The Soundness of Financial Institutions In The Fragile Five Countries

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Abstract

In recent years, economic globalization and technological development have contributed to a substantial rise in the integration of financial markets. Research findings in this area have indicated that a financial shock in one market can easily be transmitted to other markets globally. Especially, recent experiences showed that financial markets of some developing economies may even be more vulnerable to financial shocks than the emerging markets. There are several reasons, such as current account deficits, instability of local currencies, weaker financial institutions, for this situation. Contrary to the popular perception, this may be due to the lack of knowledge and prejudices of international investors about some emerging markets. This study evaluates and compares the financial soundness of 18 countries selected on the basis of the "Fragile Five" countries. The soundness of the financial structures of these countries has been evaluated based on the soundness of their financial institutions. The findings indicate that the countries with the weakest performance in the selected period are not the "Fragile Five" countries when compared with the countries in the whole sample.

Keywords: Financial Fragility, Soundness of Financial Institutions, TOPSIS Method, Financial Crises, Fragile Five Countries.

1. INTRODUCTION

Recently, globalization and technological development have strengthened the relations between financial markets. Institutional investors include financial assets from different markets to diversify their portfolios. Studies conducted in this context have revealed that an action taken in one market quickly affects other markets globally. For instance, the effects of the financial crises experienced in Russia in 1998 were even infected the American markets. The severity of the impact is more strongly felt in the capital markets of major developing countries, rapidly spreading to other emerging markets (Bakaert et al., 2011; Kenourgios & Padh, 2012). The financial crisis of a country is transmitted to other countries through financial markets. Therefore, developing countries frequently experience currency shocks. Calvo (1986) argued that the effects of shocks could be reduced only by increasing reliability. While developed markets are less affected by such shocks due to their higher reliability in the eyes of investors, emerging markets are more affected by such shocks when they are perceived to have lower reliability by investors.

Inadequate knowledge of investors about markets is the main reason for low reliability in emerging markets.

Over the past decade, the economic and financial crises in international markets have adversely affected the global economy. (Borio, 2010; Spiegel, 2011; Barrel & Philips, 2020) The negative effects of global and local crises have been more devastating on emerging economies than on developed economies. The impact of crises is first seen in financial markets and then reflected in macroeconomic indicators. Increased borrowing costs and exchange rates in financial markets during crisis have increased production and financing costs. This increase has a disruptive impact on macroeconomic indicators such as production, employment and the overall level of prices. In addition, the severity of this impact varies from country to country. In response to this situation, central banks have applied different policies. (Cecchetti, 2008; Walsh, 2009) Overall, the severity of the impact varies depending on the soundness of the financial system of countries or their resilience to financial shocks. In financial markets, however, perception often precedes the facts. Investors' perceptions about an issue affect their risk positions, thereby affecting their trading decisions. This situation is observed among investors in both global and local markets.

The significance of perception is even more elevated in the financial markets of developing countries. (Gonzales et al., 2012; Chadwick, 2019; Johnson, 2017) In a report published by Morgan Stanley Investment Bank in 2013, Brazil, Indonesia, India, Republic of South Africa and Turkey were labelled as the "Fragile Five". These five countries have been the developing countries whose currencies have been the most depreciated after the U.S. central bank's (FED) decision to reduce monetary expansion in 2013. (Bhattarai et al., 2021) The Turkish lira is the currency with the highest depreciation against the U.S. dollar between 2015 and 2018. The list was then revised by S&P Global in 2017 as Turkey, Argentina, Qatar, Egypt and Pakistan. Although the list was initially created for other purposes, the definition of fragility mentioned in 2017 is fragility against financial shocks. Therefore, these countries are considered as the five most fragile countries against financial shocks. While over the years there are those who have been on or off the list of the "Fragile Five" countries, Turkey has been included in the two lists regularly, indicating that these countries are more susceptible to shocks. This is because changes in the value of the currency mainly indicate the state of a country's economy. The value of a country's currency impacts all macroeconomic indicators through the monetary transmission mechanism. Accordingly, the value of a country's currency must be coherent to the outcome of economic activities in the country. However, shocks in financial markets, regardless of domestic dynamics, result in increased volatility and excessive depreciation in currencies due to speculative actions. For example, the depreciation of Turkish lira against the U.S. dollar in 2020 was close to 20%. There have been similar depreciations in the currencies of countries such as Republic of South Africa, Mexico and Brazil. If their effects are permanent, these movements in the financial markets also negatively affect macroeconomic indicators (Calvo & Mendoza, 2000). Therefore, the impact is transmitted from the financial markets into the real economy. In other words, activity that begins with a speculative movement in the financial markets can cause permanent and real damage to developing economies in the form of a decline in growth rates, unemployment and an increase in inflation and interest rates. For these countries, this could be a self-fulfilling prophecy that triggers real economic crises.

Well, even if this is the reaction of the markets, are the real economies of these countries really the most vulnerable to financial shocks or does the perception in these countries precede facts? In a sense, is the perception of investors based on reliable information or is it all a big misconception? The answer to this question is of great importance in terms of its contribution to having the correct perspective of the crises experienced by developing countries. As there is a direct relation between the trading behavior of investors and their perception of risk. (Hoffmann et al. 2015; Hoffmann & Post, 2017) The higher the investors' perception of risk the higher the cost of a financial shock to the economy. When perceived risk is high, the cost of capital for risky countries -here "Fragile Five" economies- is high. Developing economies mainly depend on foreign capital investments, and lending from international capital markets. Thus, the borrowing

rates-cost of capital- is crucial in their economic development and in achieving their sustainable development goals.

