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CONTENT

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SECTOR ANALYSIS OF TURKISH MARKETS USING THE PROMETHEE METHOD

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ABSTRACT

Purpose- This study has two main objectives. The first is to describe the solutions possible with the PROMETHEE method. The second is related to an analysis of sector performance in Turkish markets.
Methodology- The PROMETHEE method was used in the study**.** PROMETHEE is one of the multi-criteria decision-making MCDM methods. The best-known methods are PROMETHEE I and PROMETHEE II.
Findings- According to the PROMETHEE II method, the best-performing sectors in 2014-2016 were Manufacturing, Transportation and Storage, Information and Communications, Electricity, Gas, Steam and Airconditioning Supply, Human Health and Social Work, Wholesale and Retail Trade, Construction, Accommodation, and Food, respectively.
Conclusion- While Manufacturing and Transportation, Storage and Information, and Communications ranked in the top tiers in sector performance as expected, the Construction sector did not perform well, contrary to our expectations.

Keywords: PROMETHEE I, PROMETHEE II, Multi-Criteria Decision-Making (MCDM), decision maker, sector analysis.
JEL Codes: C00, C02, G11

1. INTRODUCTION

PROMETHEE (Preference Ranking Organization Method for Enrichment Evaluation) is one of the multi-criteria decision-making MCDM techniques. It is widely used to cope with the global problems that we are experiencing. The best-known methods are PROMETHEE I and PROMETHEE II. The basic assumption of the method is that the criteria sets are mutually independent of each other. However, with some decision-making problems, this assumption is generally violated because criteria have internal interactions with each other.

To apply these methods, preference information must be given to the decision maker. This can be given directly or indirectly. While direct preference information relates to the provision of absolute values of parameters by the decision maker, indirect preference information asks the decision maker to make comparisons relating to alternatives. Proposals provided by the PROMETHEE methods depend on the values given to the parameters being considered. Generally, different parameter groups enable different comparisons among the alternatives.

Sector analysis is the statistical analysis of the economic and financial situation of a sector in an economy. This involves calculating the difference between the actual value and the expected value. The result provides an opportunity for those interested in the economy to make an overview of the performance of companies in the sector. Investors will invest in the stocks of profitable companies among these sectors by identifying profitable sectors. Managers will make strategic decisions based on the results. Therefore, analysis of sector performance is extremely important. In addition, each sector in the economy has a relationship with the others. A potential inter-sectoral shock affects all sectors. This effect is experienced at the overall economy level.

According to the Central Bank, Turkey's economy is made up of 18 main sectors and 30 sub-sectors. In this study, the performance of the eight main interrelated market sectors in Turkey was investigated using PROMETHEE methods. The findings are included in the application section.

2. LITERATURE REVIEW

In their study, Brans et al. (1986) examined PROMETHEE as a new transition method in multi-criteria analysis. Basic features of the method include simplicity, precision, and determination. Each transition method includes the determination of certain parameters (threshold values). When small deviations arise concerning values, knowing their impact on their ranking is important for the decision maker. As the decision maker generally cannot determine the precise values correctly, this problem is significant. All the parameters to be defined have economic importance so the decision maker can easily correct them. Two methods are recommended: With both, it is possible to achieve a partial sequence (PROMETHEE I) or a complete sequence (PROMETHEE II) on a finite set of applicable actions.

In his study, Cavallaro (2005) examined an actual case in conformity with sustainable development targets using the PROMETHEE method. The process of planning and evaluating sustainable energy projects is complex because the decision-making process requires the analysis of different types of information. These include environmental, technical, economic, and social data. While some of these variables can be evaluated quite easily with numerical models, others, especially those relating to environmental impacts, can be decided upon only qualitatively. For this reason, in many cases, traditional evaluation methods such as cost-benefit analysis and fundamental economic and financial indicators cannot assess all the components in an environmentally valid energy project. The PROMETHEE method provides a flexible tool that can evaluate numerous variables being measured in different ways and bring them together.

In the study of Ballı and Karasulu (2007), the fuzzy PROMETHEE method was applied to automobile selection. Many of the economic, industrial, and financial decision-making problems have multi-criteria. In this type of problem, making the optimal selection among alternatives constitutes a difficult and complex process. In recent years, different methods have been developed to solve this type of problem. Among these, the most efficient and easiest is the PROMETHEE method, which deals with problems containing criteria that can be defined in real numbers. However, in real life, some criteria are defined in linguistic terms, so it is difficult to model them numerically. To overcome this deficiency, the fuzzy cluster approach is used. The PROMETHEE method, which has been expanded by using fuzzy inputs, was applied to the selection of seven different automobiles in the same class, using price, fuel, performance, and safety criteria. The results were found to be consistent and appropriate.

In his study, Dağdeviren (2008a) proposed an integrated approach to decision-making in equipment selection using the Analytic Hierarchy Process (AHP) and PROMETHEE method. A decision approach is provided for equipment selection problems. This selection problem is based on a comparison of equipment alternatives according to the determined criteria. AHP is used to assign weights to the criteria to be used in selection. PROMETHEE is used to determine the priorities of alternatives. In this way, weighting of the criteria considered in decision-making and evaluation of these criteria with preference functions can be achieved simultaneously.

In their study, Dağdeviren and Erarslan (2008b) examined the supplier selection process of an enterprise using the PROMETHEE method. Supplier selection using PROMETHEE has two major advantages over other sorting methods. The first is that a different preference function can be used for each factor being used in the evaluation of alternative suppliers. The second is that partial and complete sorting can be obtained in relation to the alternatives. With these advantages, the effectiveness of the supplier selection process has been increased in enterprises where the system is used.

In their study, Wang et al. (2008) examined the process of finding the best option among all possible alternatives for decision problems. Various approaches have been proposed to handle multi-criteria decision problems. PROMETHEE is one of the methods for multi-criteria problem analysis. This sorting method is quite simple when compared to other techniques. Furthermore, the PROMETHEE method eliminates the vulnerability of other traditional multi-criteria decision-making techniques that cannot process fuzzy data in the real decision-making environment. It can use fuzzy data in the decision-making process to eliminate the uncertainty and subjectivity of human judgment.

Halouani et al. (2009) examined project selection in their study. Project selection is a complex decision-making problem. It contains large amounts of data that can come both from qualitative and quantitative sources. For this reason, the development of appropriate decision-making methods would facilitate the project selection task. The recommended PROMETHEE approach provides an application area in a simpler and wider form, without compromising the advantageous features of multi-criteria methods for decision makers. Also, by adding new information types to the decision-making process, it reveals a more realistic

selection process by considering the correctness of data. It helps the decision maker to reach an opinion about preference structure. While the method is explained with a numeric selection problem, it can be used in the solution of other decision problems.

Zhaoxu and Min (2010) examined the multi-criteria decision-making PROMETHEE method in their study. The PROMETHEE method is based on the relationship between alternative pairs. This transition method primarily compares alternative pairs relating to each criterion. The PROMETHEE method defines the preference function to establish preference differences among alternative pairs for each criterion. Hence, to define the preference alternative from the perspective of the decision maker, it creates preference functions in relation to numerical differences between alternative pairs. The value of these functions varies between 0 and 1. As the functional value increases, the preferential difference also increases. When the value is zero, there is no preferential difference between alternative pairs. On the other hand, when the value is one, it means that one of the alternatives leaves the other very much behind.

In their study, Athawale and Chakraborty (2010) examined establishment place selection using the PROMETHEE method. There can be long term repercussions from establishment place selection decisions and moving the locations of existing facilities can be expensive. For this reason, it is important to select the most appropriate location to minimize costs for a long period concerning a specific industrial application. Establishment place selection or facility place selection is a strategic problem that has a significant impact on the performance of manufacturing corporations. Use of the PROMETHEE II method in the solution of a place selection problem provides important information to the decision maker and is an appropriate tool for solving place selection decision problems. It enables the decision maker to rank the alternatives more efficiently and easily.

In their study, Yılmaz and Dağdeviren (2011) proposed a new approach considering the uncertainty of the decision-making process in equipment selection. Within this framework, two different methods, F-PROMETHEE and ZOGP, were explored, and then a combined approach was introduced. Alternative options and the criteria set were determined according to the opinions of the decision-making team. Use of fuzzy numbers as input data enabled the criteria and preferences determined during the decision-making process to be specified more realistically. The proposed approach showed how F-PROMETHEE results would be integrated into a ZOGP model. However, when compared, the results from the F-PROMETHEE method and the proposed approach did not reach the same conclusions.

In their study, Qu et al. (2011) examined investment values and the investment decision-making process with the PROMETHEE approach. The Range-PROMETHEE method was used to sort 20 shares randomly selected from the Stock Exchange. It was found that the first five shares provided higher earnings within an investment period of 17 months. Five performance criteria were used to measure the growth potential of companies. These criteria were composed of numbers based on real financial data. Empirical studies revealed the effectiveness of the PROMETHEE method concerning investment values and the decision-making process.

In their study, Chen et al. (2011) used a linguistic PROMETHEE method to create an investment portfolio considering both quantitative information in financial reports and qualitative information including expert opinions. Financial report data affect the short-term performance of stocks. Expert opinions may reflect the potential capacity of a stock and its future performance. The preference degree of one stock can be compared with that of another, according to the criteria. Hence, a rational investment portfolio can be determined. The linguistic PROMETHEE method is not only involved in the investment portfolio decision problem but can also be used for multi-criteria decision-making problems such as third-party logistic suppliers, R&D project selection, and information system selection.

Safari et al. (2012) applied the Entropy-based PROMETHEE method to supplier selection in their study. Weights of each criterion were calculated using the Entropy method. Supplier selection is a comparison that is made to determine suppliers with the highest potential to meet the requirements of a company continuously at an acceptable cost. Selection of the right suppliers significantly reduces purchasing costs and improves corporate competitiveness. For this reason, supplier selection is one of the most important decision-making problems. In this study, a new integrated method is proposed for supplier selection.

In the study of Bogdanovic et al. (2012), an integrated approach combining AHP and PROMETHEE was proposed to select the most appropriate method for underground mining. Selection of the best mining method among various alternatives is a multi-criterion decision-making problem. The relevant problem comprises five possible mining methods and eleven criteria used to evaluate them. AHP was used to analyze the structure of the mining method selection problem and to determine the weights of the criteria. The PROMETHEE method was used to obtain the final ranking and to conduct sensitivity analysis by changing the weights. The results showed that the proposed integrated method could be used successfully in solving mining engineering problems.

Avikal et al. (2013) examined the disassembly problem with the PROMETHEE method in their study. Disassembly is the process of dismantling products, reproduction, recycling, and destruction. It is necessary to design and balance dismantling lines so that they operate efficiently. The multipurpose disassembly line method searches for a disassembly process by providing a suitable disassembly sequence, minimizing the number of jobs and idle time, and considering the environmental effects of the disassembly line of the consumed product. In the study, an intuitive method based on a multi-criterion decision-making technique is proposed. The results revealed that a significant improvement was achieved in performance compared to other heuristic methods.

Corrente et al. (2014) suggested that PROMETHEE methods and Stochastic Multiobjective Acceptability Analysis - SMAA - could be used to cope with various global problems. Integration of SMAA and PROMETHEE enables proposals to be obtained in conformity with the preference information provided by the decision maker. In the proposed methodology, the PROMETHEE method allows for the selection of preference parameters to be evaluated effectively. Thus, possible rows are obtained that give the best position to an alternative. This reveals that the method can cope with various complex world problems.

In the study of Veza et al. (2015), an approach was provided for enterprises to be compared and sorted according to their competencies. Enterprises were evaluated with the PROMETHEE method by considering the assets they owned. Economic and sociological criteria can also be added to the PROMETHEE method. All the data for the study were collected using specially designed questionnaires. Experts were interviewed to determine the criteria weights. Hence, a transparent procedure was obtained for the comparison and sorting of enterprises. However, the decision-making process can be affected by the weights of criteria. For this reason, the determination of criteria weight should also constitute a transparent process. Uncertain criteria weights should be avoided.

Mikaeil et al. (2015) predicted the cuttability of size stone at a stone factory using the PROMETHEE method. Prediction of the cuttability of stone constitutes one of the most important factors in production planning. This factor is used as an important criterion in the cost predictions and planning of stone facilities. The results revealed that the PROMETHEE method can be used to evaluate the testability of size stone in any stone factory.

In the study of Sungur and Maden (2016), the manufacturing industry was sorted using the PROMETHEE method. To successfully achieve regional development, it is necessary to determine sectoral superiorities and the sectoral concentrations of regions correctly. Sorting of sectors in the region according to specific superiority criteria is extremely important in making effective decisions regarding regional policies. Furthermore, separate evaluations were made for each criterion and partial superiorities were sorted.

In the study of Brans and De Smet (2016), the PROMETHEE-GAIA method was proposed for multi-criteria decision alternatives. The information required by PROMETHEE and GAIA is transparent and simple for both decision makers and analysts. The method begins with general remarks about multi-criteria problems and emphasizes that a multi-criterion problem cannot be evaluated without additional information regarding the preferences and priorities of decision makers. A preference function is created relating to each scale. Weights explaining the relative importance of each decision criterion are used in this process. The method enables interpretations to be made about potential sorting events.

Vulević and Dragović (2017) created sub-watershed sorting values with the PROMETHEE multi-criteria decision analysis method. In managed environments, soil and water resources are important elements in reducing the rate of erosion and the destructive effects of floods. The criteria used are land cover, precipitation, soil erosion, and topography. The importance of criteria was determined using the Analytic Hierarchy Process method. Results obtained from the PROMETHEE II method and the ArcGIS application provide valuable information regarding watershed management and the implementation of soil erosion and flood control measures.

In their study, Gul et al. (2018) proposed a fuzzy PROMETHEE method based on two different preference functions to solve material selection problems. Recent developments in the automotive industry have made consideration of material design and selection especially important. Selecting the right material can facilitate the protection of resources and ensure effective cost management. When selecting material or replacing existing material with something that performs better, decision makers generally use trial and error. They do this based on their experience of factors that caused time loss and significant cost increases. For this reason, having the appropriate model for material selection is particularly important. Material selection problems with contradictory criteria can be solved using multi-criteria decision-making methods because these techniques are used to resolve conflicting opinions with multi-criteria.

3. DATA AND METHODOLOGY

This study has two important purposes. The first is to demonstrate the effectiveness of the PROMETHEE method. The second is related to an analysis of sectoral performance in Turkish markets using the PROMETHEE method.

Eight sectors subject to evaluation in Table 1 are numbered A1-A8. These sectors are Manufacturing, Electricity, Gas, Steam and Air Conditioning Supply, Construction, Wholesale and Retail Trade and Repair of Motor Vehicles and Motorcycles, Transportation and Storage, Accommodation and Food Service Activities, Information and Communications, and Human Health and Social Work Activities, respectively. For each sector, Liquidity Ratios, Ratios of Financial Position, Turnover Ratios, and Profitability Ratios were examined and relevant evaluation criteria were determined. Evaluation criteria are respectively given as Current Ratio (%), Own Funds / Total Assets (%), Inventory Turnover (times), and Net Profit / Own Funds (%) in the range of C1-C4 in Table 1.

In the literature, various methods are proposed for determining weight degrees (degrees of importance) relating to criteria. Among these, the AHP, CRITIC, and ENTROPY methods are widely used. On the other hand, intuitive approaches can also be used in determining the weights of criteria.

The PROMETHEE method does not explain the selection of criteria weights. In the study, the weight degrees of criteria were determined to be equal. Furthermore, q and p values were determined at the minimum and maximum levels by examining the distribution of data. The data used in the study were obtained from TCMB Company Accounts (2014-2016), Statistics Department, Real Sector Data Division.

3.1. PROMETHEE METHOD

The study of Dağdeviren (2008, p.399-401) was used for mathematical illustration of the PROMETHEE method that was developed by J. P. Brans et al. in 1986.

$$\max\left\{ f_1(a),\, f_2(a),\ldots,\, f_n(a) Ia \in A \right\}, \tag{1}$$

Here, A is a finite set of possible alternatives and fj denotes n criteria to be maximized. For each alternative, fj (a) is an evaluation of this alternative. When we compare two alternatives, a and b ∈ A, we should be able to express the results of these comparisons in terms of preference.

For this reason, P is a preference function. Preference function transforms the difference between evaluations of two alternatives (a and b) into a preference degree between 0 and 1 with respect to a specific criterion.

$$P_{j(a,b)} = G_j\left[f_j(a) - f_j(b) \right], \tag{2}$$

$$0 \le P_{j(a,b)} \le 1, \tag{3}$$

Let fj (i) be the preference function relating to criteria. Here, Gj is a non-decreasing function of the deviation (d) observed between fj (a) and fj (b).

To facilitate selection of the private preference function, six fundamental types of this preference function are proposed to the decision maker. These are ordinary function, U-shape function, V-shape function, level function, linear function, and Gauss function. In each case, it is not necessary to fix more than two parameters (threshold, q, p, or s). Indifference threshold q: is the biggest deviation that will be ignored in this criterion. It is a small value according to the measurement scale. Preference threshold p: is the smallest deviation to be considered decisive in the choice of one alternative over another. It is a great value according to the measurement scale. Gauss threshold s is only used with the Gauss preference function. It is usually fixed as an intermediate value between indifference and preference threshold.

In the PROMETHEE method, the calculations below are made for a and b alternatives.

$$\pi(a,b) = \frac{\sum_{j=1}^{n} w_j\, P_j(a,b)}{\sum_{j=1}^{n} w_j} \tag{4}$$

$$\phi^{+}(a) = \sum_{x \in A} \pi(x, a), \tag{5}$$

$$\phi^{-}(a) = \sum_{x \in A} \pi(a, x), \tag{6}$$

$$\phi(a) = \phi^{+}(a) - \phi^{-}(a). \tag{7}$$

For each alternative, π (a, b) is a general preference index belonging to set A of alternatives. ϕ+ (a) denotes positive superiority flow and ϕ- (a) denotes negative superiority flow. ϕ (a) is the net flow value.

Three main PROMETHEE methods can be used to analyze evaluation problems, namely: (1) PROMETHEE I partial sorting, (2) PROMETHEE II complete sorting, and (3) Geometrical Analytic for Interactive Aid (GAIA) analysis.

PROMETHEE II provides full sorting of alternatives from the best to the worst. Here, net flow (ϕ) is used to sort the alternatives. It is assumed that the alternative having higher net flow is superior. As PROMETHEE I does not provide full sorting, it cannot be compared to the sorting provided with PROMETHEE II.

4. FINDINGS AND DISCUSSION

In the study, PROMETHEE I and PROMETHEE II methods were used. Solutions in the PROMETHEE II method comprise seven steps. For this purpose, the study of Sündüs and Yıldırım (2018, p.187-192) was used.

Step 1. Alternatives of the Decision Maker and Determination of Criterion Weights

PROMETHEE solution processes were calculated according to the data in Table 1. In the table, alternatives of the decision maker and criterion weights are presented.

Table 1: Data Set Relating to Sector Performance

1	A		B	C	D	E	F
2			W	0.25	0.25	0.25	0.25
3	**ALTERNATIVES**	**FIRM NUMBER**		**C1**	**C2**	**C3**	**C4**
4	Manufacturing	3057	A1	145.28	35.67	2.97	11.76
5	Electricity, Gas, Steam	319	A2	108.58	33.64	12.61	0.27
6	Construction	945	A3	144.60	23.12	0.97	5.84
7	Wholesale and Retail Trade	2387	A4	133.47	28.16	4.82	4.87
8	Transportation and Storage	343	A5	125.43	43.78	13.82	0.70
9	Accommodation and Food	551	A6	103.19	28.20	3.52	-10.27
10	Information and Communications	95	A7	184.19	58.23	10.28	1.16
11	Human Health and Social Work	151	A8	113.63	29.77	9.82	1.35

Step 2. Determination of Preference Functions

Since the data used are quantitative, the fifth function preference function (linear) and the third type preference function (V type) are used. In addition, preference function parameter q and p values are determined.

