	7	8	8	2	7	5	11	4	6

VAR20	Italy	26	27	26	27	24	22	26	28	24	25	28	29	25
VAR21	Jordan	30	32	23	2	30	30	28	30	27	28	30	15	31
VAR22	Latvia	2	4	36	18	18	16	7	10	18	20	22	32	24
VAR23	Lithuania	15	3	27	34	21	14	6	9	12	17	20	18	19
VAR24	Luxembourg	4	2	10	1	1	7	12	1	5	6	4	1	3
VAR25	Morocco	20	15	5	4	6	6	1	4	16	21	23	2	8
VAR26	Netherlands	7	7	4	3	4	2	3	5	2	3	6	5	2
VAR27	Poland	14	18	17	11	23	19	23	17	17	13	5	8	10
VAR28	Portugal	33	30	25	26	33	31	30	29	28	31	32	33	33
VAR29	Romania	22	26	1	29	32	26	14	3	14	14	2	14	13
VAR30	Slovakia	13	1	9	31	15	28	13	21	19	23	14	9	15
VAR31	Slovenia	10	9	12	21	17	13	24	24	6	12	7	17	12
VAR32	Spain	28	29	28	30	34	32	32	34	30	30	18	35	29
VAR33	Sweden	5	11	11	10	3	4	5	6	10	8	8	6	5
VAR34	Tunisia	25	16	18	12	26	34	19	33	35	35	36	30	36
VAR35	Turkey	36	35	35	35	10	10	16	18	29	33	33	22	32
VAR36	United Kingdom	21	22	22	28	28	25	22	25	21	19	24	27	23

MDS Results of the Mediterranean Countries

As mentioned above, MDS analysis of 36 Mediterranean Countries according to the 11 selected macroeconomic indicators for the weighted arithmetic mean has been used in order to show countries' positions relative to each other in a two-dimensional plane. The results of the analysis are as follows:
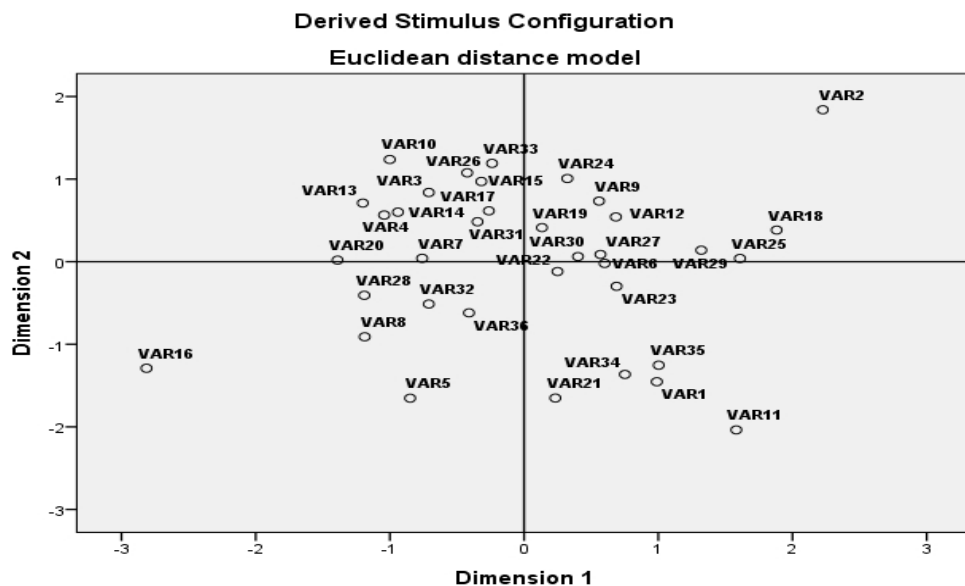

Figure 2. Euclidean Distance Model (for weighted arithmetic mean)

In Multi-Dimensional Scaling (MDS) analysis; for k = 2 (Kruskal) the iteration has been continued until the stress statistic is less than 0.001. The iteration stopped when the fourth iteration reached 0.00028 results. The result of the stress statistic is very close to 0. This is a desirable result for MDS analysis. Stress value was calculated according to Kruskal's formula and found to be 0.90678. In this context, stress value data for k = 2 dimension is explained by 0.90. So, it can be said that the obtained results reflect sufficiently the data set that is available. Multidimensional scaling analysis was performed in two dimensions.