Since the 2000s, the International Monetary Fund (IMF) began to publish countries' data under the label Financial Soundness Indicators (FSI). When the FSI was introduced, it was designed to indicate the resilience of countries' financial systems to financial shocks, in addition to indicating the soundness of financial institutions. FSI could be used for comparing and analyzing economic and financial systems of countries. FSI is of particular importance to developing countries. As it is difficult to obtain reliable data from developing countries, these countries could not be analyzed by comparing them to each other and to other countries. Ease of access to such data will increase the number and quality of studies conducted using this data. Obtaining information this way can contribute to both national and international investors making more rational decisions thanks to the enriched set of information.

This study mainly investigates how important perception is for investors when compared with facts. For this purpose, the financial soundness of countries labelled as the Fragile Five by international investors and of other similar countries will be compared. We argue that the soundness of the financial system mainly depends on the soundness of financial institutions. Based on the financial soundness indicators proposed by the IMF, this study determines the soundness of the financial system in these countries in terms of the financial performances of their depository financial institutions. TOPSIS, a non-parametric method is used to rank the selected countries. In order to deal with the time varying effects this process will be repeated over multiple periods. In this way it expected to increase the reliability of the results obtained in this research. The following sections of the study include literature review, method, application and conclusion. The literature review section mentions the leading studies in national/international literature. The next chapter includes the research question, method and application. In the conclusion, the importance of the results obtained in terms of financial markets is discussed. The conclusion also includes recommendations for investors and regulatory bodies using the results obtained. Findings of this research directly affect the information set of the investors about the risk level of the selected countries. Based on our findings investors may need to revise their perception of risk about some countries. Therefore, a revision of investors' risk perceptions will seriously affect the borrowing costs of countries. While this effect will be positive for some countries, it will be negative for some countries.

2. LITERATURE REVIEW

Financial crises negatively effect the economic development of countries. For this reason, numerous studies are being conducted on the impact of crises on the economy. Paczynska (2010) investigated the effects of global crises reaching to the far corners of the world. Following the rise in food and fuel prices, the pressures on the states caused by the global financial crisis and fragility have caused concerns in political and social stability; accordingly, there has been a "domino effect" between countries.

The Overseas Development Institute conducted a study where a team of 40 researchers have conducted research in 10 developing countries on the impact of the global financial crisis during January to March 2009. When the global financial crisis began to be significantly felt in September 2008, developing countries were affected; however, the effects dramatically varied. Although the effects of financial crisis are similar in each of them (trade, private equity flows, workers' remittances, aid), the effects vary from country to country, and many are not yet visible. Therefore, further country-specific monitoring is required. Most findings suggest that as a result of time delays, the worst effects are yet to come (Overseas Development Institute, 2010).

Bergeijk et al. (2011) analyzed the regional and country-specific effects of financial crises in developing countries and developing markets in all continents. In addition, they examined how the crises have changed development concepts, critically evaluated mainstream approaches, analyzed governance problems (including G20) and strived to view the concept of crisis from a

wider perspective. Moreover, in another study, Lin (2008) revealed that since the balance sheets of private firms have imposed serious new demands on the finances of the public sector, the crisis has crossed the threshold of public and private spheres. The reasons for concern that the crisis will adversely affect emerging markets and other developing countries and interrupt the significant economic progress of recent years have been addressed. Between 2002 and 2007, the dynamics of global growth caused mutually strengthening effects in developed and developing countries throughout the world. The study seeks to answer the question of how all this growth began to unravel in 2007–2008, starting with the U.S. housing crisis, and how to respond to the crisis to ensure that its cost to the world is as little as possible.

Kenourgios and Padhi (2012) examined the spread of three crises caused by developing markets in the late 1990s, in addition to the subprime mortgage crisis in 2008, by focusing on the financial markets of emerging economies and the U.S. as well as two global indices. Stock exchanges have been found to create a stronger transmission mechanism during these three contagious crises.

Lowell et al. (1998) examined why financial crises are contagious. In addition, they investigated why financial markets in developing countries are more vulnerable to the contagion of the effects of crises than the markets in developed countries. In this study, international crisis periods were defined between January 1989 and August 1997 and were analyzed using statistical methods. Their study results identified some indicators that could be used to take preemptive measures before the crises. The results further suggested that the indicators are functional.

Essers (2013) adopted a fragility perspective for some key development issues that have been raised in discussions following the 2008–2009 global financial and economic crises. Described as the possibility of shock (exposure - resistance), the country's vulnerability is allegedly important for future growth and reduction in poverty. Therefore, it was argued that different approaches, considering the characteristics of the country in the short and long term and combining them with roles that both developing countries will play for themselves and for international actors, are a multi-layered "therapy".

Aizenman et al. (2016) argued that in global crises, developing countries continue to be fragile against shocks from developed economies. Just a few years after the global crisis, the state debt crisis in the Eurozone has emerged as the biggest threat to the global outlook. The authors observed that although the crisis period has negatively affected equity and bond markets in developing countries, the impact of the news on the Eurozone crisis is more complicated and limited.