Table 2: Preference Function and Extended Data Set

1	A	B	C	D	E	F
2			0.25	0.25	0.25	0.25
3	Alternatives		C1	C2	C3	C4
4	Manufacturing	A1	145.28	35.67	2.97	11.76
5	Electricity, Gas, Steam	A2	108.58	33.64	12.61	0.27
6	Construction	A3	144.60	23.12	0.97	5.84
7	Wholesale and Retail Trade	A4	133.47	28.16	4.82	4.87
8	Transportation and Storage	A5	125.43	43.78	13.82	0.70
9	Accommodation and Food	A6	103.19	28.20	3.52	-10.27
10	Information and Communications	A7	184.19	58.23	10.28	1.16
11	Human Health and Social Work	A8	113.63	29.77	9.82	1.35
12		q	103.19	23.12	0.97	-10.27
13		p	184.19	58.23	13.82	11.76

Step 3. Determination of Common Preference Functions and Preference Indices

The common preference functions related to C1 criteria and the results of determining the preference indices are shown in Table 3 and Table 4.

Table 3: Obtaining D(Ai,Aj) Values as per C1 Criterion

G	H	I	J	K	L	M	N	O	P
3	**C1**	1	2	3	4	5	6	7	8
4	$D(A_i,A_j)$	A1	A2	A3	A4	A5	A6	A7	A8
5	A1	0.00	36.70	0.68	11.81	19.85	42.09	-38.91	31.65
6	A2	-36.70	0.00	-36.02	-24.89	-16.85	5.39	-75.61	-5.05
7	A3	-0.68	36.02	0.00	11.13	19.17	41.41	-39.59	30.97
8	A4	-11.81	24.89	-11.13	0.00	8.04	30.28	-50.72	19.84
9	A5	-19.85	16.85	-19.17	-8.04	0.00	22.24	-58.76	11.80
10	A6	-42.09	-5.39	-41.41	-30.28	-22.24	0.00	-81.00	-10.44
11	A7	38.91	75.61	39.59	50.72	58.76	81.00	0.00	70.56
12	A8	-31.65	5.05	-30.97	-19.84	-11.80	10.44	-70.56	0.00

For this calculation, in I5 cell; =$C4-INDEX($C$4:$C$11;I$3;1) formula has been written.

Table 4: Obtaining Pj(Ai,Aj) values as per C1 Criterion

G	H	I	J	K	L	M	N	O	P
17	**C1**	1	2	3	4	5	6	7	8
18	$P_j(A_i,A_j)$	A1	A2	A3	A4	A5	A6	A7	A8
19	A1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20	A2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
21	A3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

22	A4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
23	A5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
24	A6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
25	A7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
26	A8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

For this calculation, in I19 cell; =IF(I5<=$C$12;0;IF(AND($C$12<I5;I5<=$C$13);((I5-$C$12)/($C$13-$C$12));1)) formula has been written.

The common preference functions related to the C2 criterion and the results of determining the preference indices are shown in Table 5 and Table 6.

Table 5: Obtaining D(Ai,Aj) Values as per C2 Criterion

Q	R	S	T	U	V	W	X	Y	Z
3	**C2**	1	2	3	4	5	6	7	8
4	$D(A_i,A_j)$	A1	A2	A3	A4	A5	A6	A7	A8
5	A1	0.00	2.03	12.55	7.51	-8.11	7.47	-22.56	5.90
6	A2	-2.03	0.00	10.52	5.48	-10.14	5.43	-24.59	3.87
7	A3	-12.55	-10.52	0.00	-5.04	-20.66	-5.08	-35.11	-6.65
8	A4	-7.51	-5.48	5.04	0.00	-15.62	-0.04	-30.07	-1.61
9	A5	8.11	10.14	20.66	15.62	0.00	15.58	-14.45	14.01
10	A6	-7.47	-5.43	5.08	0.04	-15.58	0.00	-30.03	-1.57
11	A7	22.56	24.59	35.11	30.07	14.45	30.03	0.00	28.46
12	A8	-5.90	-3.87	6.65	1.61	-14.01	1.57	-28.46	0.00

For this calculation, in S5 cell; =$D4-INDEX($D$4:$D$11;S$3;1) formula has been written.

Table 6: Obtaining Pj(Ai,Aj) Values as per C2 Criterion

Q	R	S	T	U	V	W	X	Y	Z
17	**C2**	1	2	3	4	5	6	7	8
18	$P_j(A_i,A_j)$	A1	A2	A3	A4	A5	A6	A7	A8
19	A1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20	A2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
21	A3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
22	A4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
23	A5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
24	A6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
25	A7	0.00	0.04	0.34	0.20	0.00	0.20	0.00	0.15
26	A8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

For this calculation, in S19 cell, =IF(S5<=$D$12;0;IF(AND($D$12<S5;S5<=$D$13);((S5-$D$12)/($D$13-$D$12));1)) formula has been written.

The common preference functions related to the C3 criteria and the results of determining the preference indices are shown in Table 7 and Table 8.

Table 7: Obtaining D(Ai,Aj) Values as per C3 Criterion

AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ
3	**C3**	1	2	3	4	5	6	7	8
4	$D(A_i,A_J)$	A1	A2	A3	A4	A5	A6	A7	A8
5	A1	0.00	-9.64	2.00	-1.85	-10.85	-0.55	-7.31	-6.85
6	A2	9.64	0.00	11.64	7.79	-1.21	9.10	2.33	2.79
7	A3	-2.00	-11.64	0.00	-3.85	-12.85	-2.55	-9.31	-8.85
8	A4	1.85	-7.79	3.85	0.00	-9.00	1.31	-5.46	-5.00
9	A5	10.85	1.21	12.85	9.00	0.00	10.31	3.54	4.00
10	A6	0.55	-9.10	2.55	-1.31	-10.31	0.00	-6.76	-6.30
11	A7	7.31	-2.33	9.31	5.46	-3.54	6.76	0.00	0.46
12	A8	6.85	-2.79	8.85	5.00	-4.00	6.30	-0.46	0.00

For this calculation, in AC5 cell, =$E4-INDEX($E$4:$E$11;AC$3;1) formula has been written.

Table 8: Obtaining Pj(Ai,Aj) Values as per C3 Criterion

AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ
17	**C3**	1	2	3	4	5	6	7	8
18	$P_j(A_i,A_j)$	A1	A2	A3	A4	A5	A6	A7	A8
19	A1	0.00	0.00	0.08	0.00	0.00	0.00	0.00	0.00
20	A2	0.67	0.00	0.83	0.53	0.00	0.63	0.11	0.14
21	A3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
22	A4	0.07	0.00	0.22	0.00	0.00	0.03	0.00	0.00
23	A5	0.77	0.02	0.92	0.62	0.00	0.73	0.20	0.24
24	A6	0.00	0.00	0.12	0.00	0.00	0.00	0.00	0.00
25	A7	0.49	0.00	0.65	0.35	0.00	0.45	0.00	0.00
26	A8	0.46	0.00	0.61	0.31	0.00	0.42	0.00	0.00

For this calculation, in AC19 cell, =IF(AC5<=$E$12;0;IF(AND($E$12<AC5;AC5<=$E$13);((AC5-$E$12)/($E$13-$E$12));1)) formula has been written.

The common preference functions related to the C4 criterion and the results of determining the preference indices are shown in Table 9 and Table 10.

Table 9: Obtaining D(Ai,Aj) Values as per C4 Criterion

AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT
3	**C4**	1	2	3	4	5	6	7	8
4	$D(A_i,A_j)$	A1	A2	A3	A4	A5	A6	A7	A8
5	A1	0.00	11.49	5.92	6.90	11.07	22.03	10.60	10.41
6	A2	-11.49	0.00	-5.57	-4.59	-0.42	10.54	-0.89	-1.08

7	A3	-5.92	5.57	0.00	0.98	5.14	16.11	4.68	4.49
8	A4	-6.90	4.59	-0.98	0.00	4.17	15.14	3.71	3.52
9	A5	-11.07	0.42	-5.14	-4.17	0.00	10.97	-0.46	-0.65
10	A6	-22.03	-10.54	-16.11	-15.14	-10.97	0.00	-11.43	-11.62
11	A7	-10.60	0.89	-4.68	-3.71	0.46	11.43	0.00	-0.19
12	A8	-10.41	1.08	-4.49	-3.52	0.65	11.62	0.19	0.00

For this calculation, in AM5 cell, =$F4-INDEX($F$4:$F$11;AM$3;1) formula has been written.

Table 10: Obtaining Pj(Ai,Aj) Values as per C4 Criterion

AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT
17	**C4**	1	2	3	4	5	6	7	8
18	$P_j(A_i.A_j)$	A1	A2	A3	A4	A5	A6	A7	A8
19	A1	0.47	0.99	0.73	0.78	0.97	1.00	0.95	0.94
20	A2	0.00	0.47	0.21	0.26	0.45	0.94	0.43	0.42
21	A3	0.20	0.72	0.47	0.51	0.70	1.00	0.68	0.67
22	A4	0.15	0.67	0.42	0.47	0.66	1.00	0.63	0.63
23	A5	0.00	0.49	0.23	0.28	0.47	0.96	0.45	0.44
24	A6	0.00	0.00	0.00	0.00	0.00	0.47	0.00	0.00
25	A7	0.00	0.51	0.25	0.30	0.49	0.98	0.47	0.46
26	A8	0.00	0.52	0.26	0.31	0.50	0.99	0.47	0.47

For this calculation, in AM19 cell, =IF (AM5<=$F$12;0; IF (AND($F$12<AM5; AM5<=$F$13);((AM5 $F$12)/($F$13-$F$12));1)) formula has been written.

Step 4. Calculation of Values of Positive and Negative Superiorities

Positive superiority ø + (a) and negative superiority ø- (a) values have been calculated using equality (5) and equality (6).

Table 11: Positive and Negative Superiorities

30	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**J**	**K**
31	CT	1	2	3	4	5	6	7	8		
32	$P_j(A_i.A_j)$	A1	A2	A3	A4	A5	A6	A7	A8	ø+	Rank
33	A1	0.12	0.25	0.20	0.19	0.24	0.25	0.24	0.23	0.25	1
34	A2	0.17	0.12	0.26	0.20	0.11	0.39	0.13	0.14	0.22	4
35	A3	0.05	0.18	0.12	0.13	0.17	0.25	0.17	0.17	0.18	7
36	A4	0.06	0.17	0.16	0.12	0.16	0.26	0.16	0.16	0.18	6
37	A5	0.19	0.13	0.29	0.23	0.12	0.42	0.16	0.17	0.24	2
38	A6	0.00	0.00	0.03	0.00	0.00	0.12	0.00	0.00	0.02	8
39	A7	0.12	0.14	0.31	0.21	0.12	0.41	0.12	0.15	0.23	3
40	A8	0.11	0.13	0.22	0.16	0.12	0.35	0.12	0.12	0.19	5
41	ø-	0.12	0.16	0.23	0.18	0.15	0.35	0.16	0.16		
42	Rank	1	4	7	6	2	8	3	5		

For this calculation, in B33 cell, =I19*$C$2+S19*$D$2+AC19*$E$2+AM19*$F$2 formula has been written.

For this calculation, in J33 cell, =SUM(B33:I33)/(8-1) formula has been written.

For this calculation, in B41 cell, =SUM(B33:B40)/(8-1) formula has been written.

For ranking as per the positive and negative superiorities, in K33 cell, =RANK(J33;$J$33:$J$40;0) formula has been written.

In B42 cell, =RANK(B41;$B$41:$I$41;1) formula has been written.

Step 5. Obtaining PROMETHEE I Partial Rankings

For this purpose, the negative superiorities obtained from Step 4 are listed from small to large and positive superiorities from large to small. Table 12 shows these calculations.

Table 12: PROMETHEE I Partial Rankings

PROMETHEE I				
	Rank	**ø⁻**	**Rank**	**ø⁺**
A1	0.12	1	0.25	1
A2	0.16	4	0.22	4
A3	0.23	7	0.18	7
A4	0.18	6	0.18	6
A5	0.15	2	0.24	2
A6	0.35	8	0.02	8
A7	0.16	3	0.23	3
A8	0.16	5	0.19	5

Step 6. Calculation of Net Priority Value

ønet value must be calculated for the obtained rankings to be expressed with a single number. For this, equation (7) is used.

Step 7. Obtaining PROMETHEE II Full Ranking

The ranking made according to the net values obtained using the equation (7) shows the results of the PROMETHEE II analysis. Table 13 shows the exact sorting values obtained by the PROMETHEE II method.

Table 13: PROMETHEE II Full Ranking

PROMETHEE II		
	Rank	$ø^{net}$
Manufacturing	1	0.13
Transportation and Storage	2	0.09
Information and Communications	3	0.07
Electricity, Gas, Steam	4	0.06
Human Health and Social Work	5	0.03
Wholesale and Retail Trade	6	0.00
Construction	7	-0.05
Accommodation and Food	8	-0.33

According to the PROMETHEE II method, the sectors showing the best performance in 2014-2016 in Turkish markets were Manufacturing, Transportation and Storage, Information and Communications, Electricity, Gas, Steam, Human Health and Social Work, Wholesale and Retail Trade, Construction, and Accommodation and Food, respectively.

While it was anticipated that Manufacturing, Transportation and Storage, and Information and Communications would perform well, that the Construction sector performed poorly was contrary to our sectoral expectations.

5. CONCLUSION

This study has two main objectives. The first is to describe the solutions possible with the PROMETHEE method. The second involves an analysis of sectoral performance in Turkish markets using the PROMETHEE method.

Solutions using the PROMETHEE method comprise seven steps. These are Alternative Decision Maker and Criterion Weights, Determination of Preference Functions, Determination of Common Preference Functions and Preference Indices, Calculation of Positive and Negative Advantages, Calculation of PROMETHEE I Partial Rankings, Calculation of Net Priority Values, and Obtaining PROMETHEE II Full Ranking, respectively.

According to the PROMETHEE II method, the sectors revealing the best performance in the years 2014-2016 in Turkish markets were Manufacturing, Transportation and Storage, Information and Communications, Electricity, Gas, Steam and Airconditioning Supply, Human Health and Social Work, Wholesale and Retail Trade, Construction, and Accommodation and Food, respectively.

While Manufacturing, Transportation and Storage, and Information and Communications ranked in the first tiers of sectoral performance as expected, that the Construction sector showed poor performance was contrary to our expectations.

REFERENCES

Athawale, V. M., and Chakraborty, S. (2010). Facility Layout Selection Using PROMETHEE II Method. IUP Journal of Operations Management, 9.

Avikal, S., Mishra, P. K., Jain, R., and Yadav, H. C. (2013). A PROMETHEE method-based heuristic for disassembly line balancing problem. Industrial Engineering and Management Systems, 12(3), 254-263.

Ballı, S., and Karasulu, B. (2007). A Fuzzy PROMETHEE Method Application for the Most Suitable Car Selection Problem. D.E.Ü.İ.İ.B.F. Journal, 22(1), 139-147.

Bogdanovic, D., Nikolic, D., and Ilic, I. (2012). Mining method selection by integrated AHP and PROMETHEE method. Anais da Academia Brasileira de Ciências, 84(1), 219-233.

Brans, J. P., and De Smet, Y. (2016). PROMETHEE methods. In Multiple criteria decision analysis (pp. 187-219). Springer, New York, NY.

Brans, J. P., Vincke, P., and Mareschal, B. (1986). How to select and how to rank projects: The PROMETHEE method. Main objectivesEuropean journal of operational research, 24(2), 228-238.

Cavallaro, F. (2005). An integrated multi-criteria system to assess sustainable energy options: an application of the PROMETHEE method.

Chen, C. T., Hung, W. Z., and Cheng, H. L. (2011). Applying linguistic PROMETHEE method in inandstment portfolio decision-making. International Journal of Electronic Business Management, 9(2), 139.

Corrente, S., Figueira, J. R., and Greco, S. (2014). The smaa-promethee method. European Journal of Operational Research, 239(2), 514-522.

Dağdeviren, M. (2008). Decision-making in equipment selection: an integrated approach with AHP and PROMETHEE. Journal of intelligent manufacturing, 19(4), 397-406.

Dağdeviren, M., and Erarslan, E. (2008). Supplier selection with PROMETHEE sorting method. Gazi University Engineering-Architecture Faculty Journal, 23(1).

Gul, M., Celik, E., Gumus, A. T., and Guneri, A. F. (2018). A fuzzy logic based PROMETHEE method for material selection problems. Beni-Suef Uniandrsity Journal of Basic and Applied Sciences, 7(1), 68-79.

Halouani, N., Chabchoub, H., and Martel, J. M. (2009). PROMETHEE-MD-2T method for project selection. European Journal of Operational Research, 195(3), 841-849.

Mikaeil, R., Abdollahı, K. M., Sadegheslam, G., and Ataei, M. (2015). Ranking sawability of dimension stone using PROMETHEE method.

Qu, S., Li, H., and Guo, X. (2011). Application of Interval-PROMETHEE Method for Decision-making in Inandsting. ORSC and APORC, 314-321.

Safari, H., Fagheyi, M. S., Ahangari, S. S., and Fathi, M. R. (2012). Applying PROMETHEE method based on entropy weight for supplier selection. Business management and strategy, 3(1), 97-106.

Sungur, O., and Işık Maden, S. (2016). Ranking of TR61 Region (Antalya, Isparta, Burdur) Manufacturing Industry Sectors by PROMETHEE Method. Ege Academic Review, 16(4).

Sündüs, D., and Yıldırım, F.B. (2018) Multiple Criteria Decision-making Methods for the Solution of Operational, Managerial and Strategic Problems for Operators, Engineers and Managers, Promethee, 177- 199. 3. Edition, Dora Publishing-Bursa.

Veza, I., Celar, S., and Peronja, I. (2015). Competences-based comparison and ranking of industrial enterprises using PROMETHEE method. Procedia Engineering, 100(Supplement C), 445-449.

Vulević, T., and Dragović, N. (2017). Multi-criteria decision analysis for sub-watersheds ranking via the PROMETHEE method. International Soil and Water Conservation Research, 5(1), 50-55.

Wang, T. C., Chen, L. Y., and Chen, Y. H. (2008). Applying fuzzy PROMETHEE method for evaluating IS outsourcing suppliers. In 2008 Fifth International Conference on Fuzzy Systems and Knowledge Discovery (Vol. 3, pp. 361-365). IEEE.

Yilmaz, B., and Dağdeviren, M. (2011). A combined approach for equipment selection: F-PROMETHEE method and zero–one goal programming. Expert Systems with Applications, 38(9), 11641-11650.

Zhaoxu, S., and Min, H. (2010, June). Multi-criteria decision-making based on PROMETHEE method. In 2010 International Conference on Computing, Control and Industrial Engineering (Vol. 1, pp. 416-418). IEEE.

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INFLUENCE OF SOCIO-DEMOGRAPHIC CHARACTERISTICS, FINANCIAL LITERACY AND MOOD ON FINANCIAL RISK TOLERANCE

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ABSTRACT

The Purpose- Risk is an inherent element of any kind of financial investment instruments. The aim of this study is to determine the factors affecting financial risk tolerance of the individuals. Additionally, this study analyses the role of mood in the financial risk tolerance.
Data and Methodology- Data were collected using a survey questionnaire. 588 questionnaires were completed and used for analysis. This study employs an ordered logit model (OLM) to validate and assess proposed research model.
Results- According to the results of the study, there is a statistically positive and significant relationship between both positive emotional state and age and financial risk tolerance. On the other hand, there is no significant relationship between gender, income, having children, financial literacy and financial risk tolerance. The results of this study indicate that the moment of decision making is important because of risk tolerance of individuals is affected by positive emotional state as well as age.
Conclusion– This study shows that both financial knowledge and positive mood are strong determinants of financial risk tolerance. Surprisingly, there is no relation between gender, income level, having children, financial literacy level and the dependent variable financial risk tolerance level. Financial risk tolerance which shapes financial decision making process is influenced by the individual's biopsychosocial and environmental factors rather than rational choice theory.

Keywords: Financial literacy, behavioral finance, mood, financial risk tolerance, ordered logit model.
JEL Codes: D81, D91, G53

1. INTRODUCTION

Investors take expected returns of their financial instruments into consideration while making investment decision. According to traditional financial theories, investors seek to acquire maximum amount of return from their investment portfolios and these traditional theories indicate that the riskier is the investment, the greater the expected return (Tanyolac and Karan, 2015). Each investor has different preferences about their investment portfolios and portfolio selection varies with regard to their risk tolerances. As the individual's risk tolerance decreases, the risky investments he or she will make will decrease accordingly. For instance, while risk-taker investor chooses to invest in stocks, risk-averse ones prefer to investing government bonds or other low-risk financial instruments.

