MULTIDIMENSIONAL SCALING FOR CREDIT DEFAULT SWAP (CDS): EVIDENCE FROM OECD COUNTRIES

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Abstract: *The aim of this study is to analyze the similarities and differences between the OECD countries in terms of the change in CDS risk premiums. Accordingly, CDS risk premiums of the related countries are taken on a monthly basis for the 30/06/2011 - 30/09/2018 period. The Euclidean distances are calculated using Multidimensional Scaling Analysis. As a result of the study, the most similar (close) country pairs are calculated according to their euclidean distances. The results of the analysis show that New Zealand-Australia, Estonia-Austria, Slovakia-Netherlands, Finland-Denmark and Germany-France are the most similar country pairs whereas Slovenia-Turkey, Netherlands-Turkey, Russia-Norway, Russia-Mexico and Slovakia-Turkey are the most dissimilar country pairs. According to the results obtained; Mexico, Russia, Chile and Turkey are the countries which are decomposed significantly from the other OECD countries. Moreover, the countries which are geographically close to each other are also very similar in terms of the change in the economic risk level.*

Keywords: Multidimensional scaling, Credit default swap, OECD.

JEL Classification Codes: C10, G10.

1. INTRODUCTION

In today's global market, in the process of creating and managing their portfolios, investors are based on the return and risk balance of the assets they invest and act accordingly. In order to do this, they should take into consideration CDS (Credit Default Risk) premiums which indicates the risks of the countries they are investing in international markets and the rates of return provided. An inconsistency between the risk premiums and the rate of return causes the investors not to generate an optimal investment portfolio, in other words, to obtain less return than the required risk. In addition, within the scope of portfolio diversification, which is one of the basic principles of the portfolio management process, investors should have a negative correlation (a negative relationship) between the assets they include in the portfolio they create (Karan, 2018; Markowitz, 1952).

Accordingly, it is important to select the investment instruments that make a difference in terms of risk and the countries in which they belong, in terms of an effective portfolio management process. The CDS premium is an indicator of the risks that are generated by the countries in their own risk and that the investors cannot be compensated for the investment they make to the financial assets offered by that country. In other words, it is a derivative instrument that serves as an insurance against the non-payment of the returns expected by the investors and this represents the costs to be incurred (Narayanan & Uzmanoglu, 2018; Angelini, 2012).

In this study, the OECD countries that offer financial investment instruments has been analyzed in terms of their similarities and differences in their CDS premiums. CDS premiums reflecting the level of risk affects the country or country groups that are willing to invest to the financial market instruments within the global financial system. CDS shows the level of risk that investors incur and their acceptance of the level of return they expect to achieve in the face of this risk. For the countries that have high returns, CDS risk premiums are above acceptable levels, although investors still refrain from investing in those country or country groups despite this high return. The risk level of the countries and the CDS premiums naturally affect the firms and their value in the capital markets and the value of these firms. In other words, the increase or decrease in the CDS premiums reflecting the risk level of a country can have an investment and resource based impact on firms as a whole.

The main contribution of this study to the field of the literature is to show investors who are willing to form an investment portfolio based on the OECD countries, the similarities and differences between countries in terms of CDS premiums.

In the second part of the study, the data set and methodology used in the research is introduced. In the following section, analysis findings and evaluations are presented and the final section concludes the paper.

2. DATA SET AND METHODOLOGY

In this study, CDS premiums of OECD countries (country risk premium) are included in the analysis. Owing to the lack of sufficient data during the study period, some countries are excluded from the analysis. The analysis period based on the research is between June 2011-September/2018. The dataset is prepared by taking CDS risk premiums of the related countries on a monthly basis. After the dataset is formed, Euclidean distances between the countries' CDS risk premiums are calculated by using the Multidimensional Scaling Analysis (Hair et al., 2009).

Multidimensional scaling analysis is similar to factor analysis and clustering analysis. It measures the level of similarity between the variables discussed. In the measurements carried out within the scope of the analysis, the proximity between the variables shows the high correlation relationship and the distance between the variables shows the low correlation relationship. The distance measured here is the Euclidean distance and this measurement takes place in the perceptual space containing m dimensions (Machado et al., 2011a; Borg & Groenen, 2005; Nirenberg & Latham, 2003).