The stability of the financial structures of financial institutions in a country is critical to the impact of financial crises on a country's economy. Kasselaki and Tagkalakis (2014) examined the financial soundness indicators for financial institutions that control various macroeconomic and financial variables. Furthermore, they examined the total capital adequacy and asset quality for 20 OECD countries during financial crisis. According to their study results, the collection of loan loss provisions lagged behind past-due receivables and profitability had significantly deteriorated. Demirgüç-Kunt and Detragiache (1999) used a dataset for 53 countries between 1980 and 1995 to examine the empirical relation between banking crises and financial liberalization. The authors concluded that banking crises are more likely to occur in liberalized financial systems. However, the impact of financial liberalization on the fragile banking sector is weaker in places where the corporate environment is strong, especially those that respect the rule of law, have a low level of corruption and implement good contract practices.

Kaya and Açdoyuran (2019) identified the interaction between financial soundness and financial fragility between January 2003 and November 2018 for Turkey. In their study, the ratio of non-performing loans to total loans was used as an indicator of financial fragility and the ratio of capital adequacy and asset quality rates was used as an indicator of financial soundness. The authors used the Engle–Granger two-step co-integration analysis to investigate the co-integration

relation between variables. Their findings indicated that financial soundness affects financial fragility.

Bernanke and Gertler (1990) revealed that financial soundness is an important goal of policy and indicated a relation between financial soundness and economic performance. The authors examined the effects of financial instability or fragility on entrepreneurs who evaluate investment projects and highlighted the importance of policy to combat financial fragility. Creel et al. (2020) investigated the relation between the strength of financial institutions and the economic growth in European Union countries. Their findings revealed that credit has no effect on economic performance when the fragility of financial institutions is high.

Loayza and Rancière (2004) examined the effects of financial intermediation on economic activity. For their analysis they used the data from 82 countries between 1960-2000. According to their findings, financially fragile countries, namely those that experience banking crises or suffer high financial volatility, tend to present significantly negative short-run effects of intermediation on growth. On the one hand, empirical growth literature addresses the positive impact of the financial depth measured by private domestic loans and liquid liabilities. On the other hand, banking and monetary crisis literature has stated that monetary aggregates, such as domestic loans, have been found to be the best predictors of crises and the following economic decline. The authors examined these contradictory effects by using the differences between the short-term and long-term effects of financial intermediation.

Rossi (1999) examined the relation among the liberalization of capital movements, precautionary regulation and supervision, financial crises and economic development. In the study, empirical assessments were made for a sample set of 15 economies that were developing between 1990 and 1997 in terms of capital controls, precautionary regulation, audit and deposits. The study results confirmed the importance of the regulatory and supervisory framework for financial fragility and economic performance.

In a fragile financial system, even moderate shocks, for example an exchange rate shock, can have strong negative effects on key macroeconomic fundamentals. (Cuaresma et al. 2020) Ünver and Doğru (2015) investigated the determinants of fragility in terms of long-term fiscal sustainability and sovereign ratings for Brazil, India, Indonesia, South Africa and Turkey. The dataset covers the 1980–2012 period for fiscal sustainability and 1990–2012 for sovereign ratings in these countries. The study evidenced that there is a significant relationship between fiscal sustainability and current account balance, gross domestic product (GDP), total reserves, energy imports, exchange rate, external debt and credit to the private sector.

Önder et al. (2015) used TOPSIS to rank the original "Fragile Five" countries using different macroeconomic indicators such as inflation rate, current account deficit, unemployment rate and etc. between 2001 and 2013. According to their findings Turkey is the most fragile and India is the most stable economy in the Fragile Five club.

Demirkale and Özarı (2020) used TOPSIS to measure the performance of "Fragile Five" countries and MINT countries (Brazil, India, Indonesia, South Africa, Turkey, Mexico, and Nigeria), based on macroeconomic and financial indicators between 2015-2019. According to their findings, they argued that Turkey has the lowest macroeconomic and financial performance and Indonesia was found to be the best performing country.

Chadwick (2019) searched the dependence of the financial markets of certain emerging market countries such as Brazil, Chile, Colombia, Indonesia, India, South Korea, Peru, Russia, Singapore, Thailand, Turkey, Taiwan and South Africa on US monetary policy and monetary policy uncertainty between 1995 and 2017. And she concluded that the economies of these countries are not as fragile as or as bad as it is perceived.

Marjanovic and Markovic **(**2020) assess the performance of financial sector in the European Union countries. To investigate this subject, they applied the methods of multi-criteria analysis, TOPSIS. They applied TOPSIS to the data obtained from the Global Financial Development Database published by the World Bank. According to their findings, Greece is among the last three countries among the selected countries. They left Cyprus out of the sample because of insufficient data.

In this research, we investigated the financial fragility of the selected 18 countries. In order to investigate this we use the financial institutions (Deposit Takers) as a proxy for the whole financial system. Thus, we used the Financial Soundness Indicators for Deposit Takers (FSIs) of the IMF. It is to say that if the more the financial institutions are strong the more the financial system is sound. By doing this study, we contributed to the related literature in the following ways. Previous research generally concentrate on the US or European countries, but emerging countries are largely ignored. However, in this study, our sample covers both developed and emerging countries around the world. By this way, it will be possible to make comparison between these countries. In addition, the more important point is these findings may help investors in better assessment of the country risk in the selected countries and construct portfolios that are more efficient. Second, we employed the most recent data of IMF in this research. Thus, this study is necessary and timely given the tremendous impact of a financial crisis effecting on global economy.