Risk concept is one of the main components of financial decision making. In traditional finance, risk is specified considering the deviations from the average return and the probability of those deviations (Murgea, 2010). There is a possibility of getting returns in the amount of below or above the expected return. This possibility constitutes the risk of investment which investors made (Korkmaz and Ceylan, 2017). Investor decisions shaping the financial markets are not simple enough to confirm the assumptions of traditional finance and they are often heavily influenced by investors' psychological tendencies and biases without being based on logical bases. Especially, the fact that the individual risk perception, which is the most important factor affecting financial

decisions, is constantly changing with the instant changes in the moods of the people, justifies the question of the existence of the rational individual concept in the finance theories (Sefil and Çilingiroğlu, 2011). Therefore, it is required to understand the determinants, which affect risk perceptions, in order to be able to understand investment decisions of individual investors. In this regard, behavioral finance focuses on psychological factors and personal attitudes unlike traditional finance theories (Lin, 2012; Pranhakaran and Karthika, 2011).

Financial risk tolerance is a term used to specify the amount of uncertainty or maximum volatility of investment return that an investor is willing to accept when making a financial decision (Grable, 2000; Grable and Joo, 2004; Grable and Lytton, 1999). Besides, according to Hallahan et al. (2003), financial risk tolerance term may be thought as opposite meaning of risk aversion concept. To be more precise, some investors are willing to take more risk in return for getting higher investment return and they are known as the investors who have higher financial risk tolerance than risk averse ones (Faff et al., 2009). On the other hand, higher financial risk tolerance comes with the possibility of potential loss or uncertain earnings (Sultana and Pardhasaradhi, 2011). Hence, it can be said that the inability to understand financial risk tolerance of investors may result in creating suboptimal portfolios (Droms, 1987).If the financial advisor chooses a portfolio inconsistent with the investor's financial risk tolerance, the investment's outcome may not be at the desired level. This disappointment is significant for both investor and investor's financial advisor and should be minimized as much as possible (Moreschi, 2005).

Understanding and measurement of investors' financial risk tolerance topics have drawn researchers' attention recently (Chavali and Mohanraj, 2016). Also, developments in financial markets and financial instruments caused to be given more importance to financial risk tolerance subject (Anbar and Eker, 2009; Kübilay and Bayrakdaroglu, 2016) because of the role of it in individuals' investment decisions and financial planning (Muzindutsi and Ramudzilu, 2016; Ryack, 2011; Yao, Gutter, and Hanna, 2005). Even in many countries, advisors in financial institutions are obliged to have some information about their investors' personal characteristics, for instance the risk perception and the risk tolerance, in order to be able to decide the most appropriate portfolio for their clients (Fisher and Yao, 2017; Grable and Roszkowski, 2008; Paradi et al., 2018; Roszkowski and Grable, 2005). According to Dalton and Dalton (2004), two common ways of understanding the risk tolerance of clients are; analyzing the investment history of the clients and using surveys to find out their opinions regarding risky and risk-free financial instruments. By the means of this information, therefore, financial advisors can create more profitable portfolios based upon each client's financial risk tolerance.

In the literature, a large amount of researches have been conducted on the subject of financial risk tolerance and its determinants (Kübilay and Bayrakdaroğlu, 2017; Moreschi, 2005), for example demographic or socio-economic characteristics, financial knowledge or investor's mood while making investment decision. As well as this, number of these studies have continued to increase substantially in recent years, however, there has not been any consensus related to the effect of these factors on financial risk tolerance (Hallahan et al., 2004).

From the demographic or socio-economic characteristics perspective; gender, job, education level, marital status, age, income level can be associated with financial risk tolerance of investors (Kumar et al., 2015). In the studies which are related with gender and financial risk tolerance, it is mostly concluded that women are less risk tolerant than men (Embrey and Fox, 1997; Pompian and Longo, 2004; Sachse et al., 2012; Thomas and Rajendran, 2012). On the other hand, relationship between the marital status and the risk tolerance topic has not been concluded clearly. Some researches indicate that single individuals have less responsibilities than married ones and they are willing to take more risk while married ones prone to choose reliable financial investments (Grable and Lytton, 1998). Therefore, according to these studies, it can be said that single individuals are more risk tolerant than married individuals (Grable and Joo, 2004). On the contrary, in some other studies, married people are more vulnerable to make risky investments because of increasing household income level (Alpay et al., 2015). In addition to these results, Alpay et al., (2015), Ceyhan (2008), Grable (2000) and Kahyaoğlu's (2011) studies concluded that there is no relationship between marital status and financial risk tolerance. In the scope of age variable, researches generally indicate that the risk tolerance decreases as one's age increases (Anbar and Eker, 2009; Jianakoplos and Bernasek, 2006). Relationship between income level and financial risk tolerance is more explicit than other determinants. When we analyze the studies in the literature, it can be seen that increasing level of income promotes individuals to invest in riskier investment tools (Brown and Taylor, 2002; Finke and Huston, 2003; Venter, 2006; Watson and McNaughton, 2007).

Financial literacy is, also, one of the determinants of financial risk tolerance (Aren and Zengin, 2016; Muzindutsi and Ramudzuli, 2015) and many studies show that financial literacy positively related with financial behavior (Mandell and Klein, 2009). Having sufficient information about financial instruments and developments may help to investors to be able to make right investment decisions (Awais et al., 2016). In the subject of mood and financial decisions relationship, although it has been accepted that mood affects general decision making and consumer behaviors (Lerner, Han, and Keltner, 2007; Lerner, Small, and Loewenstein, 2004),

there is an on-going discussion between economists about whether the person's mood affect financial decisions (Ackert et al., 2003; Olson, 2006).

In this study, we aimed to examine whether financial literacy, mood and socio-demographic characteristics of individuals have an effect on their financial risk tolerance levels. Besides, this study is anticipated to add value to the existing literature in a suggestive way. The contribution of our research is that understanding the environmental and the biopsychosocial factors' relationship with the financial risk tolerance of investors will be helpful for the individual investors and financial advisors to make and suggest healthy investment decisions. In addition, in the next sections of the study; literature regarding financial risk tolerance and its determinants will be mentioned initially, data and methodology part will be explained in third part and then analysis and result will take place in forth section. Finally, our research's conclusion is going to be clarified in the last part of the study.

2. LITERATURE REVIEW

In the global financial environment, understanding the financial risk tolerance of investors is significant to be able to manage their investment wisely and therefore, as previously mentioned, financial risk tolerance and determinants of financial risk tolerance have been examined in a large number of studies still today (Moreschi, 2005). The most frequent tested variables to determine their relationship with financial risk tolerance are gender, age, marital status, number of dependents, income, wealth, education, and financial literacy (Faff et al., 2009; Gibson et al., 2013; Grable and Lytton, 1999).

Although there have been numerous studies in the field of financial risk tolerance and its determinants, different researches are not concluded with the same results, hence there is a lack of consensus on this issue (Mishra and Mishra, 2016). Some studies related to determinants of financial risk tolerance are as follows:

To understand better the determinants of financial risk tolerance, Irwin (1993) suggested the biopsychosocial and environmental factors which can have an influence on risk tolerance. Biopsychosocial factors over which the person has little or no control, for instance age, gender, personality traits and ethnicity and also environmental factors which are the factors such as socioeconomic status and family status were tested in Grable and Joo's (2004) study, based on Irwin's risk taking behavioral model. According to their study's results, education level, marital status, financial knowledge and household income that are parts of environmental factors and self-esteem that is one of the biopsychosocial factors are prominent characteristics which determine financial risk tolerance of the person. The relationship between biopsychosocial factors and financial risk tolerance was less discovered area as compared to demographic factors (Kannadhasan et al., 2016), so because of this reason, this study has an important place in the literature.

In another study which investigated effects of demographic characteristics of individual investors on financial risk tolerance, it was found that both marital status and education level were associated with financial risk tolerance and gender variable was independent from it. Moreover, while there was a low positive correlation between age and financial risk tolerance, correlation between annual income and financial risk tolerance of individual investors was observed significantly positive (Sulaiman, 2012). Wong (2011), compared three countries that comprise Australia United Kingdom and the United States in terms of financial risk tolerances and demographic factors. The study indicates that as education and income level increase, financial risk tolerance increases, as well. In contrast, risk tolerance diminishes with the age, being female and being married. Besides these, as a result of the comparison, countries whose citizens'risk tolerance levels from the highest to the lowest are Australia, the United States and finally the United Kingdom. Sung and Hanna (1997) also, found that female-headed families are less risk tolerant than male-headed families or married ones. In addition, they concluded that gender, marital status, education level and being in different ethnic group can differentiate people in risk perception.

In the context of Sweden, Irandoust (2017) presumed to shed light on financial risk tolerance determinants of Swedish people. The research's conclusion indicates that marital status, family size, age, income, gender, financial literacy, financial stability, portfolio structure and education variables have an effect on risk seeking behavior of the person. Apart from marital status, age and dependents, other demographic determinants are positively associated with the financial risk tolerance according to this study. Nguyen et al. (2017) also examined the relationship between some demographic variables and risk tolerance of investors. While gender and income variables are associated with risk tolerance positively; age, marital status and education variables did not have the relationship with risk tolerance. According to Chavali and Mohanraj (2016), there is a gap between individual's perceived return and actual return, and this gap leads to failure in obtaining higher returns. The study says that financial risk tolerance of individuals has an impact on their decision-making process. Especially gender variable and then occupation variable have influence on risk tolerance and perception of individuals.

Thanki (2015) investigated that whether the risk tolerance depends on demographics or personality type of investors. It was concluded that both of them affect the risk tolerance. To be more precise, in demographics context, males are more risk tolerant

than females and also unmarried investors undertake more risk than married ones. Moreover, while education has no effect on risk tolerance, income level of investor is positively related to risk tolerance. Meanwhile, it was also seen that risk tolerance has positive relationship with income to a certain level, however, risk tolerance is on the decline above that level of income. Jianakoplos and Bernasek (2006) measured the risk by observing portfolio allocations of investors and by taking their responses about their risk perceptions. According to results, risk taking decreasing with age and also households take less risk when their financial security decreases. Tanyolac and Karan (2015) analyzed the data of Income and Living Conditions Survey of Turkish Statistical Institute (TURKSTAT) between the years 2009 and 2012. As a result of the study, investors' risk tolerances and investment decisions were influenced by demographic characteristics such as age, education level, marital status and socio-economic characteristics such as income level etc.

Another study which was implemented by multinomial probit model to examine the relationship between demographic factors and investors risk perceptions, indicates that gender and marital status have an influence on risk preferences and investment decisions (Cihangir et al., 2016). Ryack (2011), also found a relationship between gender and financial risk tolerance. According to the study, husbands are more risk tolerant than wives and in addition to this, students who have a financial education in their courses are more risk tolerant than others. Gibson et al. (2013) found that there is a positive relationship between financial risk tolerance and income level, financial investment knowledge and positive stock market expectations. Furthermore, financial risk tolerance was found lower for women and olders in this research. Moreover, in Moreschi's (2005) paper, risk tolerance scores which are based on survey results and investors' self-assessed risk tolerance scores were compared. Gender and education factors were found the most important factors for investors to forecast their own risk tolerances. This study is beneficial for financial advisors to manage their relationship with clients better. The study which were performed by Kübilay and Bayrakdaroglu (2016) tested financial risk tolerances of investors by a questionnaire. The research's conclusion indicates that investors, participated to the study, mostly are inclined to representativeness heuristic. In addition to this, while investors who largely have psychological biases were agreeable people, less frequently have psychological biases were neurotic people.

According to the Grable and Roszkowski's (2008) study results; young people, males, respondents with higher income and net worth have more risk tolerance when we compared to the others. In addition to this, the results indicated that having financial education and knowledge is related with financial risk tolerance positively. Agarwal et al. (2015) study was also concluded that high level of financial literacy is related with the better financial planning. Chaffai and Medhioub (2014) tried to clarify how psychological and emotional factors can affect stock market in Tunisia by questionnaire method. They concluded that loss aversion bias, representativeness, availability and anchoring biases are the most effective biases in Tunisian stock market and also that investors, who have high level of education (bachelor or more), are more prone to have behavioral biases. Jureviciene and Jermakova's (2012) study, also showed that Lithuanian residents overtake medium risk, and prefer safer financial investment instruments. Furthermore, they are prone to follow their friends on investment issues because of the lack of financial literacy.

Bashir et al. (2013) analyzed the effects of demographic characteristics and personality traits on financial behavioral biases and risk taking behavior. Their study's result indicated that these personality traits are significantly related with overconfidence and herd behavior and risk-taking behavior apart from disposition effect. Hallahan et al., (2004) examined the demographics and financial risk tolerances scores of participants. Gender, age, number of dependents, marital status, income and wealth were determined to be related with risk tolerance scores significantly. Calcagno and Monticone (2015) reached the conclusion that investors who have low level of financial literacy do not invest in risky assets and also they are not prone to take advices from financial consultants.

Dohmen et al. (2011) in their research, reached the conclusion that generally gender, age, and parental structure have impact on risk taking behavior. Mandal and Roe's (2014) study concluded that older individuals are less risk tolerant than young people. Also, contrary to previous studies they found that when their cognitive skills were measured, people who have lowest and highest skills display the greatest risk tolerance. De Paola (2013) asked Italian students about their risk taking willingness. According to results, women are more risk averse than men and patient ones are more risk averse while students who have higher level of competency are less risk averse. In addition to these results, students whose fathers are entrepreneurs are more prone to take risk while students whose fathers work in public sector are more risk averse. Halek and Eisenhauer (2001) investigated the demographics and risk averse relationship. At the end of the research, they concluded that in line with the existing literature, women are more risk averse than men. Also, education increases investors' risk aversion. Other variables for instance age, gender, and wealth have an effect on one's risk aversion degree. Another study in which the age and financial risk tolerance relationship was examined, has revealed that when people get older, their risk tolerance decreases. Moreover, socioeconomic environments, perceptions, demographic and economic characteristics have an impact on financial risk tolerance of investors (Yao, Sharpe, and Wang, 2011)

Johnson and Tversky (1983) examined the investors' mood and their risk perception. They found that investors' mood affects their risky decisions even if they are not aware of that Grable and Roszkowski's (2008) research, which is about the relationship between being in positive mood and financial risk tolerance, reveals that these are positively associated with each other while Delis et al. (2015) found that happier investors are less likely to invest in risky financial investment and insurance purchases. Nguyen and Noussair (2014), also concluded that positive emotional state is positively correlated with greater risk taking. Moreover, in the study of Finucane et al. (2000), it was concluded that people who are in a good mood are prone to underestimate risks. Au et al. (2003) investigated the effects of mood on the investors' and decision makers'behavior in financial markets. They implemented two experiments and at the end of the experiment, contrary to some other studies, their study's result revealed that investors who are in a good mood gave less accurate decisions than others who are in a neutral or bad mood.

Treffers et al. (2012) examined moods as a reason for temporary risk preferences of investors. When there was no possibility to jeopardize financial incentives, sad mood caused risk aversion behavior. In addition, when the financial risks are high, mood has not important effect on risk preferences. Drichoutis and Nayga (2013) found that both negative and positive mood induce increase in risk aversion but negative mood has larger effect on increase. Moreover, some of the researchers investigated the mood which is associated with the weather and the risk attitude in the capital markets. Kliger and Levy (2003) tested if capital market investors' mood has an effect on their attitudes toward risk. According to their study's result, there is a negative correlation between mood and risk aversion. Namely, the better is the investors' mood, the more risk averse they are.

3. DATA AND METHODOLOGY

In this study, the determinants of financial risk tolerance is divided into three main sub-groups as financial literacy, mood and socio-demographic characteristics of individuals and it is tried to determine whether these categorical or continuous explanatory variables have an effect on individual's financial risk tolerance.

3.1. Data

A questionnaire was drawn up, based on the survey of risk tolerance (Grable and Lytton, 1999), financial literacy (Van Rooij et al., 2011), mood (Watson et al., 1988) and socio-demographic characteristics of individuals. Data were obtained via an internet survey. Of the study population, 588 respondents completed and returned the questionnaire.

Figure 1: The Determinants of Individual's Financial Risk Tolerance

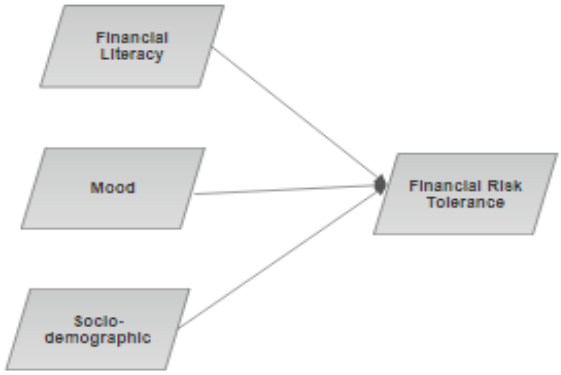


Table 1 shows the descriptive statistics of the variables. Risk tolerance survey determined participants' risk tolerance scores. Based on the results, participants are ranked with the likert-type scale range between conservative and aggressive risk tolerances suggested by (Grable and Lytton, 1999).

Table 1: Summary Statistics

Variable	Observations	Mean	Standart Deviation	Minimum	Maximum
Risk Tolerance	588	25.9795	4.7549	15	47
Gender (Female=0, Male=1)	588	0.9098	0.2866	0	1
Having Children (No=0, Yes=1)	588	0.8044	0.3969	0	1
Age	588	29.3707	6.9214	18	67
Lnincome	588	8.5	0.7974	5.991	11.002
Financial Literacy	588	5.5408	2.7514	0	11
Mood (Positive)	588	30.1513	7.3102	10	50

Participants' mood states were measured by the PANAS questionnaire (Watson et al., 1988) and the positive emotion order according to their responses was formed under four groups. Gender and child ownership are dummy variables. Also note that both Age (A) and Lnincome (I) are continuous variables.

Table 2: Descriptive Statistics

Variables	Frequency	Percent
Dependent Variable: Risk Tolerance		
Low	31	5.27
Below	118	20.07
Average	257	43.71
Above	133	22.62
High (Aggressive investor)	49	8.33
Independent Variables: Socio-Demographic		
Gender		
Male	535	90.99
Female	53	9.01
Child		
Having children (HC)	115	19.56
No children (NC)	473	80.44
Financial Literacy Level		
0 (the lowest)	28	4.76
1	33	5.61
2	39	6.63
3	40	6.80
4	58	9.86
5	72	12.24
6	68	11.56
7	100	17.01
8	68	11.56
9	48	8.16
10	23	3.91
11 (the highest)	11	1.87
Mood (Positive)		

Very slightly or not	62	10.54
A little	241	40.99
Quite a bit	235	39.97
Extremely	50	8.50

Table 2 shows that the vast majority of respondents are male (90.99%). But, ordered logistic regression models do not have to meet basic assumptions such as linearity, normality, homoscedasticity, and measurement level as in linear regression models based on the ordinary least squares algorithm. In Ordinal Logistic Model (OLM), a linear relationship between the dependent and independent variables is not required. Non-linear log transformation to the predicted odds ratio in logistic regression models makes it possible to perform all kinds of relationships. In ordered logistic regression, independent variables do not need to be multivariate normal distribution and can be used without the need for important assumptions such as the variance covariance being homogeneous (Chen and Hughes, 2004).

3.2. Methodology

In OLM, there is a natural ordering between levels, but it does not point to the differences in the strengths of these ordinal categories of dependent variable levels. Surveys that measure behavioral psychology often take the form of a likert-type scale that covers the range from least important to most important.

OLM is a kind of multiple logistic regression model that handles ordinal dependent variable. OLM analysis is preferred to other methods used to examine the relationship between variables when the dependent variable is ordinal with more than two levels. (Grilli and Rampichini, 2014).