According to the Euclidean distance model shown in Figure 2, it is seen that the countries which are perceived as similar are gathered together. In the Euclidean distance model, Greece and Algeria appear to be located in a different place from the general average. These results are consistent with the performance rankings revealed by Gray Relational Analysis., it is seen that the countries which are close to each other in performance ranking according to the results of the gray relational analysis, are located close to each other in the Euclidean distance model as well.

Conclusion

The Mediterranean Union countries were found to have a rather wavy tendency in terms of macroeconomic performance in the study, despite the fact that they were generally positive in comparison with the past. In 2006 there is no country that has grown below 5% of GNP, except for a few countries. Even in 2006, Baltic countries such as Estonia, Latvia and Lithuania showed a growth performance of around 10%. Growth in western European countries such as Germany, Spain, Austria has also been around 3-5%. The same is true for the year 2007. However, as of 2008, there has been significant changes in the economic performance of the countries. In 2008, growth in Denmark, Estonia, Greece, Ireland, Italy, Latvia, Luxembourg, Sweden and the UK was negative. Unemployment in Bosnia and Herzegovina, Spain and Latvia grew by 24%, 17.8% and 17.5% respectively in 2009.

When we look at the changes in the performance rankings of countries in terms of macroeconomic performance indicators from 2006 to 2016, quite remarkable results were obtained. In the 36 Mediterranean Union countries, there were no significant changes in the performance raking of the Czech Republic, Italy, Jordan, Luxembourg, the Netherlands, Portugal, Slovakia and Sweden. On the other hand, Bosnia and Herzegovina, Croatia, Bulgaria, Cyprus, Germany, Hungary, Ireland, Israel, Poland, Romania, Slovenia and Spain have experienced increase in performance rankings in 2016 according to the 2006 ranking score, but Albania, Algeria, Cyprus, Austria, Belgium, Denmark, Egypt, Estonia, Finland, France, Greece, Latvia,

Lithuania, Morocco, Tunisia and the United Kingdom have experienced a decline in performance rankings in 2016 according to the 2006 ranking score. The impact of the 2008 crisis is undoubtedly quite excessive in this downfall in that countries.

According to our Grey Relational Analysis method (weighted arithmetic mean), Ireland, Netherlands, Luxembourg, Germany and Sweden were at the peak during 2006-2016 period. Tunisia, Egypt, Greece, Portugal and Turkey were at the bottom during in the same period. The economic slowdown and the resulting decrease in tax revenues all over the world since 2008 have led to Greece's continuing ongoing fiscal imbalances, which have been the cause of Greece's failure to bring it to the brink of collapse, although it affects many countries outside Greece. The same is true for the Portuguese economy as well. In Egypt, the persistent devaluation of the currency, the high inflation rate, the disturbances of income distribution and other economic problems have played a significant role in the macroeconomic performance of the Egypt economy in recent years. This situation is also seen in the analysis results. This is closely related to the fall in tourism, one of the main sources of Egypt economy income. Undoubtedly, the developments in the political structure of the country in recent years are extremely influential.

One of the underlying causes of Turkey's position is deep problems especially in the past years. For example, in 2001, due to the crisis in the country, the economy was seriously damaged and it took a long time to recover. Although there are positive developments in economic indicators since 2006, Turkey is only in 32th place in terms of 11-year performance. This situation is closely related to the 2001 crisis and the 2008 crisis. The results of the analysis also show this situation. After the crisis years, there has been a serious decline in the performance ranking of Turkey. At the same time, political developments in the region undoubtedly affect economic performance. Similar comments can be made for Tunisia.

The findings of this paper would help governments for taking necessary precautions and foreign investors for creating more effective investment strategies.

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