3. DATA, METHOD AND APPLICATION
3.1 Dataset and Selection of Financial Indicators
The stability of a country's financial structures and their resistance to financial shocks are critical to national and international investors. This is one of the key factors investors consider when determining risk premium. Therefore, it directly affects the costs for the parties in need of financing. The importance of identifying the soundness of financial structures against shocks accurately could be seen when choosing a risk-return profile from the perspective of investors and minimizing financing costs from the perspective of countries and companies. Therefore, a need emerges to reliably and objectively measure and analyze the performance of a country's financial structure for the benefit of both investors and countries. One of the main elements of the soundness of the financial structures of a country is the soundness of its financial institutions. Financial performance indicators that examine the relation between items in the balance sheet and income statements and their trends over time are required to measure the financial soundness of financial institutions in a country (Bülbül & Köse, 2011)

First of all, in order to set the relevant sample for the research question; Brazil, Indonesia, India, Republic of South Africa & Turkey were selected. These countries are the members of the original "Fragile Five" club of Morgan Stanley. Then, Argentina, Egypt, Pakistan & Qatar are included as the new members of the club. The rest of the countries in the sample were mainly selected randomly. South American countries Mexico and Colombia were subsequently added to the sample. Cyprus, Greece, Italy, Poland, Portugal, Romania & Spain from the European Union, are also selected. China and Russia were also included in the sample. Finally to complete the dataset, Nigeria is included from the African continent due to its distressed economy.[1]

As an indicator of the stability of a country's financial system, financial soundness performances of financial institutions that collect deposits were examined. Financial ratios used for financial institutions in selected countries were chosen from among the Financial Soundness Indicators published by the IMF. These financial ratios are calculated by the IMF to be a possible indicator of the financial soundness of institutions. In this study, the selected rates were obtained from the official website of the IMF and the dataset was created. Financial ratios for 2016, 2017 and 2018 were used for each country, and the countries' financial stability performances for each year were

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[1] Some countries added to the dataset are excluded from the research sample due to lack of data, such as China, Egypt, Hungary, Qatar & Russia.

evaluated using the Technique for Order Preference by Similarity to Ideal Solution (TOPSIS) method. The analysis was applied for three consecutive periods to achieve a dynamic structure.

No	Input/Output	Rates
1	I	Regulatory Tier I Capital to Risk Weighted Assets
2	I	Customer Deposits to Total Loans
3	I	Foreign Currency Denominated Liabilities to Total Liabilities
4	I	Non-Performing Loans to Total Loans
5	I	Net Open Position in Foreign Exchange to Capital
6	I	Spread Between Reference Lending Rate & Deposit Rate
7	O	Net Income to Total Assets (ROA)
8	O	Net Income to Total Equity (ROE)
9	O	Interest Margin to Gross Income

TABLE 1: Selected Financial Ratios.

3.2 TOPSIS Method
The decision maker should choose one of the Multi Criteria Decision Making Methods in order to evaluate the alternatives according to many conflicting criteria. The TOPSIS method, which has an analysis process that does not include complex algorithms and mathematical models, is applied by researchers due to its ease of use and easy understanding and interpretation of the results. In addition, it makes it possible to compare decision units in particular, according to the specified criteria and the ideal situation between the maximum / minimum values that the criteria can take. For these reasons, TOPSIS method was preferred as a method of research in this study.

The TOPSIS method was applied using selected financial ratios to evaluate the performance of selected countries in terms of financial stability. TOPSIS is a multi-criteria decision-making method developed by Hwang and Yoon (1981). It is based on the principle of identifying the closest positive optimum solution and the farthest negative optimum solution alternatives. The positive optimum solution comprises the best criteria attainable, and the negative optimum solution comprises the worst criteria values possible. This method assumes that each criterion has a single value that increases or decreases. The TOPSIS method is conducted through a number of steps. The steps in the study are as follows (Okay & Köse, 2015).

Step 1: Creation of the Decision Matrix
The decision matrix contains the criteria values corresponding to the alternatives.

$$X = \begin{bmatrix} x_{11} & x_{12} & \cdots & x_{1j} & \cdots & x_{1n} \\ x_{21} & x_{22} & \cdots & x_{2j} & \cdots & x_{2n} \\ \vdots & \vdots & & \vdots & \vdots & \vdots \\ x_{i1} & x_{i2} & \cdots & x_{ij} & \cdots & x_{in} \\ \vdots & \vdots & & \vdots & \ddots & \vdots \\ x_{k1} & x_{k2} & \cdots & x_{kj} & \cdots & x_{kn} \end{bmatrix} \qquad \text{Eq. (1)}$$

Step 2: Normalisation of the Decision Matrix
Normalized values are calculated using the decision matrix and the formula below.

$$r_{ij} = \frac{x_{ij}}{\sqrt{\sum_{i=1}^{k} x_{ij}^2}} \qquad \begin{array}{l} i = 1,2,\dots,k \\ j = 1,2,\dots,n \end{array}$$

Eq. (2)

$$R = \begin{bmatrix} r_{11} & r_{12} & \cdots & r_{1j} & \cdots & r_{1n} \\ r_{21} & r_{22} & \cdots & r_{2j} & \cdots & r_{2n} \\ \vdots & \vdots & & \vdots & \vdots & \vdots \\ r_{i1} & r_{i2} & \cdots & r_{ij} & \cdots & r_{in} \\ \vdots & \vdots & & \vdots & \ddots & \vdots \\ r_{k1} & r_{k2} & \cdots & r_{kj} & \cdots & r_{kn} \end{bmatrix}$$