This analysis is based on the assumption that there is an unobservable and continuous variable behind the observable, ordinal, intermittent dependent variable (so-called latent variable). The latent variable (Y^*) is explained by independent variables. The representation of Y^* is as follows;

$$Y^* = \sum_{k=1}^{K} \hat{b}_k X_k + \varepsilon \quad (1)$$

As in the two-level dependent variable models, Y^* can not observed and is considered as the undercurrentof unobserved phenomenon. The error term (ε) is assumed to have a mean of 0 and a symmetric distribution. As the dependent variable has J levels of ordinal categories, the relationship between the observed levels and lines could be given as follows:

$$Y_i = 1, Y^* \leq \mu_1 (= 0) \quad (2)$$

$Y_i = 2, \mu_1 < Y^* \leq \mu_2$
$Y_i = 3, \mu_2 < Y^* \leq \mu_3$; i=1,2,…,N
$Y_i = J, \mu_{J-1} < Y^*$

μ indicates the threshold values that distinguish the categories of the dependent variable from each other.

$$p(y = j) = F\left[\mu_j - \sum_{k=1}^{K} \hat{b}_k x_k\right] - F\left[\mu_{j-1} - \sum_{k=1}^{K} \hat{b}_k x_k\right] \quad (3)$$

Eq. (3) gives probability equations of dependent variable which has J pieces of categories. Probability equations and probabilistic expression of the logistic regression model where the dependent variable is categorized by J is given in Eq. (4).

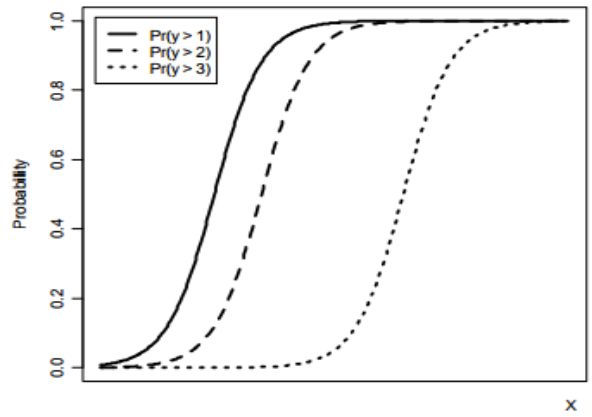
$$log\left[\frac{P(y \leq j \backslash x)}{1 - P(y \leq j \backslash x)}\right] = \mu_j - \sum_{k=1}^{K} \hat{b}_k x_k; \text{ j=1,2,…,J-1} \quad (4)$$

$$P(y \leq j) = P\left(y^* \leq \mu_j\right) = \frac{e^{\mu_j - \sum_{k=1}^{K} \hat{b}_k x_k}}{1 + e^{\mu_j - \sum_{k=1}^{K} \hat{b}_k x_k}}$$

Parallel Lines Assumption- Parallel lines assumption is the basic assumption of ordinal logit models. Accordingly, for a dependent variable that affects the likelihood that an individual will be in ordered categories, the coefficients$(\hat{b}_k)$ connecting variable values to different categories must be the same across all categories.

The graphical representation of the parallel lines assumption is as follows:

Figure 2: Parallel Lines Assumption (For Four Categories Dependent Variable and a Single Independent Variable)



Source: Fox (2005)

Figure 2 explains that with the increase in the independent variable X_k, all three probabilities gradually approach 1, as the lines of all three curves are the same, probability fields vary because the threshold parameters for all three probabilities differ.

4. ANALYSIS AND RESULTS

Model- According to the OLM results, the equation is found as follows;

$$\sum_{k=1}^{8} \hat{b}_k x_{ik} = (-0.0403A + 0.1709I + 0.0357FL + 0.0413M + 0.2869HC - 1.118VS - 1.037AL - 0.5922QB) \quad (5)$$

And the probability estimations of an individual's (i)considering the risk tolerance level are found by Eq. (7-11) (i = 1, 2, ..., 588), (k = 1, 2, ...,8):

$$P(Y_i = "low") = \frac{exp(-\sum_{k=1}^{8} \hat{b}_k x_k)}{1+exp(-\sum_{k=1}^{8} \hat{b}_k x_k)} \quad (6)$$

$$P(Y_i = "below") = \left\{\frac{exp(1.8484 \sum_{k=1}^{8} \hat{b}_k x_k)}{1+exp(1.8484 \sum_{k=1}^{8} \hat{b}_k x_k)}\right\} - \left\{\frac{exp(\sum_{k=1}^{8} \hat{b}_k x_k)}{1+exp(\sum_{k=1}^{8} \hat{b}_k x_k)}\right\} \quad (7)$$

$$P(Y_i = "average") = \left\{\frac{exp(3.799 \sum_{k=1}^{8} \hat{b}_k x_k)}{1+exp(3.799 \sum_{k=1}^{8} \hat{b}_k x_k)}\right\} - \left\{\frac{exp(1.8484 \sum_{k=1}^{8} \hat{b}_k x_k)}{1+exp(1.8484 \sum_{k=1}^{8} \hat{b}_k x_k)}\right\} \quad (8)$$

$$P(Y_i = "above) = \left\{\frac{exp(5.4348 \sum_{k=1}^{8} \hat{b}_k x_k)}{1+exp(5.4348 \sum_{k=1}^{8} \hat{b}_k x_k)}\right\} - \left\{\frac{exp(3.799 \sum_{k=1}^{8} \hat{b}_k x_k)}{1+exp(3.799 \sum_{k=1}^{8} \hat{b}_k x_k)}\right\} \quad (9)$$

$$P(Y_i = "high") = 1 - \left\{\frac{exp(5.4348 - \sum_{k=1}^{8} \hat{b}_k x_k)}{1+exp(5.4348 - \sum_{k=1}^{8} \hat{b}_k x_k)}\right\} \quad (10)$$

Considering the Eq. (5), the probability of the individual's risk tolerance level i. can be estimated respectively by the following equations as "low", "below", "average", "above" or "high" given below:

$$P(Y_i \leq "low"; j = 1) = P(y^* \leq \mu_1 = 0) \quad (11)$$

$$= \frac{exp(-\sum_{k=1}^{8} \hat{b}_k x_k)}{1 + exp(-\sum_{k=1}^{8} \hat{b}_k x_k)}$$

$$P(Y_i \leq "below"; j = 1) = P(y^* \leq \mu_1 = 1.8712) \quad (12)$$

$$= \left\{ \frac{exp\left(1.8484 - \sum_{k=1}^{8} \hat{b}_k x_k\right)}{1 + exp\left(1.8484 - \sum_{k=1}^{8} \hat{b}_k x_k\right)} \right\}$$

$$P(Y_i \leq \text{"}average\text{"}; j = 1) = P(y^* \leq \mu_1 = 3.8253) \quad (13)$$

$$= \left\{ \frac{exp\left(3.799 - \sum_{k=1}^{8} \hat{b}_k x_k\right)}{1 + exp\left(3.799 - \sum_{k=1}^{8} \hat{b}_k x_k\right)} \right\}$$

$$P(Y_i \leq \text{"}above\text{"}; j = 1) = P(y^* \leq \mu_1 = 5.4408) \quad (14)$$

$$= \left\{ \frac{exp\left(5.4348 - \sum_{k=1}^{8} \hat{b}_k x_k\right)}{1 + exp\left(5.4348 - \sum_{k=1}^{8} \hat{b}_k x_k\right)} \right\}$$

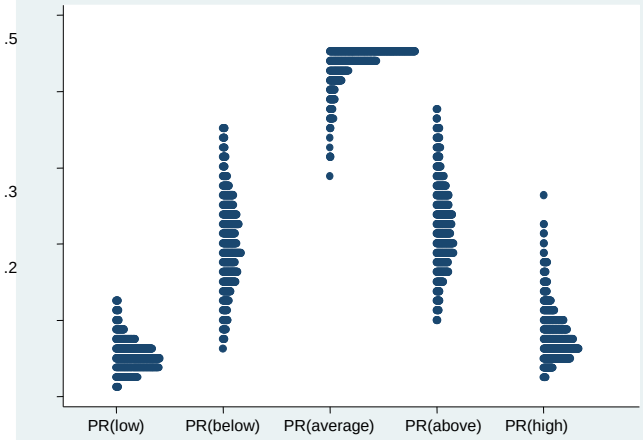
Table 3: Ordered Logit Model Estimation Results

Dependent Variable: RiskTolerance					
1:Low, 2:Below,3:Average, 4:Above, 5:High	$\hat{b}$	**Std. Error**	z	$P > \|z\|$	$\exp(\hat{\hat{b}})$
Age (A)	-0.040396	0.0145819	-2.77	**0.006***	0.960409
Lnincome (I)	0.1709317	0.1057103	1.62	0.106	1.18641
Financial Literacy Level (FL)	0.0357621	0.0293801	1.22	0.224	1.036409
Gender					
Male (M)	0.4139041	0.2701506	1.53	0.125	1.512712
Child					
Have child(dren) (HC)	0.2869704	0.2288712	-1.25	0.210	1.332385
Mood (Positive Affect)					
Very slightly or not (VS)	-1.118018	0.3602724	-3.10	**0.002***	0.3269272
A Little (AL)	-1.037035	0.3005189	-3.45	**0.001***	0.3545044
Quite a bit (QB)	-0.5922348	0.2992466	-1.98	**0.048***	0.5530899
Threshold parameters					
$\mu_1 = 0$					
$\mu_2 = 1.848417$		0.1721977		**0.000***	
$\mu_3 = 3.799028$		0.1961945		**0.000***	
$\mu_4 = 5.434859$		0.2344171		**0.000***	
Likelihood ratio test for parallel lines assumption					
chi2(23) = 85.33 (Prob>chi2 = **0.0000***)					
Determining the validity of model					
Log likelihood =-798.45039 LR chi2(8) = 28.88					
Prob>chi2 = **0.0003***Pseudo R2 = 0.0178					

*: Coefficients are statistically significant at the p = 0.05 level; Base categories: Female (FM), No child (NC), Extremely (EX),

Probability estimations of dependent variable- Probability estimations of five different financial risk tolerance levels were performed for each individual by means of Eq. (7-11). Figure 3 provides the graphical representation of the results. As shown in Figure 3, the predicted probabilities for the "high" and "low" tend to be less than 0.20, with the majority of predictions for the "average" category falling between 0.40 and 0.50. On the other hand, "below" and "above" categories tend to be between 0.10 and 0.40.

Figure 3: The Estimated Probabilities of Financial Risk Tolerance



Significance test of threshold parameters- There are three threshold parameters to estimate for a five level dependent variable. As seen in the Table 3, the predicted parameters $\mu_2 = 1.848417$, $\mu_3 = 3.799028$, $\mu_4 = 5.434859$are significant at the 0.05 significance level.

Test of the parallel lines assumption and model validity- In this study, Likelihood Ratio test was used to test the validity of parallel lines assumption. As can be seen from the Table 3, χ^2 value 85.33 in the degrees of freedom of 23 and p=0.0000 which was obtained for H_0indicates that the validity of the model assumption holds and this condition shows that OLM is a convenient approach for the modelling (Arı, 2014).

Null hypothesis for the estimated LR statistics is as follows:

H_0: All of the regression coefficients are equal to zero and the estimated model is invalid.

The likelihood ratio χ^2 of 798.45039 with a p-value of 0.0003 indicates that the model as a whole is statistically significant at a significance level of 0.05, as compared to the null hypothesis with no predictors.

Interpretation of Coefficients and Odds Ratios- Along with the increase in the variables with statistically significant and positive coefficients, the financial risk tolerance of individuals decreases. On the other hand, with the decrease in the variables with statistically significant and negative coefficients, there is an increase in the financial risk tolerances of the individuals.

The results of the OLR analysis are shown in Table 3. From this table, we can see that there is not a statistically significant relationship between independent variables i.) financial literacy level (t = 1.22, p = 0.224), ii.) gender (t = 1.53, p = 0.125), iii.) having children (t = -1.25, p = 0.210) and iv.) income(log) (t = 1.62, p = 0.106) and dependent variable financial risk tolerance. On the other hand, OLR revealed that both age (A) and mood are statistically significant. From this results, we can see that $\hat{b}_A = -0.040396$ which indicates that for a one year increase in age, individual's ordered log-odds of being in a higher financial risk tolerance category would decrease by -0.04while the other variables in the model are held constant. The odds ratio for age was found as $exp(\hat{b}_A) = 0.9604$.Since this value is not greater than 1, the reciprocal of this value is taken to make the interpretation more clear and the value 1.041 is obtained. However, it should be noted that the "basic" and "indicator" categories are also interchanged in interpretations. Thus, for a one-year increase in age, the odds of "low financial risk tolerance" versus the combined "below, average, above and high financial risk tolerance" categories are 1.041 times greater, given the other variables are held constant in the model.

Moreover, when the levels of happiness mood are compared among themselves, those who are in the "very slightly" category are 1.07 times more likely have less financial risk tolerance than those who are in the "a little" category, and 1.88 times less financial risk tolerance than those in the "quite a bit" category. This suggests that as the happiness level increases, the likelihood of having a higher financial risk tolerance level also increases.

The odds ratios for VS, AL and QS were found respectively as 0.326, 0.354 and 0.553. When the reciprocal of these values is taken, respectively 3.067, 2.824 and 1.808 are obtained. Accordingly, being in an "extremely" positive mood indicates that the odds is approximately 1.808 times greater than that of individuals being in a "quite a bit" positive mood; 2.824 times greater than that of individuals being in a "a little" positive mood; and 3.067 times greater than that of individuals being in a very slightly or not" positive mood when having a "high" financial risk tolerance compared with "above" or a lesser financial risk tolerance level of individuals. This suggests that as the happiness mood level increases, the likelihood of having a higher financial risk tolerance level of individuals also increases.

5. CONCLUSIONS

The level of financial risk tolerance of individuals has an effect on financial decision making process. The present study was designed to determine the effect of socio-demographic factors, mood and financial literacy on individual's financial risk tolerance. Factors affecting the financial risk tolerance in the study are based on three criteria: individuals' socio demographic characteristics, financial literacy level and emotional state (i.e. positive mood).

Prior studies that have noted the importance of biopsychosocial and environmental factors effect on financial risk tolerance. According to the results of the academic studies on the determinants of financial risk tolerance, there is a positive and strong relationship between both financial knowledge and positive mood and financial risk tolerance, while there is a moderate and negative relationship between both age and income and financial risk tolerance. In addition, studies show that males have higher financial risk tolerance than females (Grable, 2016). Contrary to expectations, this study shows that there is no statistically significant relationship between independent variables gender, income level, having children, financial literacy level and the dependent variable financial risk tolerance level of individuals.

However, these findings are limited by the use of an ordinal dependent variable. Accordingly, it can be said that one of the aims of the OLM analysis is classification and investigating the relationship between variables (Mertler and Reinhart, 2016). These results therefore need to be interpreted with caution.

According to the results of the study, age and positive mood are statistically significant parameters that determine the risk tolerance behavior of individuals. This finding is in agreement with Grable and Roszkowski's (2008) findings which show that individual's happiness levels is positively associated with having a higher level of financial risk tolerance.

REFERENCES

Ackert, L. F., Church, B. K., & Deaves, R. (2003). Emotion and Financial Markets. *Economic Review - Federal Reserve Bank of Atlanta*, *88*(2), 33–41. http://doi.org/10.1017/CBO9781107415324.004

Agarwal, S., Amromin, G., Ben-David, I., Chomsisengphet, S., & Evanoff, D. D. (2015). Financial literacy and financial planning: Evidence from India. *Journal of Housing Economics*, *27*, 4–21. http://doi.org/10.1016/j.jhe.2015.02.003

Alpay, E. E., Yavuz, M., & Kahyaoğlu, M. B. (2015). Gelir Durumunun Risk Algısına Etki Eden Diğer Sosyo-Ekonomikve Demografik Faktörler Üzerindeki Etkisi. *Cumhuriyet Üniversitesi İktisadi ve İdari Bilimler Dergisi*, *16*(1), 205–226.

Anbar, A., & Eker, M. (2009). Bireysel yatırımcıların finansal risk algılamalarını etkileyen demografik ve sosyoekonomik faktörler. *ZKU Journal of Social Sciences*, *5*(9), 129–150.

Aren, S., & Zengin, A. N. (2016). Influence of Financial Literacy and Risk Perception on Choice of Investment. *Procedia - Social and Behavioral Sciences*, *235*(February), 656–663. http://doi.org/10.1016/j.sbspro.2016.11.047

Arı, E.& Yıldız, Z. (2014). Parallel Lines Assumption in Ordinal Logistic Regression and Analysis Approaches, International Interdisciplinary Journal of Scientific Research, Vol. 1, No. 3 pp. 8-23.

Au, K., Chan, F., Wang, D., & Vertinsky, I. (2003). Mood in foreign exchange trading: Cognitive processes and performance. *Organizational Behavior and Human Decision Processes*, *91*(2), 322–338. http://doi.org/10.1016/S0749-5978(02)00510-1

Awais, M., Laber, M. F., Rasheed, N., & Khursheed, A. (2016). Impact of Financial Literacy and Investment Experience on Risk Tolerance and Investment Decisions: Empirical Evidence from Pakistan. *International Journal of Economics and Financial Issues*, *6*(1), 73–79.

Bashir, T., Azam, S. N., Butt, S. A. A., Javed, S. A., & Tanvir, S. A. (2013). Are Behavioral Biases Influenced By Demographic Characteristics & Personality Traits? Evidence From Pakistan. *European Scientific Journal*, *9*(29), 277–293.

Brown, S., & Taylor, K. (2002). Wage Growth , Human Capital and Risk Preference : Evidence from the British Household Panel Survey. Retrieved April 9, 2018, from https://www.le.ac.uk/economics/research/RePEc/lec/leecon/econ02-14.pdf?uol_r=d307e306

Calcagno, R., & Monticone, C. (2015). Financial literacy and the demand for financial advice. *Journal of Banking & Finance*, *50*, 363–380. http://doi.org/10.1016/j.jbankfin.2014.03.013

Ceyhan, G. (2008). *Yaşam Biçimlerinin Finansal Risk Toleransına Olan Etkileri Üzerine Bir Uygulama (Basılmamış Yüksek Lisans Tezi)*. Hacettepe Üniversitesi Sosyal Bilimler Enstitüsü, Ankara.

Chaffai, M., & Medhioub, I. (2014). Behavioral finance: An empirical study of the Tunisian stock market. *International Journal of Economics and Financial Issues*, *4*(3), 527–538.

Chavali, K., & Mohanraj, M. P. (2016). International Journal of Economics and Financial Issues Impact of Demographic Variables and Risk Tolerance on Investment Decisions: An Empirical Analysis. *International Journal of Economics and Financial Issues*, *6*(1), 169–175.

Chen, C. K.&Hughes, J. (2004). Using Ordinal Regression Model to Analyze Student Satisfaction Questionnaires, Association for Institutional Research, Vol. 1, 2004, 1-13.

Cihangir, M., Şak, N., & Bilgin, Ş. (2016). Bireysel Yatırımcı Demografileri: Osmaniye İlinde Risk Getiri Tercihlerinin Multinominal Probit Modeliyle İncelenmesi. *Muhasebe ve Finansman Dergisi*, (70), 129–142. http://doi.org/10.25095/mufad.396684

Dalton, M. A., & Dalton, J. F. (2004). *Personal Financial Planning: Theory and Practice*. Kaplan Financial.

De Paola, M. (2013). The Determinants of Risk Aversion: The Role of Intergenerational Transmission. *German Economic Review*, *14*(2), 214–234. http://doi.org/10.1111/j.1468-0475.2011.00561.x

Delis, M. D., Kammas, P., & Mylonidis, N. (2015). *Trust , Happiness , and Households' Financial Decisions*.

Dohmen, T., Falk, A., Huffman, D., Sunde, U., Schupp, J., & Wagner, G. G. (2011). Individual Risk Attitudes: Measurement, Determinants, and Behavioral Consequences. *Journal of the European Economic Association*, *9*(3), 522–550. http://doi.org/10.1111/j.1542-4774.2011.01015.x

Drichoutis, A. C., & Nayga, R. M. (2013). Eliciting risk and time preferences under induced mood states. *Journal of Socio-Economics*, *45*, 18–27. http://doi.org/10.1016/j.socec.2013.04.008

Droms, W. G. (1987). Investment Asset Allocation for PFP Clients. *Journal of Accountancy*, *163*(4), 114–118.

Embrey, L., & Fox, J. (1997). Gender differences in the investment decision-making process. *Journal of Financial Counseling and Planning*, *8*(2), 33–40.