After the measurement carried out in multidimensional scaling analysis, the variables which show proximity are marked close to each other on the perceptual space map. Thus, a simple representation of the variables containing the complex data set is obtained in the perceptual space. This situation allows for an easier understanding of the similarities and differences between the variables by means of the graphical map (Machado et al., 2011b).

3. EMPIRICAL FINDINGS

As a first stage, when Table 1 is examined, the iteration is continued until the value of stress statistics for k = 2 is less than 0.001 and iteration is stopped as 0.00036 result is reached in the 4th.iteration. Stress statistics are close to zero, and the stress is found to be close to zero, so the solution is considered appropriate.

Table 1. Results of Stress Statistics

Iteration	S-stress	Improvement
1	0.25249	-
2	0.20060	0.05188
3	0.19823	0.00237
4	0.19788	0.00036

When Table 2 is examined, the stress value calculated according to Kruskal (1964a; 1964b)'s formula was found to be 0.92789 and this result indicates that the stress value explains the data 92.78%.

Table 2. Matrix results

	Matrix Results		
Stress	0.20509	**RSQ**	0.92789

Figure 1 shows the coordinate values that are based on two dimensional geometric representation. Using both dimensions, it is aimed to find the groups of positive and negatively charged countries with a factor load above 1 and to determine the grouping among themselves. When the relevant values are examined; Russia, Mexico, Chile and Turkey, whose factor load is above 1 and negatively charged, differs from other countries in terms of CDS premiums. When the results are evaluated in terms of the second dimension, it is seen that Poland, Ireland, UK and Denmark, which have more than 1 negative charge, constitute a group and Slovenia, Mexico and Chile have the other group. When the two dimensions are considered together; It can be stated that the first group includes Slovenia, Russia, Mexico, Chile and Turkey, while the other group includes Poland, Ireland, UK and Denmark.

As a result of the analysis, the similarities (proximity) and differences (distance) between the countries in terms of their CDS risk premiums are determined which are shown in Figure1.

In the first phase, the most similar (close) pair of the first five countries; New Zealand-Australia (0.331), Estonia-Austria (0.358), Slovakia-Netherlands (0.423), Finland-Denmark (0.444) and Germany-France (0.447). In the second stage, the most different (distant) top five countries are; It was seen that Slovenia-Turkey (4,267), Netherlands-Turkey (4,132), Russia-Norway (4,076), Russia-Mexico (4,064) and Slovakia-Turkey (4,047). When the results were analyzed, it is similar in its countries of the European Union, Mexico, Russia, Turkey and Mexico, Chile is the country in the negative sense it seems to decompose significantly from other countries.

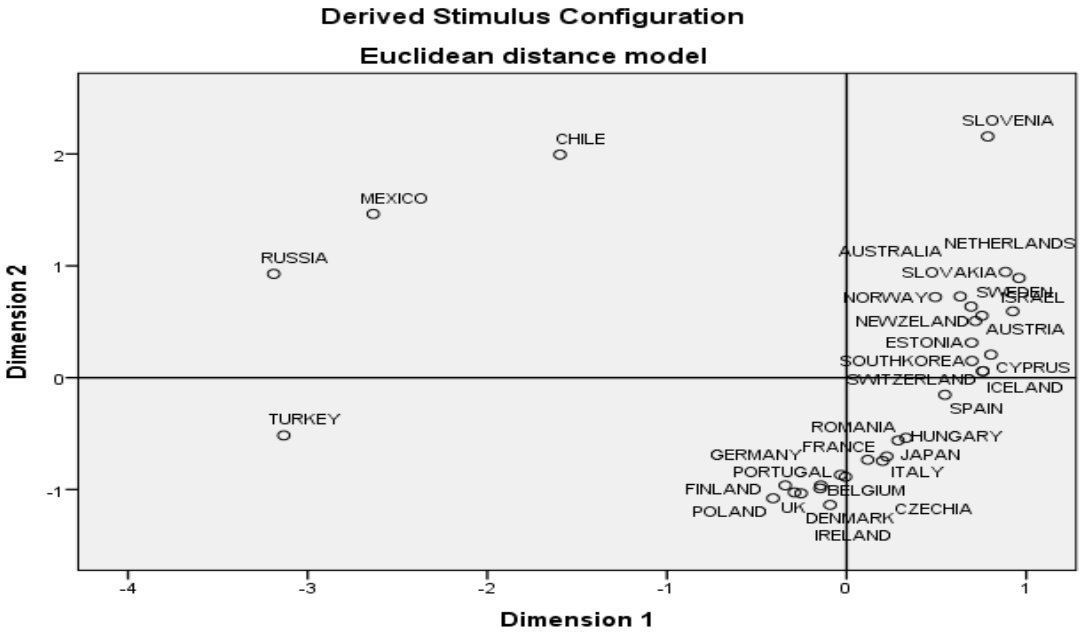

Figure 1. Derived Stimulus Configuration Euclidean Distance Model

When Figure 2 is examined, it can be stated that the distances between CDS premiums show a linear relationship and the distances put forward by the model are consistent with the real distances.