Eq. (3)

Step 3: Formation of the Weighted Normalised Decision Matrix

In this step, the weighted values of the components of the normalized decision matrix are calculated. For this, weights (Wj) are first determined, which express the importance of each j criterion.

$$\left(\sum_{j=1}^{n} W_j = 1 \right)$$

$$W_j = \begin{bmatrix} w_1 & \cdots & w_n \end{bmatrix}$$

Eq. (4)

Financial ratios	Reg.Tier I Cap to Risk Weighted Ass.	Customer Deposits to Total Loans	For Curr. De.Liabil.s to Tot.Liabi.s	Non Per. Loans to Total Loans	Net Open Pos. in Forex to Cap.	Spread Btw Ref. Lend. Rate & Deposizt Rate	ROA	ROE	Int. Margin to Gross Income
Weight Values (w$_j$)	0,158	0,109	0,117	0,117	0,121	0,089	0,097	0,093	0,097

TABLE 2: Weight Values.

Then, the values in each row of the normalized matrix, given in equation (3), are multiplied by the weight values in equation (4) to obtain the weighted normalized decision matrix (V) as in equation (5).

$$V = \begin{bmatrix} v_{11} & v_{12} & \cdots & v_{1j} & \cdots & v_{1n} \\ v_{21} & v_{22} & \cdots & v_{2j} & \cdots & v_{2n} \\ \vdots & \vdots & & \vdots & \vdots & \vdots \\ v_{i1} & v_{i2} & \cdots & v_{ij} & \cdots & v_{in} \\ \vdots & \vdots & & \vdots & \ddots & \vdots \\ v_{k1} & v_{k2} & \cdots & v_{kj} & \cdots & v_{kn} \end{bmatrix}$$

Eq. (5)

Step 4: Calculation of Ideal Positive and Ideal Negative Solutions

The highest values of the weighted normalized values present ideal positive solutions and the lowest values present ideal negative solutions.

$$A^+ = \left\{ \left(\max v_{ij} \, \middle| \, j \in I \right), \left(\min v_{ij} \, \middle| \, j \in J \right) \right\}$$
Eq. (6)

$$A^- = \left\{ \left(min \, v_{ij} \, \middle| \, j \in I \right), \left(max \, v_{ij} \, \middle| \, j \in J \right) \right\}$$
Eq. (7)

Ideal positive and ideal negative solutions are obtained as follows to indicate the value of I = benefit (maximization) and J = cost (minimization) in the formulas.

$$A^+ = \left\{ v_1^+, v_2^+, \ldots, v_j^+, \ldots, v_n^+ \right\}$$

$$A^- = \left\{ v_1^-, v_2^-, \ldots, v_j^-, \ldots, v_n^- \right\}$$

Step 5: Calculation of Measures of Separation
The distance between alternatives is measured using the equations (8) and (9).

Accordingly,

- The distance of each alternative to the positive ideal solution is as follows:

$$S_i^+ = \sqrt{\sum_{j=1}^{k} \left(v_{ij} - v_j^+ \right)^2},$$
i=1, 2,..., k   Eq. (8)

- The distance of each alternative to the negative ideal solution is as follows:

$$S_i^- = \sqrt{\sum_{j=1}^{k} \left(v_{ij} - v_j^- \right)^2},$$
i=1, 2,..., k   Eq. (9)

Step 6: Calculation of Relative Proximity to the Ideal Solution
Relative proximity to the ideal solution is determined by the following equality:

$$C_i^* = \frac{S_i^-}{S_i^- + S_i^+}, \quad i = 1, 2, \ldots, k$$
$$0 \leq C_i^* \leq 1$$
Eq. (10)

Step 7: Ranking of Alternatives and Scores
After the calculation, alternatives are ranked from highest to lowest, and ultimately, the maximum C_i^* value is selected. The alternative with the highest value is defined as the most similar alternative to the ideal.

3.3 Application of the Method and Results
The study includes 18 countries (decision points) and 9 financial ratios (criteria). Scoring and sorting of the results from the values obtained during the 2016–2018 period by implementing the steps described above using the TOPSIS method are indicated in the table below.

No	Scores	2016	Scores	2017	Scores	2018
1	0,6900	Argentina	0,7237	Israel	0,6387	Israel

2	**0,6008**	**Republic of South Africa**[2]	**0,5239**	**Indonesia**	0,5403	Argentina
3	**0,5949**	**Indonesia**	**0,5212**	**Republic of South Africa**	0,4306	Mexico
4	0,5696	Israel	**0,5090**	**Brazil**	**0,4192**	**Indonesia**
5	0,5631	Pakistan	0,5049	Mexico	**0,4188**	**Brazil**
6	0,5506	Mexico	0,5025	Pakistan	0,4123	Romania
7	**0,5324**	**Brazil**	0,4949	Spain	**0,4048**	**Turkey**
8	0,5269	Poland	0,4877	Poland	0,3992	Colombia
9	0,5233	Colombia	0,4846	Colombia	0,3884	Nigeria
10	**0,4970**	**India**	0,4825	Argentina	0,3883	Poland
11	0,4911	Romania	0,4772	Romania	**0,3877**	**Republic of South Africa**
12	**0,4849**	**Turkey**	0,4750	Portugal	0,3848	Pakistan
13	0,4725	Spain	0,4664	Italy	0,3529	Spain
14	0,4556	Nigeria	**0,4632**	**Turkey**	0,3421	Italy
15	0,4396	Portugal	**0,4310**	**India**	0,3214	Portugal
16	0,4298	Italy	0,3815	Greece	**0,3108**	**India**
17	0,4294	Greece	0,3649	Nigeria	0,2735	Cyprus
18	0,4247	Cyprus	0,3590	Cyprus	0,1587	Greece

TABLE 3: Countries and Scores.