Faff, R., Hallahan, T., & McKenzie, M. (2009). Nonlinear linkages between financial risk tolerance and demographic characteristics. *Applied Economics Letters*, *16*(13), 1329–1332. http://doi.org/10.1080/13504850701381123

Finke, M. S., & Huston, S. J. (2003). The Brighter Side of Financial Risk: Financial Risk Tolerance and Wealth. *Journal of Family and Economic Issues*, *24*(3), 233–256. http://doi.org/10.1023/A:1025443204681

Finucane, M. L., Alhakami, A., Slovic, P., & Johnson, S. M. (2000). The affect heuristic in judgments of risks and benefits. *Journal of Behavioral Decision Making*, *13*(1), 1–17. http://doi.org/10.1002/(SICI)1099-0771(200001/03)13:1<1::AID-BDM333>3.0.CO;2-S

Fisher, P. J., & Yao, R. (2017). Gender differences in financial risk tolerance. *Journal of Economic Psychology*, *61*, 191–202. http://doi.org/10.1016/j.joep.2017.03.006

Fox, J. (2005). Logistic regression. Maximum-Likelihood Estimation and Generalized Models, York Summer Programme in Data Analysis.

Gibson, R., Michayluk, D., & Van de Venter, G. (2013). Financial risk tolerance: An analysis of unexplored factors. *Financial Services Review*, *22*(1), 23–50.

Grable, J. E. (2000). Financial risk tolerance and additional factors that affect risk taking in everyday money matters. *Journal of Business and Psychology*, *14*(4), 625–630. http://doi.org/10.1023/A:1022994314982

Grable, J. E., & Lytton, R. H. (1998). Investor Risk Tolerance: Testing the Efficacy of Demographics as Differentiating and Classifying Factors. *Financial Counseling and Planning*, *9*(1), 61–73.

Grable, J. E., & Roszkowski, M. J. (2008). The influence of mood on the willingness to take financial risks. *Journal of Risk Research*, *11*(7), 905–923. http://doi.org/10.1080/13669870802090390

Grable, J., & Joo, S. (2004). Environmental and biopsychosocial factors associated with financial risk tolerance. *Journal of Financial Counseling and Planning*, *15*(1), 73–82.

Grable, J., & Lytton, R. (1999). Financial risk tolerance revisited: the development of a risk assessment instrument. Financial services review, 8(3), 163-181.

Grable J.E. (2016) Financial Risk Tolerance. In: Xiao J. (eds) Handbook of Consumer Finance Research. Springer, Cham. https://doi.org/10.1007/978-3-319-28887-1_2

Grilli, L., & Rampichini, C. (2014). Ordered logit model. In Encyclopedia of Quality of Life and Well-Being Research (pp. 4510-4513). Springer Netherlands.

Halek, M., & Eisenhauer, J. G. (2001). Demography of Risk Aversion. *The Journal of Risk and Insurance*, *68*(1), 1. http://doi.org/10.2307/2678130

Hallahan, T. A., Faff, R. W., & McKenzie, M. D. (2004). An empirical investigation of personal financial risk tolerance. *Financial Services Review*-

Greenwich-, *13*(1), 57–78.

Hallahan, T., Faff, R., & McKenzie, M. (2003). An exploratory investigation of the relation between risk tolerance scores and demographic characteristics. *Journal of Multinational Financial Management*, *13*(4–5), 483–502. http://doi.org/10.1016/S1042-444X(03)00022-7

Irandoust, M. (2017). Factors Associated With Financial Risk Tolerance Based on Proportional Odds Model: Evidence From Sweden. *Journal of Financial Counseling and Planning*, *28*(1), 155–164. http://doi.org/10.1891/1052-3073.28.1.155

Irwin, C. E. (1993). Adolescence and risk taking: How are they related? In N. J. Bell & R. W. Bell (Eds.), *Adolescent Risk Taking* (pp. 7–28). Newbury Park, CA: Sage.

Jianakoplos, N. A., & Bernasek, A. (2006). Financial Risk Taking by Age and Birth Cohort. *Southern Economic Journal*, *72*(4), 981. http://doi.org/10.2307/20111864

Johnson, E. J., & Tversky, A. (1983). Affect, generalization, and the perception of risk. *Journal of Personality and Social Psychology*, *45*(1), 20–31. http://doi.org/10.1037/0022-3514.45.1.20

Jureviciene, D., & Jermakova, K. (2012). The Impact of Individuals' Financial Behaviour on Investment Decisions. In *Electronic International Interdisciplinary Conference* (pp. 242–250).

Kahyaoğlu, M. B. (2011). Yatırım Kararlarına Etki Eden Çeşitli Duygusal ve Psikolojik Faktörlere Maruz Kalma Düzeyi Üzerinde Cinsiyetin Rolü: İMKB Bireysel Hisse Senedi Yatırımcıları Üzerine Bir Uygulama. *Ekonomik ve Sosyal Araştırmalar Dergisi*, *7*(1), 29–51.

Kannadhasan, M., Aramvalarthan, S., Mitra, S. K., & Goyal, V. (2016). Relationship between Biopsychosocial Factors and Financial Risk Tolerance: An Empirical Study. *Vikalpa*, *41*(2), 117–131. http://doi.org/10.1177/0256090916642685

Kliger, D., & Levy, O. (2003). Mood-induced variation in risk preferences, *52*, 573–584. http://doi.org/10.1016/S0167-2681(03)00069-6

Korkmaz, T., & Ceylan, A. (2017). *Sermaye Piyasası ve Menkul Değer Analizi* (8. Baskı). Bursa: Ekin Kitabevi.

Kumar, M. D., Kambuaya, M., Jamil, F., & Muneer, S. (2015). Determinants of the Risk Tolerance of Individual Investors. *International Journal of Economics and Financial Issues*, *5*(Special Issue), 373–378.

Kübilay, B., & Bayrakdaroglu, A. (2016). An Empirical Research on Investor Biases in Financial Decision-Making, Financial Risk Tolerance and Financial Personality. *International Journal of Financial Research*, *7*(2), 171–182. http://doi.org/10.5430/ijfr.v7n2p171

Kübilay, B., & Bayrakdaroğlu, A. (2017). *Finansta Psikososyal Boyut: Yatırım Psikolojisi ve SosyolojikFaktörler Açısından Bir İnceleme* (1. Baskı). Ankara: Detay Yayıncılık.

Lerner, J. S., Han, S., & Keltner, D. (2007). Feelings and Consumer Decision Making: Extending the Appraisal-Tendency Framework. *Journal of Consumer Psychology*, *17*(3), 181–187. http://doi.org/10.1016/S1057-7408(07)70027-X

Lerner, J. S., Small, D. A., & Loewenstein, G. (2004). Heart Strings and Purse Strings. Carryover Effects of Emotions on Economic Decisions. *Psychological Science*, *15*(5), 337–341. http://doi.org/10.1111/j.0956-7976.2004.00679.x

Lin, H. (2012). How Herding Bias could be derived from Individual Investor Types and Risk Tolerance ? *International Journal of Social, Behavioral, Educational, Economic, Business and Industrial Engineering*, *6*(6), 1395–1400.

Mandal, B., & Roe, B. E. (2014). Risk tolerance among national longitudinal survey of youth participants: The effects of age and cognitive skills. *Economica*, *81*(323), 522–543. http://doi.org/10.1111/ecca.12088

Mandell, L., & Klein, L. S. (2009). The Impact of Financial Literacy Education on Subsequent Financial Behavior. *Journal of Financial Counseling and Planning*, *20*(206), 15–24. http://doi.org/10.1.1.334.3320

Mertler, C. A., & Reinhart, R. V. (2016). Advanced and multivariate statistical methods: Practical application and interpretation. Routledge.

Mishra, M., & Mishra, S. (2016). Financial Risk Tolerance among Indian Investors: A Multiple Discriminant Modeling of Determinants. *Strategic Change*, *25*(5), 485–500. http://doi.org/10.1002/jsc.2075

Moreschi, R. W. (2005). An Analysis Of The Ability Of Individuals To Predict Their Own Risk Tolerance. *Journal of Business & Economics Research*, *3*(2), 39–48.

Murgea, A. (2010). Classical and Behavioural Finance in Investor Decision. *Annals of University of Craiova - Economic Sciences Series*, *2*(38), 212–223.

Muzindutsi, P.-F., & Ramudzilu, P. M. (2016). Financial knowledge and subjective financial risk tolerance among students at a South African university. *Risk Governance and Control: Financial Markets & Institutions*, *5*(3), 2015.

Muzindutsi, P.-F., & Ramudzuli, P. M. (2015). Financial knowledge and subjective financial risk tolerance among students at a South African university. *Risk Governance and Control: Financial Markets & Institutions*, *5*(3), 180–185.

Nguyen, L., Gallery, G., & Newton, C. (2017). The joint influence of financial risk perception and risk tolerance on individual investment decision-making. *Accounting & Finance*. http://doi.org/10.1111/acfi.12295

Nguyen, Y., & Noussair, C. N. (2014). Risk Aversion and Emotions. *Pacific Economic Review*, *19*(3), 296–312. http://doi.org/10.1111/1468-0106.12067

Olson, K. R. (2006). A Literature Review of Social Mood. *The Journal of Behavioral Finance*, *7*(4), 193–203. http://doi.org/10.1207/s15427579jpfm0704

Paradi, J. C., Sherman, H. D., & Tam, F. K. (2018). Financial Services Beyond Banking: Risk Tolerance Measures for Portfolio Investors (pp. 313–325). http://doi.org/10.1007/978-3-319-69725-3_18

Pompian, M. M., & Longo, J. M. (2004). A New Paradigm for Practical Application of Behavioral Finance. *The Journal of Wealth Management*, *7*(2), 9–15. http://doi.org/10.3905/jwm.2004.434561

Pranhakaran, K., & Karthika, P. (2011). A Study on Risk Perception and Portfolio Management of Equity Investors in Coimbatore City. *Journal of Management and Science*, *1*(2), 1–13.

Roszkowski, M. J., & Grable, J. (2005). Gender Stereotypes in Advisors â€™ Clinical Judgments of Financial Risk Tolerance : Objects in the Mirror Are Closer than They Appear. *Journal of Behavioral Finance*, *6*(4), 181–191. http://doi.org/10.1207/s15427579jpfm0604

Ryack, K. (2011). The impact of family relationships and financial education on financial risk tolerance. *Financial Services Review*, *20*(3), 181–193.

Sachse, K., Jungermann, H., & Belting, J. M. (2012). Investment risk – The perspective of individual investors. *Journal of Economic Psychology*, *33*(3), 437–447. http://doi.org/10.1016/j.joep.2011.12.006

Sefil, S., & Çilingiroğlu, H. (2011). Davranışsal Finansın Temelleri: Karar Vermenin Bilişsel Ve Duygusal Eğilimleri. *İstanbul Ticaret Üniversitesi Sosyal Bilimler Dergisi*, *10*(19), 247–268.

Sulaiman, E. K. (2012). An Empirical Analysis of Financial Risk Tolerance and Demographic Features of Individual Investors. *Procedia Economics and Finance*, *2*, 109–115. http://doi.org/10.1016/S2212-5671(12)00070-6

Sultana, S. T., & Pardhasaradhi, S. (2011). An Empirical Investigation of the Relation between Risk Tolerance and Socioeconomic Characteristics of Individual Investors. *QUEST-Journal of Management and Research*, *2*(1), 57–66.

Sung, J., & Hanna, S. D. (1997). Factors Related to Risk Tolerance. *SSRN Electronic Journal*, *7*. http://doi.org/10.2139/ssrn.2234

Tanyolac, C., & Karan, M. B. (2015). Analyzing Demographic Characteristics of the Security Investors: An Application to Turkey. *Journal of Economics Finance and Accounting*, *2*(4). http://doi.org/10.17261/Pressacademia.2015414376

Thanki, H. (2015). Risk Tolerance Dependent on What ? Demographics or Personality Type : Findings from an Empirical Research. *Journal of Marketing and Consumer Research*, *6*, 48–56.

Thomas, T. C., & Rajendran, G. (2012). BB & K Five-way Model and Investment Behavior of Individual Investors : Evidence from India. *International Journal of Economics and Management*, *6*(1), 115–127.

Treffers, T., Koellinger, P. D., & Picot, A. O. (2012). In the Mood for Risk? An Experiment on Moods and Risk Preferences. *ERIM Report Series Research in Management*, (July).

Van Rooij, M. C., Lusardi, A., & Alessie, R. J. (2011). Financial literacy and retirement planning in the Netherlands. Journal of Economic Psychology, 32(4), 593-608.

Venter, G. V. (2006). Financial Planners' Perceptions of Risk Tolerance. In *The 2006 Financial Management Association's (FMA) Annual Conference* (pp. 1–31). Salt Lake City, Utah, USA.

Watson, D., Clark, L. A., & Tellegan, A. (1988). Development and validation of brief measures of positive and negative affect: The PANAS scales. Journal of Personality and Social Psychology, 54(6), 1063–1070.

Watson, J., & McNaughton, M. (2007). Gender Differences in Risk Aversion and Expected Retirement Benefits. *Financial Analysts Journal*, *63*(4), 52–62. http://doi.org/10.2469/faj.v63.n4.4749

Wong, A. (2011). Financial Risk Tolerance and Selected Demographic Factors : A Comparative Study in 3 Countries. *Global Journal of Finance and Banking Issues*, *5*(5), 1–13.

Yao, R., Gutter, M. S., & Hanna, S. D. (2005). The Financial Risk Tolerance of Blacks , Hispanics and Whites. *Financial Counseling and Planning*, *16*(1), 51–62.

Yao, R., Sharpe, D. L., & Wang, F. (2011). Decomposing the age effect on risk tolerance. Journal of Socio-Economics, 40(6), 879-887.

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EFFECTS OF INDUSTRY 4.0 ON MARKETING STRATEGIES, AN APPLICATION ON TURKISH AUTOMOBILE INDUSTRY: A RESEARCH AMONG AUTO EXECUTIVES IN TURKEY

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ABSTRACT

Purpose - The study investigates the effects of Industry 4.0 on automobile marketing strategy in Turkey. It attempts to show whether a significant relationship among Industry 4.0 and market growth and cost reduction of auto brands in Turkey via IoT (Internet of Things).
Methodology – The study employed 37 automobile brands as sample from Turkey. 61 participants have responded the questionnaire. The research method utilized in the study was analyzed by sampling using the questionnaire as a data collection tool.
Findings - First, supported a summary of Industry 4.0 and auto marketing, it was found out the conception and behavior changes in several sorts of automobile brands, awakening stakeholders to the transforming forces that are reshaping their business and organization. Second, these quite reshaping organization changes marketing strategy deeply. The usage rate of digital channels has increased positively in automobile marketing strategies. Third, the usage rate of one-to-one marketing has increased positively in automobile marketing. And, the number of dealerships has affected negatively such a way that transforming sales points to delivery points. It is understood that government policies and sales points have a significant effect on market size.
Conclusion - The study contains valuable information and managerial implications for marketing professionals who want to implement different marketing strategies in the enlightening of Industry 4.0. First, supported a summary of Industry 4.0 and automobile marketing, it was found out the conception and behavior changes in several sorts of automobile brands, awakening stakeholders to the transforming forces that are reshaping their business and organization. Second, these quite reshaping organization changes marketing strategy deeply.

Keywords: Industry 4.0, marketing strategies, automobile marketing, IoT, auto brands.
JEL Codes: C38, L62, M31, M38

1.INTRODUCTION

The concept of Industry 4.0 appears for the first time in Germany in 2011 as a concept that has been studied in economic policies. It can be considered as a strategy related to strategy of high technology and internet systems. The concept of Industry 4.0 can be explained as the industrial revolution based on cyber-physical systems, the Internet of Things (IoT) and therefore concepts and technologies that support communication over the internet or involve continuous internet communication. This revolution means data exchange and unlimited interaction not only between consumer and consumer (C2C) but also between consumer and machine (C2M) or between machine and machine (M2M) (Roblek, 2016). In order to create high added value for companies and customers, it is still necessary to bring products and services customer-oriented (Kagermann, 2015). Industry 4.0 represents the proliferation of digitalization, the emergence of smart devices, in short, advanced digitalization (Lasi et al., 2014). Extensive fields such as artificial intelligence (AI), robots, the internet of things (IoT), autonomous tools, 3D printing technology, nanotechnology,

biotechnology, cloud storage and quantum computing can be referred to as the surprising combination of advancing technology breakthroughs (Schwab, 2016). Organizations must understand that their related products or services can provide a critical basis for identifying sociological and psychological factors that affect the customer's decision to use connected products. Some companies that have not yet passed from traditional marketing to contents marketing - while they are still within the development and promotion stages of internet-related technologies - now have the newest chances of change to align their marketing strategies with market competition and technology. Industry 4.0 will enable it to extend the accuracy of marketing strategies to vary or improve the connection between the customer and therefore the company, and can also enable it to get valuable content relevant to customers and to reply to them in real time. Accordingly, marketing departments can be prepared by developing new products and services or developing new marketing strategies to help protect old customers and acquire new customers. This thesis focuses on the importance and impact of Industry 4.0 on automobile marketing strategy and, accordingly, the creation of added value for marketing companies. This gap has been vanished by using TOE Research Model (technology–organization–environment) between marketing strategy suffering from Industry 4.0 within the automobile industry through examining the factors that impact the advanced technology adoption.

2.LITERATURE REVIEW

2.1. Industry 4.0 Review

History of industry revolutions has been described in the first part but to give a wider detail about the history of industry revolutions; the first industrial revolution began with the invention of the steam engine at the top of the 18th century, representing the mechanization. The second industrial revolution started at the start of the 20th century, since electrification and Frederik Taylor's principle of labor division and assembly-line production marked the large-scale production of standardized goods and therefore the beginning automation. Within the 1970s, the third industrial revolution drove forth automation and customized diversity of product and repair variants by extensively integrating information technologies (IT) and electronics into production planning systems, leading to the digitization (Kagermann et al., 2013). This concept has launched the fourth technological revolution, which is predicated on the concepts and technologies that include virtual-physical systems, internet of things (IoT) supported communication via internet that permits endless interaction. Hence, the exchange of data not only between human to human and human to machine but also between machine to machine are accelerated. (Roblek V., 2016). It enables the creation of completely new products and new business models in the automobile industry, especially on the production line with IoT. (Dominici et al., 2016). Firms must consider that their products or services can provide a critical basis for identifying sociological and psychological factors that affect the customer's decision to use connected products. Some organizations that have not yet passed from traditional marketing to contents marketing – while they're still within the development and promotion stages of internet-related technologies – now have the newest changes to align their marketing strategies with market competition and technology. Accordingly, firms can prepare strategies such as new product or new service developments and new marketing strategy. These will help them to keep old customers and find new customers. Technology begins to determine a new and different absence. A positive appearance of Industry 4.0 is that value creation is influenced by efficiency and new business models and gains in the new marketing strategy. However, technological change has positive and negative effects on both employee and business, marketing strategies.. There are some concerns that Industry 4.0 will trigger technological unemployment at the end of the day. Accordingly, work profiles in many workplaces will vary. However, it will be necessary to make changes in training and employee development as well.

2.2.Industry 4.0 and IoT

The Internet of Things is being a part of the Future Internet. One of the principles of Industry 4.0 is to gather the maximum amount information as possible in real time from all the various parts of the value chain. Additionally, when collecting data, data should be collected and analyzed with computerized machines that help reduce production costs and improve quality in order that it is as efficient, fast and versatile as possible. "To achieve such improvements, IoT systems and Cyber-Physical Systems (CPSs) are essential because they permit the gathering, processing and storage of knowledge obtained in real-world objects"(T. M. Fernández et al., 2018) . Additionally, such systems can find and track related items within the factory information system, supplier system, customer data as well as marketing and sales data systems, so that they can exchange data. However, it is possible with IoT that Industry 4.0 devices can communicate autonomously among themselves and coordinate with one another and with other remote systems on the web. While detecting hazards or obstructions on the road as visualized, the vehicle also generates appropriate messages containing geographic locations and emergency call system and more application-related information. These messages are often broadcast immediately to all or any other vehicles within the communication range and may be stored, evaluated and transmitted to them. Smart cars implement more functions and services than traditional ones and that they expand

the value chain. On the one hand, because of automatic driving technology, in-car applications like freedom of movement, mobile office, social media and entertainment are improved and used more frequently. Smart vehicles connect with other objects (things), including catering, tourism, logistics and home via IoT. Services such as online booking, travel advice, smart logistics management and smart home control are all accessible from the vehicle via IoT. Marketing also must draw a replacement path within the light of those developments. Automobile companies can draw customer portraits and deliver advertisements supported data covering their owners' information, consumption habits, driving habits, vehicle conditions, etc. During this way, marketing costs are expected to decrease and brands can create more loyalty among customers (Xu Kuang et al., 2017). This survey was looked for the effects of Industry 4.0 on marketing strategy of Turkish Auto Industry and according to marketing strategy, it had been also looked for the change of marketing costs alongside marketing strategy.