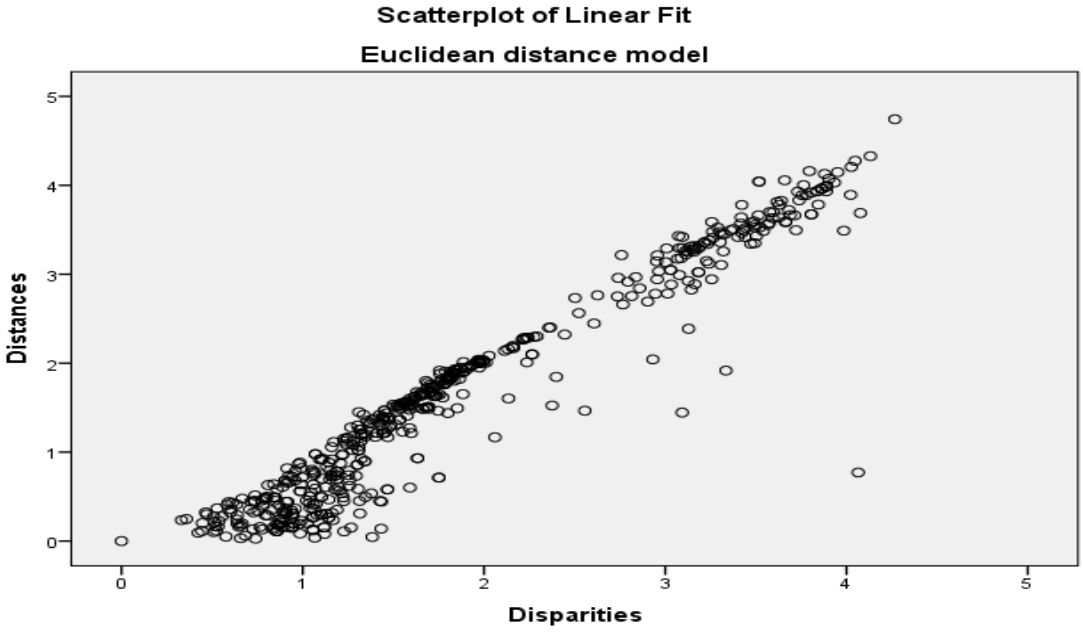

Figure 2. Scatterplot of Linear Fit Euclidean Distance Model

4. CONCLUSION

In this study, the similarities and differences of the OECD countries in terms of their CDS risk premiums are analyzed. As an analysis, Multidimensional Scaling Analysis is used for the period between 30/06/2011 - 30/09/2018 on a monthly basis. In the analysis process, the most similar and different countries in terms of CDS risk premiums are determined according to their Euclidian distances. In this respect, five countries with the most similarities in terms of their CDS risk premiums are identified.

In addition, CDS has been identified in countries that constitute certain groups in terms of risk premiums. When the findings are evaluated, it is seen that the countries that have similarities are generally in close geographical region and / or within the same economic and political unity. The existence of certain standards for countries within a given community constitutes the status of providing an autocontrol for the countries in the relevant community. In addition, the close economic and financial interaction in the countries of the near geographical region is also influential in the similarity of the country's risk levels. However, the factors included in the above-mentioned community or geographic proximity factors may not always be an effective factor in the process of country similarity. As it can be seen that Turkey, Mexico, Chile and Russia are close to each other in terms of the risk decomposition, but they differ significantly from the OECD countries.

When the curves obtained are evaluated in terms of investors who trade in the market, global risk investors who want to make risk diversification within the portfolio creation process and / or want to obtain the appropriate return to the risk they incur, the risk premiums of the countries they invest and the rates of return against them and the risk levels of the countries where they invest, they have to take into account a negative relationship (distance).

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