* Some countries added to the dataset are excluded from the research sample due to lack of data, such as China, Egypt, Hungary, Qatar & Russia.
**Expert opinions were used in the selection of financial rates.
***https://www.imf.org/external/np/sta/fsi/eng/fsi.htm

According to the results obtained by the Topsis method, Israel and Indonesia are generally on the upper ranks and Cyprus Greece of the EU are on the lower ranks in the list. When the TOPSIS scores obtained are examined, it is seen that the scores of the countries other than the countries in the first two places are close to each other. It is necessary to highlight that the difference between the scores of the countries that are ranked first and the countries that are ranked in the second place in all years is greater than the differences between the scores of the remaining countries in the sample. According to this result, it is possible to say that the financial soundness performance of the number-one country's financial institutions in the list is much better than rest of the countries in the list.

However, when TOPSIS scores are examined by years, it is seen that the maximum (0.6900; 0.7237) and minimum (0.4247; 0.3590) values of 2016 and 2017 are close to each other, while the maximum (0.6387) and the minimum (0.1587) values of year 2018 have decreased compared to the previous two years. These results could be interpreted as an evidence that the financial strength of the financial institutions of the countries has weakened in 2018 compared to the previous two years.

In 2016; according to the scores the last five countries were Nigeria, Portugal, Italy, Greece and Cyprus. In 2017; the last five countries were Turkey, India, Greece, Nigeria and Cyprus. Finally, in 2018; Italy, Portugal, India, Cyprus and Greece have the worst performing financial institutions. The scores of Cyprus and Greece, which are in the bottom of the list, should be underlined.

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[2] The original "Fragile Five" countries of 2013 written in Bold letters.

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Although they are at the bottom in the whole sample period, their scores worsened especially in 2018. Cyprus's score in 2018 is 0,2735, and it is nearly 12% lower than even India, which is third-to-last country in the list. And the score of Greece is 0,1587 which is even %41 lower than the second worst performing country, Cyprus.

4. DICUSSION AND IMPLICATIONS

The soundness of a country against financial shocks depends on the soundness of the financial structure of financial institutions that have the authority to collect deposits, which are the basis of its national financial system. The stability of the financial structure of a financial institution could be understood using performance measurements and assessments of whether the funds are used effectively. In addition, due to constantly changing conditions both inside and outside a country, performance measurements and evaluations at regular intervals are necessary to accurately analyze the current situation. Furthermore, for investors who want to invest their funds in different countries and markets, it is important to have access to accurate and impartial information. Thus, investors can effectively price assets by correctly conducting their risk-return analysis. This is also in the interest of the borrowers. By this means, borrowers have the opportunity to obtain financing at optimum costs. Therefore, it is a positive situation for both parties to get accurate and objective information on this matter.

In this study, the financial soundness performances of 18 countries selected on the basis of countries labelled as the "Fragile Five" were evaluated using the TOPSIS method. The nine financial soundness ratios selected as the indicators of financial soundness were ranked according to the performance of each country for each year of the IMF data obtained during the 2016–2018 period.

When examining the country rankings obtained using the TOPSIS method used in the study, it has been observed that the top five countries with the best performance in the respective periods have changed year to year. However, Brazil, Indonesia and Israel appear to be among the top five of the best performing countries in all three periods. At this point, Brazil and Indonesia are two of the countries grouped as the "Fragile Five Countries". Republic of South Africa became one of the top five countries in 2016 and 2017. The performance of the financial institutions in Turkey, which is claimed to be the permanent member of the Fragile Five club, is also noteworthy. Turkey ranked 12th among 18 countries in 2016, 14th in 2017 and 7th in 2018. Despite being among the five poor performing countries on the list in 2017, it appears to have an average rank with its performances in 2016 and 2018.

According to the research results, among the five countries that have performed the worst in the respective period, Cyprus and Greece, who are members of the European Union, have the lowest performance in all three periods under consideration. Portugal and Italy, which are also members of the European Union, are among the worst performing countries in 2016 and 2018. The other two countries that performed the worst were India and Nigeria. It is worth emphasizing that India is a member of the "Fragile Five" countries.

Significant results have been reached in this study regarding the soundness of the financial system in countries when the financial soundness performance of financial institutions that collect deposits were examined based on the Financial Soundness Indicators issued by the IMF. The countries called the Fragile Five in global financial circles actually do not have the worst performance among the 18 countries compared using the indicators of financial soundness of their financial institutions. On the contrary, financial institutions in Israel and Indonesia and may be Rep. of S Africa have shown their highest performance in the relevant periods. In general, it is possible to say that Colombia, Pakistan and Turkey are in the middle of the list. In contrast, the performance of financial institutions in Cyprus, Greece and even Portugal and Italy have been low, compared with those of other countries, even they are European Union members.