2.3. IoT from Marketing View

According to the blog of i-scoop via internet, IoT affects all industries rapidly virtually. IoT is the interconnectivity of our digital devices such a way that gives endless opportunities for brands to concentrate and answer the requirements of their customers-with the right message, at the right time, on the right device. And it is expected that by 2020, the worldwide marketplace for IoT solutions are going to be $7.1 trillion. It is estimated that IoT connected devices are going to be +13 billion by 2020. And i-scoop also gives a view that the marketing power of the Internet of Things is connectivity for better customer interactivity . There are two main elements to know the IoT regarding IBM. These are new generations of IoT and big data. IBM called the future generation of IoT as Cognitive IoT. IBM said that Cognitive IoT technologies will make it possible for business leaders to know what is happening within the world more deeply and comprehensively and it will make the items or businesses operate more efficiently and therefore the business leaders could better cope with the activities during the business processes. Businesses need samples like natural language processing, machine learning and video, image and text analytics. These quite new technologies help the marketing managers understand what is actually happening and what the particular needs from the purchasers are via data produced by machine learning algorithms. On the other hands, A World Economic Forum report published in September 2015 identified 21 tipping points. Tipping point means that the moments when specific technological shifts hit mainstream society. They will shape our future digital and hyper-connected world. All are expected to take place over the next 10 years, thereby witnessing the profound changes triggered by the fourth industrial revolution. According this report, one of the tipping points is IoT (Internet of Things). Experts suggest that, within the future, every (physical) product can be connected to communication infrastructure, and sensors everywhere will allow people to completely perceive their environment. The other tipping point is Smart Cities. Many cities will connect services, utilities and roads to the online. These smart cities will manage their energy, material flows, logistics and traffic. Some progressive cities are already implementing many new data-driven services, including intelligent parking solutions, smart garbage collection and intelligent lighting. Therefore, these systems can be used while the selling and marketing of the vehicle. The other tipping point is Driverless Cars. Trials of driverless cars from large companies like Audi and Google are already getting involved. These vehicles can potentially be more efficient and safer than cars with people behind the steering wheel. Moreover, they might reduce congestion and emissions, and extend their existing models for transportation and logistics. It now suggests that the selling and marketing of the vehicle will be made on this technology.

2.4. TOE Framework Review

Technology has changed the world dramatically as mentioned in above sections (Wook Ok, 2017) and some new concepts have been introduced accordingly to the technology throughout the end of 20th of century and the beginning of 21st century. One of these concepts is Technology-organization-environment (TOE). Additionally, to the terms like IoT, TOE term is another concept that has been introduced couple of years ago and both adopted by business world and business literature. Technology-organization- environment concept, defined three factors of a business context that effect the process that adopts and ensures innovation of technology: firstly, the organizational context, secondly technological context, and finally environmental context. Organizational context explains business size; centralization, formalization, and complexity of its management structure. Technological context defines all the internal and external technologies related to the business which also means existing technologies within the firm, as well as the range of available technologies in the market. Environment context is the field that a business operates its business industry, competitors, access to resources supplied by others, and dealings with government (Tornatzky and Fleischer, 1990). The advantage of the TOE framework is that it is a simple empirical application that gives a robust theoretical background and useful guidance for researchers. Researchers are to apply TOE framework to research the adoption of varied technologies. Maduku et al., (2016) suggested that competitive pressure, complexity, top management, relative advantage, financial resource, cost reduction, employee capability, customer pressure had a big positive impact on mobile

marketing supported the TOE framework. Saldanha and Krishnan (2012) found that enormous firms have a far better degree of adoption and firms in highly knowledge-intensive and innovation-intensive industries have a far better degree of adoption.

3.DATA AND METHODOLOGY

3.1. Sampling and Data Collection

The methodology approach of the study is predicated on the theoretical and methodological research of the contemporary marketing literature and therefore the conclusions of the questionnaires of auto brand managers. This study is predicated on an exploratory research utilizing case study method. Questionnaires administered with 37 automobile brand managers in Turkey. Data are analyzed with descriptive analysis. The research method utilized in the study was analyzed by sampling using the questionnaire as a data collection tool. It includes closed questions, measured with a nominal and Likert scale. 61 managers provided complete and useful answers to the present research. The collected data were analyzed with the Statistical Package for the Social Sciences (SPSS) software using with reliability index, frequency tables and factor analysis, PCA (Principal Component Analysis) and regression analysis (ANOVA). A survey instrument was developed to research the hypotheses. The questionnaires were designed through discussions with academicians and experts from automotive companies. The fact that the person who prepared this study has 25 years of automotive experience also contributed to the survey. 44 related questions were finalized using the seven-point Likert scale. 11 questions are related with demographic. So, the total questions asked to the participants at questionnaire form is 55. All the questions and items were presented both in English and Turkish to decrease any misunderstanding, and questionnaire form was built on googleform.com , a professional questionnaire website. The e-mail is sent to the participants to tell about the aim of this study and therefore the data collected are mainly for research only. Then, the online questionnaire website link was sent to guide targeted participants to fill out the survey. At the end of the day, a total number of 61 returns were received out of 37 auto brand managers, of which 61 questionnaires were valid with a response rate of 82 percent.

Internet of Things (IoT), market growth and cost reduction are the dependent variables of this study. Transport routes & infrastructure, one-to-one marketing, sales point, car cost, government policies are independent variables of this study. According to the research model, all seven independent factors affect IoT, market growth and cost reduction directly.

H1a : The predicted theoretical and practical developments in the local electronic highway systems will directly and positively affect “cost reduction” and “market growth”.

H1b : The predicted theoretical and practical developments in the local electronic highway systems via IoT will directly and positively affect ‘‘cost reduction” and ‘‘market growth”.

H2a : Intensive usage of one-to-one marketing factor will directly and positively affect “cost reduction” and “ market growth”.

H2b : Intensive usage of one-to-one marketing factor via IoT will indirectly and positively affect “cost reduction” and “ market growth”.

H3a : Predicted evolving of the sales point factor will directly and positively affect “cost reduction” and “market growth”.

H3b : Predicted evolving of the sales point factor via IoT will indirectly and positively affect “cost reduction” and “market growth”.

H4a : The gradual increase in vehicle production cost factor will directly and positively affect “cost reduction” and “market growth”.

H4b : The gradual increase in vehicle production cost factor via IoT will indirectly and positively affect “cost reduction” and “market growth”.

H5a : Predicted incentives and tax benefits in government policies will directly and positively affect “cost reduction” and “market growth”.

H5b : Predicted incentives and tax benefits in government policies via IoT will indirectly and positively affect ‘‘cost reduction” and ‘‘market growth”.

Factor and Reliability Analysis and hypotheses testing are mentioned on Section 4.

3.2. Demographics

It is found that the majority of respondents are in their early middle age (49%), have at least bachelor degree education (65%) and have working experience of more than 15 years (67%). Most of the respondents (83%) are working in the sales/marketing department. These findings indicate that respondents have knowledge of the advanced techniques and they are capable to answer the questions about Industry 4.0. In addition, it was found that female accounts for 20% of total responses. It is found that the field of business are 82% distributors. And, the percentage of national firms is 65% and the percentage of international firms is 35%. Demographics results are showed in Table 1.

Table 1: Profile of Respondents

Demographics	**n**	**%**	**Demographics**	**n**	**%**
Gender			Working Experience		
Male	49	%80	5-10	2	%3
Female	12	%20	10-15	18	%30
			15	41	%67
Department			Age		
Marketing	10	%17	<40	25	%41
Sales/Marketing	51	%83	40-50	30	%49
			50>	6	%10
Title			Field of Business		
Manager	41	%67	Producer	11	%18
Senior Manager	20	%33	Distributor	50	%82

4. FINDINGS AND DISCUSSIONS

"Firms aim to maximize their profits in order to survive within the market against their competitors. So as to realize this, they need to either cut their costs or increase their market share" (Richard Cyert, et al., 1963). Accordingly, the marketing strategy are often built on these two items. In the proposed research model of this survey, the marketing strategy is predicated on these two items. However, the possibility of an intermediate or regulatory effect of IoT was also evaluated. General reliability analysis for all questions was performed by SPSS. It had been observed that there was no problem. Reliability analysis was performed for the individual sub-dimensions as well. The Sales Point scale came at the complete limit, the others were quite higher. Factor analyzes and rotations of variables were performed by SPSS. A total of three questions, one in the Cost Reduction, one within the Sales Point and one within the Government Policies dimensions, dropped down due to the factor could not loaded. These questions were likely confused in the mind of the respondents. All independent variables were measured on two dependent variables according to the correlation matrix. The effects of all independent variables on IoT were examined. The effect of all independent variables (IoT) on dependent variables was examined. IoT factor seems to have no intermediate or regulatory effects. In regression analysis, Sales Point directly affects the Market Growth. Other variables have little effects. Only the Government Policies factor has some influence, but less than the other factor. On Cost Reduction, almost no factor other than the Government Policies factor makes sense.

4.1. Factor and Reliability Analysis

To test the assumptions of the factor analysis, the multiple regression analysis was applied using IBM SPSS 22.0 software. A reliability test was performed on six variables. "The aim of reliability test was to measure the dependability of the questionnaire results for further analysis, especially the internal consistency of the research" (Lin D., 2018).

Cronbach's α coefficient test was chosen to assess the reliability of the data. Cronbach's αs for all variables were above 0,70, which ensures that the consistency level of all investigated items is reliable. Sekaran et al., (2011) shows that the threshold value for reliability analysis is 0,700 and the scales above this value are reliable. When the results of the research are evaluated within this framework, it is seen that all the sub-dimensions in the research are above this threshold value. Thus, other analyzes were started without leaving any academic suspicion. The Sales Point scale came at the complete limit, the others were quite higher. It is 0,695. But the others are above 0,70.

Cronbach's Alpha is a measure of reliability that is a lower bound for the true reliability of the survey. The computation of Cronbach's alpha is supported the number of items on the survey and the ratio of the average inter-item covariance to the average item variance. Alpha value of a scale to be accepted as reliable by Cronbach Alpha must be at least 0,70 level. Cronbach's alpha value of less than 0,70 scales are unreliable or unreliable scale. According to the results of SPSS software, the total value of the reliability of the survey is Alpha value was found as 0,965. It is understood that the research has high reliability because it is greater than α > 0,70. The Cronbach Alpha value is made for both all variables and all individual variables. All variables except for only sales are greater than α > 0,70. Cronbach's Alpha Results are showed in Table 2.

Table 2: Cronbach's Alpha Result

Variables	One-to-one Marketing	Transport Routes& Infrastructure	Car Cost	Sales Points	IoT	Government Policies	Cost Reduction	Market Growth
Cronbach's Alpha	0,911	0,753	0,810	0,695	0,800	0,747	0,748	0,830

4.2. Hypotheses Testing

According to the description in Research Methods for Business by Sekaran et al., (2011), Pearson correlation matrix will indicate the direction, strength, and significance of the bivariate relationships among all the variables that were measured at an interval or ratio level. Pearson Correlation is a measure of linear association between two variables. Its values of the coefficient of correlation range from -1 to 1. The sign of the coefficient indicates the direction of the connection, and its measure quantity indicates the strength, with larger absolute values indicating stronger relationships. Correlation is significant at the 0,01 level (2-tailed). Sig (2- tailed), the probability of obtaining results as extreme because the one observed, and in either direction when the null hypothesis is true. A two-tailed significance level tests a null hypothesis during which the direction of an impact is not specified in advance p < 0,05. Since there is "sig (2-tailed) p <0,05" in the correlation matrix, it indicates that there is a significant relationship among the variables. The line Pearson Correlation value, which shows the direction and strength of the relationship, was positive for all variables. Therefore, it shows that there is a positive strong relationship among all variables. The result obtained supports the hypotheses. Pearson Correlation value of Transport Routes& Infrastructure is 0,855, it means it has quite higher correlation (0,855) among One-to-One Marketing and Transport routes& Infrastructure factors. IoT factor has a higher correlation with Sales Point and Car Cost. Government Policies factor has also higher correlation value with Car Cost, Sales Point and IoT factors. Market Growth has higher correlation value with Sales Point, Government Policies and Cost Reduction. A Pearson correlation test was conducted to examine the feasibility to use multiple regression methods. The results of the Pearson correlation validate the mutual correlation of variables as significant at the 0,01 level. Correlation matrix is showed in Table 3.

The regression coefficients indicate the relative importance of each of the independent variables within the prediction of the dependent variable. Each variable has a positive regression coefficient at a significance level less than 0,01, indicating that all the variables. Thus, rejected hypotheses are:

H1a : The predicted theoretical and practical developments in the local electronic highway systems will directly and positively affect “cost reduction” and “market growth”.

H1b : The predicted theoretical and practical developments in the local electronic highway systems via IoT will directly and positively affect “cost reduction” and “market growth”.

H2a : Intensive usage of one-to-one marketing factor will directly and positively affect “cost reduction” and “ market growth”.

H3b : Predicted evolving of the sales point factor via IoT will indirectly and positively affect “cost reduction” and “market growth”.

H4a : The gradual increase in vehicle production cost factor will directly and positively affect “cost reduction” and “market growth”.

Confirmed hypotheses will be explained in step by step as following section. According to the coefficients table of the regression analysis, the significant value p<0,05 indicates that there are significant relationships among the variables. The coefficients table of Cost Reduction Factor, p value for Government Policies is 0,037 that is less than p<0,05. There are significant relationships with only Government Policies. Except Government Policies Factor hypothesis all other hypothesis has been rejected as their p value are higher than desired value of 0,05. Beta value of 0,483 represents a positive and intermediate level of effect. Hence, Government Policies Factor has a significant and intermediate positive effect on Cost Reduction via IoT. So, H5a is confirmed. Predicted incentives and tax benefits in government policies will directly and positively affect “cost reduction” and “market growth”.

On the other hand, Government Policies Factor has a significant and intermediate positive effect on Cost Reduction without IoT. Hence, with and without IoT, there is positive effect on Cost Reduction from Government Policies.

The coefficients table of Market Growth Factor, p value for Government Policies is 0,046 and p value for Sales Point is 0,002, both of them are less than p<0,05 value. There are significant relationships with Government Policies and Sales Point and Market Growth via IoT. oto_FACTOR, transport_FACTOR, cost_FACTOR and iot_FACTOR hypothesis has been rejected as their p value are higher than the desired p value of p>0,05. On the other hand, gov_FACTOR and sales_FACTOR has been confirmed as their p values as smaller than the desired p value of p>0,05, so, H5a and H3a are confirmed. Confirmed H3a hypothesis is as follows: Predicted evolving of the sales point factor will directly and positively affect “cost reduction” and “market growth”. Confirmed H5a hypothesis is as follows: Predicted incentives and tax benefits in government policies will directly and positively affect “cost reduction” and “market growth”.

There are significant relationships with Government Policies and Sales Point and Market Growth. The coefficients table of Market Growth Factor, p value for Government Policies is 0,010 and p value for Sales Point is 0,001, both of them are less than p<0,05 value. There are significant relationships with Government Policies and Sales Point and Market Growth. Beta value for Sales Factor is 0,410 represents a positive and intermediate level of effect.

The coefficients table of IoT Factor, p value for Government Policies is 0,002 and p value for One-to-One Marketing is 0,18 and p value for Car Cost is 0,044, all of them are less than p<0,05 value. There are significant relationships among Government Policies, One-to-One Marketing and Car Cost. oto_FACTOR and gov_FACTOR has been confirmed as their p values are smaller than the desired p value of p>0,05. Thus, H2b, H4b and H5b are confirmed.

Confirmed H2b hypothesis is as follows: Intensive usage of one-to-one marketing factor via IoT will indirectly and positively affect “cost reduction” and “market growth”.

Confirmed H4b hypothesis is as follows: The gradual increase in vehicle production cost factor via IoT will indirectly and positively affect “cost reduction” and “market growth”. Confirmed H5b hypothesis is as follows: Predicted incentives and tax benefits in government policies via IoT will indirectly and positively affect “cost reduction” and “market growth”. transport_FACTOR and sales_FACTOR hypothesis has been rejected as their values are higher than the desired p value of p>0.05. H1b and H3b are rejected.

Rejected H1b: The predicted theoretical and practical developments in the local electronic highway systems via IoT will directly and positively affect “cost reduction” and “market growth”.

Rejected H3b: Predicted evolving of the sales point factor via IoT will indirectly and positively affect “cost reduction” and “market growth”.

Table 3: Correlation Matrix

		oto_FACTOR	transport _FACTOR	cost_FACTOR	sales_FACTOR	IoT_FACTOR	gov_FACTOR	cr_FACTOR	market_ FACTOR
oto_FACTOR	Pearson Correlation	1	,855**	,699**	,688**	,722**	,637**	,481**	,671**
	Sig. (2-tailed)		,000	,000	,000	,000	,000	,000	,000
	N	61	61	61	61	61	61	61	61
transport_FACTOR	Pearson Correlation	,855**	1	,782**	,717**	,722**	,736**	,546**	,753**
	Sig. (2-tailed)	,000		,000	,000	,000	,000	,000	,000
	N	61	61	61	61	61	61	61	61
cost_FACTOR	Pearson Correlation	,699**	,782**	1	,721**	,802**	,814**	,589**	,745**
	Sig. (2-tailed)	,000	,000		,000	,000	,000	,000	,000
	N	61	61	61	61	61	61	61	61
sales_FACTOR	Pearson Correlation	,688**	,717**	,721**	1	,792**	,809**	,603**	,838**
	Sig. (2-tailed)	,000	,000	,000		,000	,000	,000	,000
	N	61	61	61	61	61	61	61	61
IoT_FACTOR	Pearson Correlation	,722**	,722**	,802**	,792**	1	,841**	,613**	,792**
	Sig. (2-tailed)	,000	,000	,000	,000		,000	,000	,000
	N	61	61	61	61	61	61	61	61
gov_FACTOR	Pearson Correlation	,637**	,736**	,814**	,809**	,841**	1	,684**	,833**
	Sig. (2-tailed)	,000	,000	,000	,000	,000		,000	,000
	N	61	61	61	61	61	61	61	61
cr_FACTOR	Pearson Correlation	,481**	,546**	,589**	,603**	,613**	,684**	1	,803**
	Sig. (2-tailed)	,000	,000	,000	,000	,000	,000		,000
	N	61	61	61	61	61	61	61	61
market_FACTOR	Pearson Correlation	,671**	,753**	,745**	,838**	,792**	,833**	,803**	1
	Sig. (2-tailed)	,000	,000	,000	,000	,000	,000	,000	
	N	61	61	61	61	61	61	61	61

5. CONCLUSION

For the first time, such this research was conducted on marketing strategy with wide participation among the members of Automotive Distributors in Turkey (ODD members). It was investigated for the first time that automobile marketing strategies have a significant relationship with the factors researched by this thesis. As a marketing strategy, the thoughts of the brand managers were investigated in terms of market size and cost reduction. Summary of the attitudes of the brand managers related with marketing strategies under the influence of industry 4.0 and IoT was given below. Through a case study, this study has several practical and theoretical contributions attempting to fill this gap. First, supported a summary of Industry 4.0 and auto marketing, it was found out the conception and behavior changes in several sorts of automobile brands, awakening stakeholders to the transforming forces that are reshaping their business and organization. Second, these quite reshaping organization changes marketing strategy deeply. The usage rate of digital channels has increased positively in automobile marketing strategies. Third, the usage rate of one-to-one marketing has increased positively in automobile marketing. And, the number of dealerships has affected negatively such a way that transforming sales points to delivery points. According to the research results, it is understood that government policies and sales points have a significant effect on market size. That is, when the government makes a positive

change in taxes on automobiles, the market shares of brands increase positively. However, a positive increase in the number of sales points, namely authorized dealers, leads to a positive increase in the market share of the brand. In contrast, a change in government policies only affects cost reduction. It can be said that no factor other than government policies has a significant effect on cost reduction. One-to-one marketing has a significant impact on IoT. That is, the IoT usage rate will increase one-to-one marketing usage rate. Accordingly, there is a significant relationship between one-to-one marketing and transport routes & infrastructure. That is, if we use one-to-one marketing with IoT and transport routes & infrastructure, automobile sales will increase and the brand's market shares will increase accordingly. In addition, intensive use of one-to-one marketing will have a positive effect on reducing marketing costs. It has been understood that there is a positive relationship between vehicle production costs and brand market size and cost reduction. So, when you reduce vehicle costs with the help of IoT, the brand's market share will increase and costs will decrease. Industry 4.0 and IoT shows that we are entering a phase where we need to rethink what is expected or desired from every company and every person, with the help of internet-connected devices. For this reason, IoT technology creates completely new products, new marketing strategy, new services and new business models that promise profits in almost all industries. Companies that produce smart vehicles are given the opportunity to provide direct consumer experience. Thanks to Industry 4.0, the consumer will be contacted directly and will provide evaluation; however, perceived values will ensure that the entire service group associated with the management of connected vehicles will focus on real customer value. Industry 4.0 results in a rapid transformation on marketing strategies. At the editing phase of the thesis, Covid-19 outbreak affecting the whole world and Turkey, are affected negatively tourism and especially the automobile industry. Automobile dealers and services are closed and their employees have been taken to free administrative leave according to the decisions taken by the government in order to stop the epidemic. Accordingly, customers no longer have not preferred visit showrooms. As a result of these reactions, the usage rate of digital channels has been increased positively in automobile marketing strategies. Additionally, the frequency of using virtual media has been increased positively in after-sales.