The most interesting result of the analysis employed is that the scores of the countries have changed significantly over the years. While applying the method, repeating the analysis for a couple of years without being stuck in a single year enabled us to catch up the changes in time. Thanks to the dynamic application of the analysis, a better understanding of the sample has been achieved. These findings have shown us that when examining countries, it would be more appropriate to make a multi-term analysis without sticking to a single period.

It is necessary to evaluate these results carefully, especially for international investors. This is important for effective risk and return management. However, at this point, it is also appropriate to indicate that it is early to come to a definite conclusion. The high financial soundness of the financial institutions operating in a country is an indicator of the country's resilience to financial shocks, but it should be noted that just by itself it will not be an adequate indicator of whether a country is resilient to financial shocks. In the last two years world economy have been experiencing one of largest economic shocks in the recent past as a result of Covid 19 pandemic. The pandemic is expected to push most countries to economic distress may be for the next few years. As a result of pandemic emerging markets and developing countries could have face challenging difficulties. For this purpose, it is necessary to study the financial structure of the country as a whole and taking in consideration to all other necessary conditions, such as pandemic, especially with recent data. In addition, the number of samples and the sample period should be expanded, and analyses that are more thorough are required. The diversification of the methods used will also positively contribute to the reliability of the results to be achieved.

This study has some limitations. First, the unavailability of data for all the selected countries caused the sample of countries to be reduced. This may negatively affect the power of the study. Second, the soundness of financial institutions has been used as a proxy for the soundness of the financial system to conduct the research. This assumption was made to achieve the purpose of the study. However, in order to reach the final conclusion, the soundness of the financial system should be investigated from different perspectives. Despite its limitations, this study can still serve as a guideline for international investors when assessing the country specific risk.
When more recent data available in the future, researchers may repeat the analysis for a better assessment of country specific risk.

5. REFERENCES

[1] Acosta-González, E. & Fernández-Rodríguez, F. & Sosvilla-Rivero, S. "On factors explaining the 2008 financial crisis." Economics Letters 115.2, 215-217, 2012.

[2] Aizenman, J. & Jinjarak, Y. & Lee, M. & Park, D. "Developing Countries' Financial Vulnerability to The Eurozone Crisis: an Event Study of Equity and Bond Markets". Journal of Economic Policy Reform, Vol. 19, 1-19, 2016.

[3] Artekin, A. Ö. & Soydal, H. "2001-2015 Döneminde Uygulanan Para Politikalarının "Kırılgan Beşli" Ülkeleri Üzerinde Etkileri". Selçuk Üniversitesi İktisadi ve İdari Bilimler Fakültesi Sosyal Ekonomik Araştırmalar Dergisi, Sayı: 33, 175-187, 2007.

[4] Barrell, R., & Davis, E. "The Evolution of the Financial Crisis of 2007—8". National Institute Economic Review, 206, 5-14. doi:10.1177/0027950108099838. [2008]

[5] Bekaert, G. & Ehrmann, M. & Fratzscher, M. & Mehl, A. "Global Crises and Equity Market Contagion". NBER Working Paper, No. 1381, 1-48, 2011.

[6] Bergeik, P. & de Haan, A. & van der Hoeven, R. "The Financial Crisis and Developing Countries", United Kingdom: Edward Elgar Publishing, 2011.

[7] Bernanke, B. & Gertler, M. "Financial Fragility and Economic Performance". The Quarterly Journal of Economics, Vol. 105, No. 1, 87-114, 1990.

[8] Bhattarai, S. & Chatterjee, A. & Yong Park, W. "Effects of US quantitative easing on emerging market economies." Journal of Economic Dynamics and Control 122,104031, 2021

[9] Bülbül, S. & Köse A. "Türk Gıda Şirketlerinin Finansal Performansının Çok Amaçlı Karar Verme Yöntemleriyle Değerlendirilmesi". Atatürk Ü. İİBF Dergisi, 10. Ekonometri ve İstatistik Sempozyumu Özel Sayısı, 71-97, 2011.

[10] Calvo, G. A. "Temporary Stabilization: Predetermined Exchange Rates". Journal of Political Economy, Vol. 94, 1319-1329, 1986.

[11] Calvo, G. A., & Mendoza, E. G. "Capital-markets Crises and Economic Collapse in Emerging Markets: An Informational-frictions Approach". American Economic Review, Vol. 90, 59-64, 2000.

[12] Cecchetti, S. G. "Crisis and responses: the Federal Reserve and the financial crisis of 2007-2008" No. w14134. National Bureau of Economic Research, 2008.

[13] Çeviş, İ. "Finansal Krizler ve Para Politikası" Para Teorisi ve Politikası, Edition: 1, Chapter: 15, Editors: Çetin Doğan, İnci Parlaktuna, Denizli: Lisans Yay., 217-456, 2012.

[14] Chadwick, M. G. "Dependence of the "Fragile Five" and "Troubled Ten" Emerging Market Financial Systems on US Monetary Policy and Monetary Policy Uncertainty". Research in International Business and Finance, Vol. 49, 251-268, 2019.

[15] Claudio B., "Ten propositions about liquidity crises", CESifo Economic Studies, Volume 56, Issue 1, Pages 70–95, https://doi.org/10.1093/cesifo/ifp031. [March 2010]

[16] Creel, J. & Hubert, P. & Labondance, F. "Credit, Banking Fragility and Economic Performance". OFCE, 2020.

[17] Cuaresma, J. C. & Huber, F. & Onorante, L. "Fragility and the effect of international uncertainty shocks." Journal of International Money and Finance, Vol. 108, İssue C, 2020.

[18] Demirgüç-Kunt, A. & Detragiache, E. "Financial Liberalization and Financial Fragility", IMF Working Papers, Publisher: İnternational Monetary Fund, 1-36, 1998.

[19] Demirkale, Ö. & Özarı, Ç. "Assesstment of Macroeconomic and Financial Performance of Fragile Five and MINT Countries Using TOPSIS Method". Florya Chronicles of Political Economy, Vol. 6, No. 2, 171-192, 2020.

[20] Essers, D. (2013 April-June). "Developing Country Vulnerability in Light of The Global Financial Crisis: Shock Therapy?" Review of Development Finance, [On-line]. Vol. 3(2), 61-83. Available: https://www.sciencedirect.com/science/article/pii/S1879933713000043. [Dec. 12, 2020]

[21] Giovannetti, G. & Allen, F. "Fragile Countries and The Current Economic Crisis". European Reports on Development, İtaly, 1-49, 2009.

[22] Hoffmann, A. O. & Post, T. & Pennings, J. M. "How investor perceptions drive actual trading and risk-taking behavior." Journal of Behavioral Finance 16.1, 94-103, 2015.

[23] Hoffmann, A. O. & Post, T. "How return and risk experiences shape investor beliefs and preferences." Accounting & Finance 57.3, 759-788, 2017.

[24] Johnson, S. "Why emerging markets' 'Fragile Five' aren't quite so fragile" Financial Times (August, 21, 2017)https://www.ft.com/content/b5a3aba2-8292-11e7-a4ce-15b2513cb3ff. [20 May 2021]

[25] Kenourgios, D. & Padhi P. (2012 April). "Emerging Markets and Financial Crises: Regional, Global or Isolated Shocks?". [On-line]. Vol. 22, Issues 1-2, 24-38, https://www.sciencedirect.com/science/article/pii/S1042444X12000035. [Dec. 15, 2020]

[26] Lin, J. Y. "The Impact of the Financial Crisis on Developing Countries". Publisher: World Bank, 1-31, 2008.

[27] Loayza, N. & Ranciere, R. "Financial Development, Financial Fragility, and Growth". Policy Research Working Papers, 2004.

[28] Lowell, J. & Neu, C. R. & Tong, D. "Financial Crises and Contagion in Emerging Market Countries", National Security Research Division, Publisher: RAND, 1-72, 1998.

[29] Marjanović, I. & Marković, M. "Assessing the financial sector development of EU countries: an entropy-based TOPSIS approach." Mefkon 2020 Innovation As An Initiator Of The Development "Innovations In The Function Of Development", 148-165, 2020.

[30] Okay, G., Köse, A. "Financial Performance Analysis of Brokerage Firms Quoted on the Istanbul Stock Exchange Using the TOPSIS Method of Analysis". International Journal of Business and Social Science, Vol. 6, No. 8(1), 68-77, 2015.

[31] Oktar, S. & Dalyancı, L. "Finansal Kriz Teorileri ve Türkiye Ekonomisinde 1990 Sonrası Finansal Krizler", Marmara Üniversitesi İ.İ.B.F. Dergisi, Cilt XXIX, Sayı II, 1-22, 2010.

[32] Overseas Development Institute. "The Global Financial Crisis and Developing Countries". Working Paper 316, Londra, 1-77, 2010.

[33] Önder, E. & Taş N. & Hepsen, A. "Economic Performance Evaluation of Fragile 5 Countries After The Great Recession of 2008-2009 Using Analytic Network Process and Topsis Methods". Journal of Applied Finance & Banking, Vol. 5, No. 1, 1-17, 2015.

[34] Paczynska, A. "Global Financial Crisis and Fragile States". Global Studies Review, 1-4, 2010

[35] Rossi, R. B. "Financial Fragility and Economic Performance in Developing Economies: Do Capital Controls, Prudential Regulation and Supervision Matter?". IMF Working Paper, WP/99/66, 1-32. 1999.

[36] Sayar, R. "Uluslararası Finansal Krizler ve Uluslararası Ticarete Etkileri" Uluslararası Ticaret; Değer Zinciri Pazar Yapıları ve Muhasebe Uygulamaları, 1. Basım, (ed. Adnan Kara, Ramazan Sayar), Bursa: Ekin Basım Yayın Dağıtım, 2019.

[37] Selçuk, B. "Küresel Krizin Türk Finans Sektörü Üzerindeki Etkileri" Uluslararası Ticaret Değer Zinciri, Pazar Yapıları ve Muhasebe Uygulamaları". Ekonomi Bilimleri Dergisi, Cilt 2, Sayı 1, 21-27, 2010.

[38] Spiegel, M. "The Academic Analysis of the 2008 Financial Crisis: Round 1", The Review of Financial Studies, Volume 24, Issue 6, Pages 1773–1781, https://doi.org/10.1093/rfs/hhr040. [June 2011]

[39] Ünver, M. & Doğru, B. "The Determinants of Economic Fragility: Case of the Fragile Five Countries". Akdeniz İİBF Dergisi, Vol. 15, No. 31, 1-24, 2015.

[40] Walsh, C. E. "Using monetary policy to stabilize economic activity." Financial Stability and Macroeconomic Policy 245, 296, 2009.