6. LIMITATIONS

There are some limitations during this study. First, the highest growth rate and the similar application could not be taken into consideration and compare survey results headed for a single country between different countries with data on cases during this study that focuses on the skills of the automobile industry in Turkey. Second, because there is a sort brief history between industry 4.0 and automobile marketing strategy, the right quantitative analysis would be difficult right now to explain the economic effects in this new value chain, as the relevant market data is almost nonexistent. Therefore, for future research, an in-depth comparison of different automobile marketing strategies can be made for large countries such as the USA, the European Union and Japan, and can also explore future mobility and industry's key political and social factors. However, this transformation has cooperation in both the manufacturing industry and the Internet business, which may create new challenges for future administrative and commercial movements. Hence there are more questions needed to be discussed like the following: *What quite organization form or business model will dominate in automobile industry for the future? How will new entrants make marketing strategy to introduce their latest products and services that have never been considered before?* These related questions might be a study for the future research.

REFERENCES

Dominici, G., Roblek, V., Abbate, T., & Tani, M. (2016), "Click and drive": Consumer attitude to product development. Towards future transformations of driving experience. Business Process Management Journal, 22, 420-434. doi:10.1108/BPMJ-05- 2015-0076

I-Scoop (2020). How the Internet of Things impacts marketing, http://www.i-scoop.eu/how-the-internet-of-things-impacts- marketing/ IBM (2015). Redefining Boundaries: Insights from the Global C.

Fernández-Caramés, T. M., Fraga-Lamas, P. (2018). A review on human-centered IoT-connected smart labels for the industry 4.0. IEEE Access, 6, 25939-25957.

Kagermann, H., Wahlster, W., and Helbig, J., (2013), Recommendations for implementing the strategic initiative Industrie 4.0 – Final report of the Industrie 4.0 Working Group. Communication Promoters Group of the Industry-Science Research Alliance. Frankfurt am Main: Acatech.

Kuang, Xu & Zhao, Fuquan & Hao, Han & Liu, Zongwei. (2017), Intelligent connected vehicles: the industrial practices and impacts on automotive value-chains in China. Asia Pacific Business Review. 1-21. 10.1080/13602381.2017.1340178

Lasi, H., Fettke, P., Kemper, H. G., Feld, T., & Hoffmann, M. (2014), Industry 4.0. Business & Information Systems Engineering, 6, 239-242. doi:10.1007/s12599-014-0334-4.

Lin D., Lee C., (2018), Strategic response to Industry 4.0: an empirical investigation on the Chinese automotive industry ", Industrial Management & Data Systems Vol. 118 No. 3, pp. 589-605.

Maduku, D.K., Mpinganjira, M. and Duh, H. (2016), "Understanding mobile marketing adoption intention by South African SMEs: a multi-perspective framework", International Journal of Information Management, Vol. 36 No. 5, pp. 711-723.

Saldanha, T. and Krishnan, M.S. (2012), "Organizational adoption of Web 2.0 technologies: an empirical analysis", Journal of Organizational Computing and Electronic Commerce, Vol. 22 No. 4, pp. 301-333.

Sekaran, Uma and Bougie R. (2011), Research Methods for Business, Fifth Edition, John Wiley & Sons Ltd

Tornatzky, L. G., Fleischer, M., & Chakrabarti, A. K. (1990). Processes of technological innovation. Lexington books.

Roblek, V., Meško, M., Krapez, A. (2016), A Complex View of Industry 4.0, SAGE Open, April-June, 1–11.

Schwab, K. (2016). World Economic Forum. https://www.weforum.org/agenda/2016/01/the-fourth-industrial-revolution-what-it-means-and-how-to-respond/

Wook Ok, M. (2018). Use of iPad as assistive technology for students with disabilities. TechTrends, 62(1), 95-102.

World Economic Forum (2015). Deep Shift – Technology Tipping Points and Societal Impact, Survey Report, Global Agenda Council on the Future of Software and Society, September 2015.

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THE ROLE OF FINANCIAL DEVELOPMENT, EDUCATION AND ECONOMIC GROWTH ON ENVIRONMENTAL QUALITY IN CAMEROON

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ABSTRACT

Purpose - The using of economic growth as an instrument to alleviate poverty in developing countries remains a challenge, as economic growth often emerges with greenhouse gases. In this regard, this study aimed to examine the impact of education, financial development, and economic growth on environmental quality in Cameroon.
Methodology – This study employs the Autoregressive Distributive Lag (ARDL) and the Toda-Yamamoto causality test methods to examine the relationship between the above-mentioned variables and carbon dioxide emissions in Cameroon's for the period 1980-2016.
Findings- From the ARDL bounds tests, we found that a long-run relationship exists between the variables and the Toda-Yamamoto causality tests reveal multiple unidirectional causalities, from carbon dioxide to financial development, economic growth, and foreign direct investment and from economic growth to human capital. Similarly, bidirectional causality runs between human capital and energy consumption, between human capital and financial development and lastly, between financial development and foreign direct investment.
Conclusion- It is therefore crucial for the government to develop policies that mitigate the spread of pollution and to encourage the practice of green education and sustainable finance in Cameroon.

Keywords: Cameroon, human capital, economic growth, financial development, environmental quality.
JEL Codes: Q51, Q53, O44

1. INTRODUCTION

Nowadays, developing countries are becoming exposed to the danger of climate change and global warming. This is partly because human activities (farming, mining, deforestation, and industrialization) are inflicting permanent damage to the environment. In most developing countries, including that of Cameroon, the government has as objective to raise growth to reduce poverty, create jobs, improve the human capital development and to generate a friendly environment. However, it is quite perplexing to use economic growth as a policy objective since there is always a trade-off between this construct and environmental degradations. Economic growth often generates both positive and negative externalities on the environment. Positively, it goes along with an increase in consumption, rise in investment, reduction in poverty, high employment and the knowledge spillover from advanced societies to less advanced ones. Meanwhile negatively, it leads to the exploitation of natural resources and the emission of greenhouse gases that are harmful to the environment (Galeotti, 2007). Moreover, most third world countries are characterized with inadequate human capital, poor financial market and high dependency on primary activities (agriculture, forestry, mining, and fishing) see (The World Bank Report, 2009). Meanwhile, these sectors are quite vulnerable to environmental hazards, making it difficult to tackle the dual issues of climate change and poverty alleviation. Furthermore, the "pollution havens hypothesis'', argues that jurisdictions with weak environmental regulations (developing countries) turn to attract more polluting industries from stronger nations (developed countries). This phenomenon is frequent in Sub Saharan African countries since the

environmental policies to tackle the spread of greenhouse gases are limited. According to (Oxfam, 2020), the annual emissions of pollution (CO2) per head are 0.40 tons in Cameroon, 0.09 tons in Rwanda, 0.19 tons in Malawi, 0.49 tons in Nigeria, 8.9 tons in South Africa, 1.68 tons in India and 4.7 tons in Britain. From this research, someone in Britain will take just five days to emit the same amount of CO2 that someone in Rwanda, in a year. Nevertheless, in recent years, numerous efforts have been made by the governments in developing countries to promote financial development, human capital development, economic growth, and environmental sustainability. However, the ability of education, financial development and economic growth to impact environmental quality in developing countries has been a subject of hot debate and remains inconclusive. While several scholars are of the view that education, financial development and economic growth have a positive effect on environmental quality (Awad and Warsame, 2017) and (Hundie, 2018), other researchers have demonstrated that these variables are negatively related with environmental quality (Ali, 2018) and (Phuong et al., 2018).

Because the relationship between these variables are inconclusive and considering the fact that economic growth often generate more greenhouse gases (GHG), particularly carbon dioxide emission, it is therefore, crucial to examine the environment education-nexus and environment growth-nexus in developing countries. The environment growth-nexus is usually model using the environmental Kuznets curve (EKC). This curve was first introduced to examine the relationship between income inequality and per capita income (Kuznets, 1955) and later used by Grossman and Krueger (1995) and Selden and Song (1994) to study the relationship between economic growth and environmental pollution.

The major research questions of this study are: does education, financial development, and economic growth influence environmental conditions? The main objective of this study is to determine the relationships between education, financial development, economic growth and environmental quality in Cameroon. This will be done by using the ARDL bounds test and the Toda-Yamamoto causality test methods. Unlike other studies, the structural breaks in the series have been considered, using the Lee and Strazicich (2003) test methods. The rest of the paper is structured as follows. The first section is the introductory remarks and the next section covers the literature reviews. The last section is the estimation techniques, the findings, and the conclusion.

2. LITERATURE REVIEW

In this section focus on the theoretical studies that examine the relationship between human capital, financial development, economic growth, foreign direct investment, energy consumption and environmental quality.

2.1. Theoritical Literature

In literature, most studies have focused on the relationship between between growth/income, energy consumption, foreign direct investment and environmental quality (carbon dioxide emissions). The theory used to explain this relationship has three strands. The first one centres on the carbon dioxide emissions, energy consumption, and economic growth nexus. This part mostly focuses on the Environmental Kuznets Curve hypothesis. Kuznets (1955) established the hypothesis, which studied the inverse relationship between income inequality and economic growth. This was later redeveloped by (Grossman and Krueger, 1991), to study the relationship between economic growth and environmental quality, known as the Environmental Kuznets Curve (EKC).

The EKC hypothesis postulates that in the initial stage of economic development, an increase in national income is accompanied by an increase in environmental pollution. After that, a stage is reached in the developmental process of a country after which an increase in national income is not complemented with an increase in environmental pollution. The reason being that, in the early stage of development, nations do not usually care for the quality of the environment, as more utilization of natural resources are essential in building-up a nation. However, once a certain level of income is riched, nations try to care about the quality of their environment, since certain environmental issues generate health problems. In other word, an inversed U-shaped association, exists between economic growth and environmental pollution.

The second strand is about the association between energy consumption and economic growth. In literature, researchers have proposed four hypothesis to test this relationship. The first is the neutrality hypothesis, states that there is no causal relationship between energy consumption and economic growth. In others word, countries energy policies have no impact on economic growth. Secondly, the growth hypothesis, that assumes a unilateral causality, run from energy consumption to economic growth. This implies that any increase in the consumption of energy will lead to economic growth. Thirdly, the conservation hypothesis, which settled that a unilateral causality is moving from economic growth to energy consumption. Lastly, the feedback hypothesis, which concludes that, there is a bilateral causality between energy consumption and economic growth.

The third strand focus on the relationship between foregn trade and environmental pollution. There are two important hypothesis that study this relationship, the Pollution Halo Hypothesis (PHH) and the Pollution Haven Hypothesis. According to the pollution havens hypothesis, environmental regulations will move polluting activities to poorer countries. As environmental consciousness raises globally, countries settle down to improve new environmental regulations, with severe sanctions (Harrison, 1997). The Pollution halo effect on the other hand, states that foreign direct investment leads to the improvement of environmental quality in developing countries, as it goes along with the transfer of skills, technology, capital and better management techniques. In other words, multi-national enterprises have the tendency to transfer clean energy and technology to developing countries that further reduce the level of carbon dioxide emissions. Meanwhile, in recent period, researchers have introduced other variables like financial development and foreign direct investment into the analysis as control variables. Meanwhile, the studies that examine the relationship between human capital and environmental quality are limited in literature. This study will therefore add to the above, by looking at the impact of education on environmental quality.

The impact of education on environmental quality may take place in various forms. Firstly, educated people tend to be more environmental friendly, by demanding for more environmental improvement. Secondly, educated people have better access to information which at times induce them to potentially consume more environmental friendly products. On the other hands, human capital accumulation (Education) could be detrimental to the environment in the sense that it could generate high productivities and consumptions that may in turn raises pollution. Likewise, high education may lead to high income meanwhile the high income raises consumption that further create more environmental damages. In countries with high literacy rates, the purchasing power of individuals are generally high and people have the ideology of “consume more to be happier” making them to develop the desire to live well without taking care of their environment. Nevertheless, the focus of this paper is to jointly examine the impact of financial development, human capital and economic growth on environmental quality.

The theory of financial development was first introduced by McKinnon and Shaw. This theory holds that financial sector development is quite essential for a nation's growth. It states that the forces of demand and supply operating in the market turn to generate an equilibrium rate of interest that in turn lead to high savings and investment. The financial sectors are vital in modern market economies. It acts as an engine of growth in facilitating payment and the provision of intermediary services between the lenders and borrowers. These sectors equally offer households, and firms with good management tools (Beck, 2013).

Financial development affects economic growth in different channels and researchers have grouped them into two broad categories (Levine, 2005). The first view is based on the standard neoclassical framework and is regarded as a direct channel. According to this view, financial development will stimulate growth through an increase in domestic investment and saving thereby reducing the cost of capital. The second view focuses on indirect channels and according to this interpretation, financial development provides the catalyst for certain collateral benefits like domestic institutional development, better governance, macroeconomic discipline that positively spillover to economic growth.

Sehrawat, Giri and Mohapatra (2015) state that economic growth is driven by changes in the number of factors of production (such as labor and capital) or increases in the efficiency by which the factors are used. Hence, if international financial integration could lead to the growth of the factor of production or efficiency gains in the use of such factors, then it would promote economic growth. Likewise, economic efficiency depends on free markets for goods, labor and finance, and a minimal state. Levine (2005) states that financial development is a good predictor of future economic growth, capital accumulation, and technological change. Even though some theories suggest that the development of the financial markets has an insignificant effect on the real sector, there is a positive, first-order relationship between financial development and economic growth.

2.2. Empirical Literature

This section gives a brief survey on several studies to determine whether education, financial development, economic growth, foreign direct investment and energy consumption are important drivers of environmental quality in Cameroon.

2.2.1. Education and Environmental Quality

Human capital accumulation is determined through the learning ability of individual and it saves as the engine for economic growth. Chakraborty and Gupta (2014) examined the relationship between human capital, environmental quality and economic growth and find that environmental quality and human capital are positively related. The authors state that educated people turn to use the available resources efficiently without causing much harms to the environment. On the contrary, environmental pollution turns to yield a negative effect on the health of an individual, which goes a long way to lower the learning ability of that individual. Likewise, pollution may impact human capital negatively particularly when noise pollution turns to disturb the learning

environment. Meanwhile Roth (2017) states that air pollution turn to harm the scholastic achievement and human capital formation.

Goetz et al., (2016) investigate the relationship between human capital, income and environmental quality and find that higher educational attainment has an independent, positive effect on the quality of the environment. In other words, countries with high literacy rate turn to have better environmental conditions. This implies that education plays a leading role not just in generating growth but also in bringing additional benefit in the improvement of the environment. Torras and Boyce (1998) regress environmental pollution on income, literacy rate, Gini coefficient of income inequality and find that literacy rate has a significant negative effect on pollution particularly in low income countries, while Petrosillo et al., (2007) find that tourists attitudes are highly dependent on their education level. In other words, those with high school attainments turn to generate less environmental damages. Hower, in some instance, human capital (education) turn to have a detrimental effect on the quality of the environment, especially in countries that have passed through economic transformation (agriculture to industry) and from less polluting human capital to more polluting physical capital. In these type of countries, environmental pollution will take the form of a U-shape.

2.2.2. Financial Development and Environmental Quality

Moghadam and Lotfalipour (2015) investigate the effect of financial development on environmental quality in Iran using the method of Auto Regression Model Distributed Lag (ARDL) with data that runs from 1970 to 2011. The findings show that financial development causes lots of damages to the Iranian environment meanwhile trade openness turns to reduce these damages. Alam et al., (2016) examines the impact of financial development in Pakistan using the quarterly data that runs from 1985 to 2004. The author concludes similar results and further argues that financial development acts as an impediment to the environment.

On the other hand, Li et al., (2015) jointly study the relationships between financial development, environmental quality and economic growth in 102 countries, using the generalized method of moments (GMM) estimation methods for the period 1980 to 2010. Their results show that financial development positively affects environmental quality. Saud, Chen, Saud et al., (2019) recently examine the impact of financial development and economic growth on environmental quality for a panel of 59 Belt and Road Initiative (BRI) countries, throughout 1980 to 2016. The authors conclude that financial development positively enhanced environmental quality in BRI countries.

2.2.3. Economic Growth, Energy Consumption and Environmental Quality

N. Agarwal (2012) analyzes the joint impact of economic growth, foreign direct investment (FDI) and financial development on environmental quality in Malaysia, using time series data that runs from the period1980 to 2008. The study finds that the environment-growth nexus via the Environment Kuznets Curve Hypothesis (EKCH) is positive in Malaysia. Aboagye (2015) investigates the impact of environmental qualities on economic growth in SSA, using panel data within the period 1985 to 2010. The author confirms the existence of the Environmental Kuznets Curve (EKC) for energy consumption but not for CO2 emissions. This finding indicates that in the long run, pollution emissions are instead increasing in Malaysia.

Hilaire and Kaffo Fotio (2014) examine the impact of economic growth on environmental quality for four Congo Basin countries (Cameroon, Congo, Gabon and the Democratic Republic of Congo) within the period 1978 to 2012. The author demonstrates that in the long run, economic growth has a positive impact on CO2 emissions in these countries. Likewise, Phimphanthavong (2013) investigates the relationship between economic growth and environmental degradation using time series analysis between 1980 to 2010. While using the EKC's hypothesis, he confirms that in the early stage, economic growth increases pollution that turns to fall after reaching a high level of income.

Awad and Warsame (2017) examine the impact of economic growth on carbon emissions in 54 African countries with data ranging from 1990 to 2014. The authors use the method of panel data analysis to verify the presence of the environmental Kuznets curve (EKC) hypothesis but came out with contradictory results. However, Bond et al. (2015), using time series data shows that economic growth is detrimental to the environment in the long run and the authors thus confirm the relevance of the EKC in that country. Carillo and Maietta (2014) employ the method of dynamic panel data to verify the impact of growth on environmental quality in Italy. The authors strongly confirm the existence of the EKC hypothesis in that country. Meanwhile, Fakher and Abedi (2017) recently analyzed the relationship between economic growth, foreign direct investment and environmental quality in some selected developing countries using panel data that runs from 1983 to 2013. The authors settle that in the long run, economic growth has a positive impact on environmental quality.

Aali-Bujari et al., (2017) investigate the impact of energy used on economic growth in the Organization for Economic Cooperation and Development (OECD) countries during the period 1977 to 2014, using the panel data analysis. It was found that energy

consumption is positively related to economic growth in the long. Mugableh (2013) investigates the effects of economic growth and energy consumption on CO2 emissions in Malaysia for the period 1971 to 2012 by using the ARDL method. The results indicate the existence of co-integrating relationships among the variables. The author also finds that energy consumptions have a positive impact on economic growth and CO2 emissions in the short and long-run. Meanwhile, Saidi and Hammami (2015) employ the dynamic panel data to investigate the impacts of carbon dioxide emission and economic growth on energy consumptions and finds a result, that is contradicting the EKC hypothesis.

Hundie (2018) analyses the relationship between energy consumption, affluence, financial development, trade openness, urbanization, population and CO2 emissions in Ethiopia by employing the time series data that runs from 1970 to 2014. In using the ARDL bound tests, the author concludes that energy consumption, population, trade openness and economic growth have a positive impact on CO2 in the long-run. On the other hand, Ali (2018) examines the variables that generate carbon emissions in France with a specific focus on foreign direct investment (FDI), financial development, economic growth, energy consumption and energy research innovations using the annual data that runs from 1955 to 2016. The author demonstrates that energy research has a negative impact, on carbon emissions in France while senergy consumption is positively linked to carbon emissions.

2.2.4. Economic Growth, Energy Consumption and Environmental Quality

Ioannis Kostakis (2011) investigates the role of foreign direct investment (FDI) inflows on environmental quality (C02) for the period 1970 to 2010 in Asian countries, using the ARDL, FMOLS and OLS methods. The author finds that FDI inflows do not generate a negative impact on the Singaporean and other Asian countries in the short run but does in the long run. Meanwhile, Abdouli and Hammami (2017) investigate the impact of foreign direct investment inflows, environmental quality, and capital stock on economic growth in 17 the Middle East and North African Countries (MENA) countries. Using panel analysis, that runs from 1990-2012, the authors find a similar result, where FDI positively impact environmental quality in the long run. Phuong et al., (2018) investigate the causal relationship between CO2 emissions, FDI and economic growth in Vietnam using annual time series data that runs for the period 1986 to 2015. The authors find that there exists a long-run relationship between the aforesaid variables in Vietnam.

To sum up, the relationship between human capital, financial development, economic growth, foreign direct investment, energy consumption and carbon dioxide emissions remains ambiguous. The using of different method, sample of country/countries and the time period, could alter the results. This study differs from other studies in that it considers the multiple structural breaks in the Cameroon's time series and the introduction of the various diagnostic tests, as explained in the methodology part. In this regard, it will contribute to the relevant literature.

3. DATA AND METHODOLOGY

We hypothesize that environmental quality is determined by education, financial development, economic growth, foreign direct investment, and energy consumption, based on Brock and Taylor (2010). The data are collected from various sources. The data on carbon dioxide emissions, economic growth, financial development, education and energy consumption are collected from the World Development Indicators meanwhile that of foreign direct investment is extracted from the United Nation Statistics Division (UNSD). The studyl employs the Cameroon time series annual data that runs from 1980 to 2016. The justification of the time frame is based on the availability of data and various events that has taken place in Cameroon.

The emission of carbon dioxide per capita is measured in metric tons per capita and is estimated from the combustion of fossil energies and cement industries in liquid, solid, or gas form and is considered in this study as an indicator of environmental quality. Education corresponds to secondary school enrollment often used as an indicator of human capital and it is measured in percentages meanwhile for financial development, researchers often employed numerous variables as a proxy in literature. In this regard, Munir et al. (2013) stated that the variables commonly use as proxy for financial development are foreign direct investment, deposit rate, lending rate, and broad money (M2). In this respect, we have considered credit to the private sector as an indicator of financial development and is measured in percentage of GDP. For economic growth, it is captured using GDP, measured in constant 2010 USD. Foreign direct investment and energy consumption are considered in this study as control variables like in most studies in literature. Besides, foreign direct investment is measured as a percentage of GDP and is used to capture the effects of pollution havens hypothesis in Cameroon, while energy consumption is measured in kg of energy. The model is specified as,

$$\mathrm{CO2}_{\mathrm{t}} = \mathrm{f}(\mathrm{FDI}_{\mathrm{t}}, \mathrm{FD}_{\mathrm{t}}, HC_{\mathrm{t}}, GDP_{\mathrm{t}}\, EN_{\mathrm{t}}) \quad (1)$$

By taking the log of both side, we then obtained equation two as noted below;

$$LCO2_t = \alpha_0 + \beta_1 LFDI_t + \beta_2 LFD_t + \beta_3 LHC_t + \beta_4 LGDP_t + \beta_5 LEN_t + \varepsilon_t \quad (2)$$

Where $LCO2_t$ in equation 2 represents the log of Carbon dioxide emission, $LFDI_t$ stands for the log of foreign direct investment and LFD_t indicates the log of financial development. Likewise, $LGDP_t$ measures the log of economic growth, LHC_t pinpoints the log of human capital (education), LEC_t signifies the log of energy consumption. α_0 is a constant term while $\mathcal{E}_t$ is the white noise term and subscript *t* is the time period. Moreover, β_i *(i = ,1,2,3,4,5)* are the estimated parameters and are projected to be positive.

4. ESTIMATION METHODS

Because Cameroon is a developing economy, that at times experience internal and external shocks, we will, therefore, employ the structural break unit-roots test to study the integrating properties of the variables recommended by Clemente et al. (1998). These structural breaks either take the form of additive outliers (IO model) or double-break additive outliers (AI model) see Hundie (2018). The structural breaks usually used the dummy variables and are presented as shown below;

$$y_t = \mu + \delta_1 DU_{1t} + \delta_2 DU_{2t} + \bar{y}_t \quad (4)$$

$$\bar{y}_t = \sum_{i=1}^{k} \omega_{1i} DT_{b1,t-i} + \sum_{i=1}^{k} \omega_{2i} DT_{b2,t-i} + \alpha \bar{y}_{t-i} + \sum_{i=1}^{k} \theta_i \Delta \bar{y}_{t-i} + e_t \quad (5)$$

$$y_t = \mu + \delta_1 DU_{1t} + \delta_2 DU_{2t} + \varphi_1 DT_{b1,t} + \varphi_2 DT_{b2,t} + \alpha y_{t-i} + \sum_{i=1}^{k} \theta \Delta y_{t-i} + e_t \quad (6)$$

Equation 4, indicates two structural breaks models, in which DU_{mt}= for $t \succ T_{bm}$ + 1 and 0 otherwise, for *m* = 1,2. $T_{b1}$and T_{b2} are the two breakpoints. Baum et al. (1999) as cited in Hundie (2018) argue that $\bar{y}_t$should represents the residuals of the estimation that stands for the dependent variable as shown in equation 5 above.

The co-integrating properties of the variables are examined by applying the recent Author Regressive Distributive Lag (ARDL) method. This approach is suitable compares to the Johansen (1988) and Johansen and Juselius (1990) tests of co-integration. Particularly, this method turns to minimize the endogeneity problems, the stationarity problems, and is quiet applicable irrespective of whether the model is I (0) or I (1) see Hundie (2018). The ARDL model with the error-correction term is given as;

$$\Delta CO2_t = \alpha_1 + \sum_{i=1}^{p} \beta_{1i} \Delta CO2_{t-i} + \sum_{i=0}^{q_1} \eta_{1i} \Delta FDI_{t-1} + \sum_{i=0}^{q_2} \gamma_{1i} \Delta FD_{t-1} + \sum_{i=0}^{q_3} \theta_{1i} \Delta HC_{t-1} + \sum_{i=0}^{q_4} \pi_{1i} \Delta GDP_{t-1} + \sum_{i=0}^{q_5} \phi_{1i} \Delta EC_{t-1} + \delta_1 LCO2_{t-i} + \delta_2 LFDI_{t-i} + \delta_3 LFD_{t-i} + \delta_4 LGDP_{t-i} + \delta_5 LEC_{t-i} + \varepsilon_{1t} \quad (7)$$

$$ECT_t = CO2_t - \alpha_2 - \sum_{i=1}^{p} \beta_{2i} CO2_{t-i} - \sum_{i=0}^{q_1} \eta_{1i} \Delta FDI_{t-1} + \sum_{i=0}^{q_2} \gamma_{1i} \Delta FD_{t-1} + \sum_{i=0}^{q_3} \theta_{1i} \Delta HC_{t-1} + \sum_{i=0}^{q_4} \pi_{1i} \Delta GDP_{t-1} + \sum_{i=0}^{q_5} \phi_{1i} \Delta EC_{t-1} \quad (8)$$

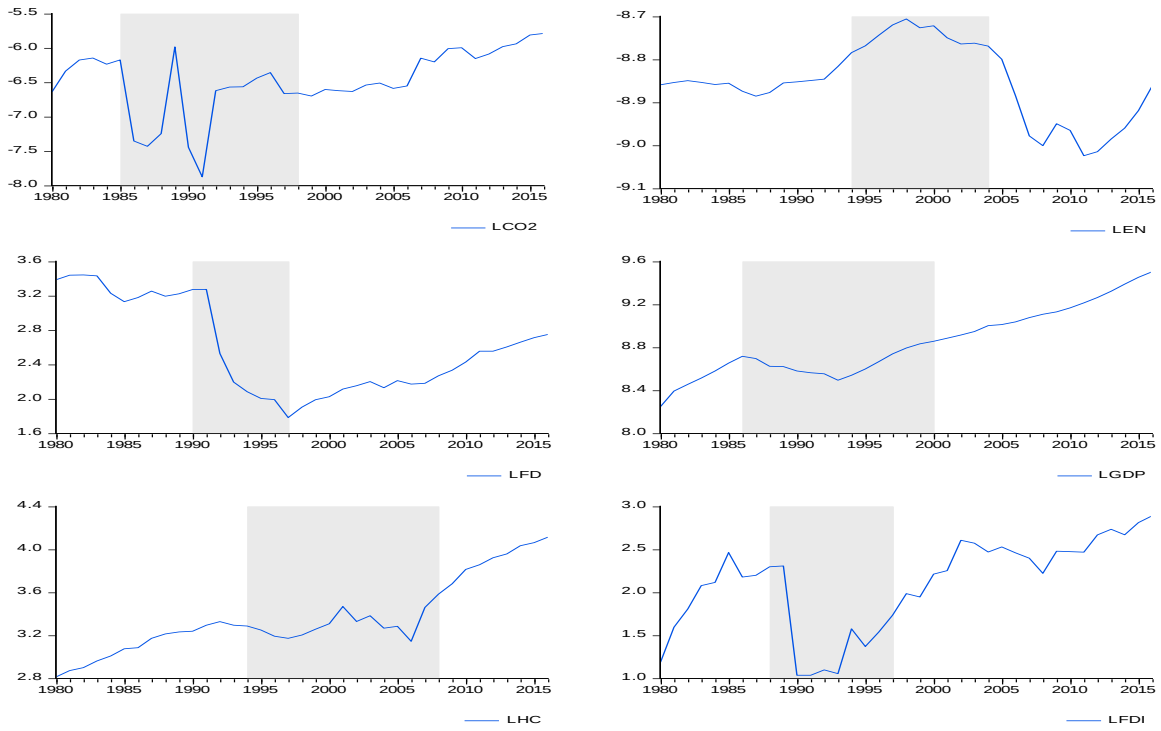
The parameters that show the corresponding long-run multipliers are given by δ_i, where I = 1,2,3,4,5. Meanwhile, the short run coefficients of the ARDL model are represented with β_i, η_i, γ_i, θ_i, $\pi_i$and ϕ_i. In the ARDL bounds testing approach, we have two stages. The first stage is to investigate whether a long-run relationship exist between the variables in equation 7. In this regard, an appropriate lag length is selected, based on the Schwartz Bayesian Criteria (SBC). The bounds testing procedure is based on the joint F-statistics or Wald statistics that examine the null hypothesis of no co-integration, H_o: $\delta_i = 0$ against the alternative hypothesis of H_1: $\delta_i \neq 0$, I = 1,2,3,4,5.

In case the calculated F-statistic is above the upper band level, the null hypothesis is rejected, indicating the presence of co-integration. On the other hand, if it falls below the critical bound, the null hypothesis of no co-integration is not rejected and finally, but if it lies between the critical bounds then the result is inconclusive. The second stage is to estimate the long-run model, represented by equation 8.

5. EMPIRICAL RESULTS

The plot of Cameroon's annual data is presented in Figure 1 with two breakpoints. It is shown that the dates of these structural breaks in most cases point to: (a) Lake Nyos disaster and the petroleum crisis between 1985 to 1993 period, (b) the 1994 to 2004 local currency devaluation and the post-electoral crisis; and (c) the 2008 to 2009 financial crisis that affected many countries in the world, including Cameroon.

Figure 1: Plot of Cameroon's Actual Data with Two Breakpoints



The variables, model types, and the two structural breaks unit roots tests are depicted as shown in Table 1 below. According to Lee and Strazicich (2003), all the variables are stationary at a 5 percent significance level, and thus suitable to conduct the ARDL bounds tests .

Table 1: Lee and Strazicich (2003) Unit Root Tests

Series	*Model*	*Lag*	*Break times*	λ	t*-statistics*	*Critical values 5%*
$LCO2_t$	*Model C*	1	1986 1998	0.2 0.6	-6.27	-5.74
$LFDI_t$	*Model C*	3	1988 1997	0.2 0.6	-5.84	-5.74
LFD_t	*Model C*	3	1990 1997	0.2 0.6	-7.55	-5.74
$LGDP_t$	*Model C*	3	1986 2000	0.2 0.6	-5.45	-5.74

$\boldsymbol{LHC_t}$	*Model C*	2	1994 2008	0.4 0.6	-5.10	-5.65
$\boldsymbol{LEC_t}$	*Model C*	4	1994 2004	0.4 0.6	-4.95	-5.67

Note: *p*- values at the 5 % significance level were obtained from Lee and Strazicich (2003).

Before conducting the ARDL bounds tests, the lag structure is first selected with the help of the Akaike Information Criterion (AIC). The lag orders (3,3,2,3,3,3) are chosen, with critical values I (0) = 2.62 and I (1) = 3.79, significant at 5% level. From the analysis, we found that the calculated F-statistics is 11.41, and comparing it with the critical values, the null hypothesis is rejected, showing that there exists a long-run relationship between the variables.

Next, the estimation of the long-run coefficients of the ARDL (3, 3, 2, 3, 3, 3) model, is conducted and presented in Table 2. The results demonstrate that there exists a long-run relationship between the variables. It is deduced from the results that financial development and human capital are the variables that significantly impact carbon dioxide emissions (in the long run. Specifically, a 1% increase in foreign direct investment and financial development will raise carbon dioxide emissions by 0.01% and 1.34% respectively. Whereas, a 1% increase in economic growth, human capital and energy consumption will reduce carbon dioxide emissions by about 1.09 %, 3.71% and 0.99% correspondingly.

Table 2: Long-Run Model Estimates

Regressors	**Coefficients**	**t-values**
$LFDI_t$	0.011	0.980
LFD_t	1.342	0.034**
$LGDP_t$	-1.090	0.396
LHC_t	-3.713	0.051**
LEC_t	-0.989	0.411
DT_1	0.162	0.012**
DT_2	0.008	0.583
Diagnostic tests	**Test-statistics**	**p-value**
Heteroscedasticity (ARCH)	0.698	0.687
Normality test	0.221	0.895
Serial correlation LM	3.343	0.088

*and ** indicate significant at 1% and 5* level.

Furthermore, the results of the short-run model are presented in Table 3. These results suggest that foreign direct investment and economic growth are statistically significant in impacting carbon dioxide emissions in the short-run, meanwhile, financial development, *human capital* and energy consumptions do not. We equally note that economic growth and energy consumption are variables that dominate in augmenting carbon dioxide emissions in the short-run. The diagnostic tests demonstrate that this model is free from heteroscedasticity, normality, and serial correlation problems. Additionally, the coefficient of the error correction term, ECT (-1) is negative (-94.8%) and statistically significant at 5% level. This shows that about 95% of any deviation of carbon dioxide emissions in the short-run will be adjusted in the long-run and thus, support the existence of a long-run relationship between the variables.

Table 3: Short-Run Model Estimates

*and** indicate significant at 1% and 5% level

Regressors	Coefficient	t-values
ΔLEC_t **(-1)**	5.874	2.555**
ΔLFD_t	0.494	0.878
ΔLFD_t **(-1)**	-0.032	-2.777**
Δ$LFDI_t$	0.706	2.574**
Δ$LGDP_t$	9.901	4.960*
ΔLHC_t	-0.139	0.253
ΔLHC_t **(-2)**	1.234	2.136**
ΔLDT_1	0.153	7.690*
ΔLDT_2	0.007	0.574
ECT(-1)	-0.948	-3.014**

The following outcomes have been noted. Firtsly, education has a negative impact on carbon dioxide emissions in Cameroon and is in line with those of Goetz et al., (2016) and Roth (2017). This finding is supported with the fact that educated people often have good access to information, that makes them more environmentally friendly. Nonetheless, in some situations, people with a high level of education may adversely influence the environment through the output growth. For instance, a high accumulation of human capital through education could raise investment, consumption, economic growth, and carbon dioxide emission. Focusing on financial development, we note that it has a positive impact on carbon dioxide emission, which supports the previous work of Moghadam and Lotfalipour (2015). Meanwhile, Li et al., (2015) and Saud et al., (2019) settled for a negative relationship between financial development and carbon dioxide emission.

Moreover, a negative relationship was established between economic growth and carbon dioxide emission, which indicates that pollution turn to fall when economic growth increases. This result is in line with the works of Bond et al., (2015), Valadez and Hu (2016) and Ali (2018) but contradicts the previous findings by Fakher and Abedi (2017) and Hundie (2018). It was equally shown that foreign direct investment is positive but statistically insignificant to impact carbon dioxide emission in the long run. The positive links between foreign direct investment and carbon dioxide emission, thus support the relevance of the pollution havens hypothesis in Cameroon. This is partially because foreign firms turn to rip the developing countries from their natural resources by producing goods that are harmful to the quality of the environment (Libanda et al., 2017). This outcome is in line with that of Abdouli and Hammami (2017) but invalidates the work of of Joysri (2009).

The causal effects between financial development, foreign direct investment, economic growth, human capital, energy consumption and environmental quality is tested, using the Tada-Yamamoto (TY) causality test method. The results as shown in Table 4, indicate that, unidirectional causality runs from carbon dioxide to human capital, economic growth and foreign direct investment at 95% confidence interval.

We also find other unidirectional causalities, running from economic growth to human capital and from human capital to foreign direct investment. Meanwhile, bidirectional causalities flow between human capital and energy consumption, between human capital and financial development and finally, between financial development and foreign direct investment. Interestingly, the TY causality result also confirmed that financial development and energy consumption do not cause carbon dioxide emission in the short run. In the theoretical literature part of this study, we mentioned three nexus between human capital, financial development, economic growth, foreign direct investment, energy consumption and environmental quality. Based on the hypothesized theory, this finding, support the neutrality hypothesis in Cameroon, where no causal effect runs between energy consumption and economic growth.

Table 4: Toda-Yamamoto Causality Tests

Dependent Variables	$LCO2_t$	LEC_t	LFD_t	$LFDI_t$	$LGDP_t$	LHC_t
$LCO2_t$	--	[2.366] (0.500)	[5.430] (0.143)	[10.966] (0.012)**	[27.133] (0.000)*	[9.262] (0.026)**
LEC_t	[0.884] (0.830)	--	[4.023] (0.259)	[1.655] (0.647)	[0.801] (0.849)	[8.191] (0.042)**
LFD_t	[0.868] (0.829)	[1.709] (0.635)	--	[8.601] (0.035)**	[0.471] (0.925)	[8.840] (0.032)**
$LFDI_t$	[0.769] (0.857)	[0.901] (0.825)	[18.636] (0.000)*	--	[0.214] (0.975)	[7.009] (0.072)
$LGDP_t$	[2.855] (0.415)	[0.581] (0.901)	[1.854] (0.603)	[17.756] (0.001)*	--	[7.610] (0.055)**
LHC_t	[0.752] (0.861)	[7.774] (0.051)**	[7.909] (0.048)**	[7.637] (0.054)**	[1.666] (0.645)	--

*and ** indicate significant at 1% and 5% level and the value in [ ] and ( ) represent Chi sq. statistics and p-values.

Finally, the stability of the model is checked by applying the CUSUM and the CUSUM of square tests as shown in Figures 2 and 3 below. Both tests pinpoint that the estimated coefficients are stable at a 5% level of significance. From these results, it is concluded that this model is stable and may not lead to a biased estimate.

Figure 2: CUSUM at 5 % significance

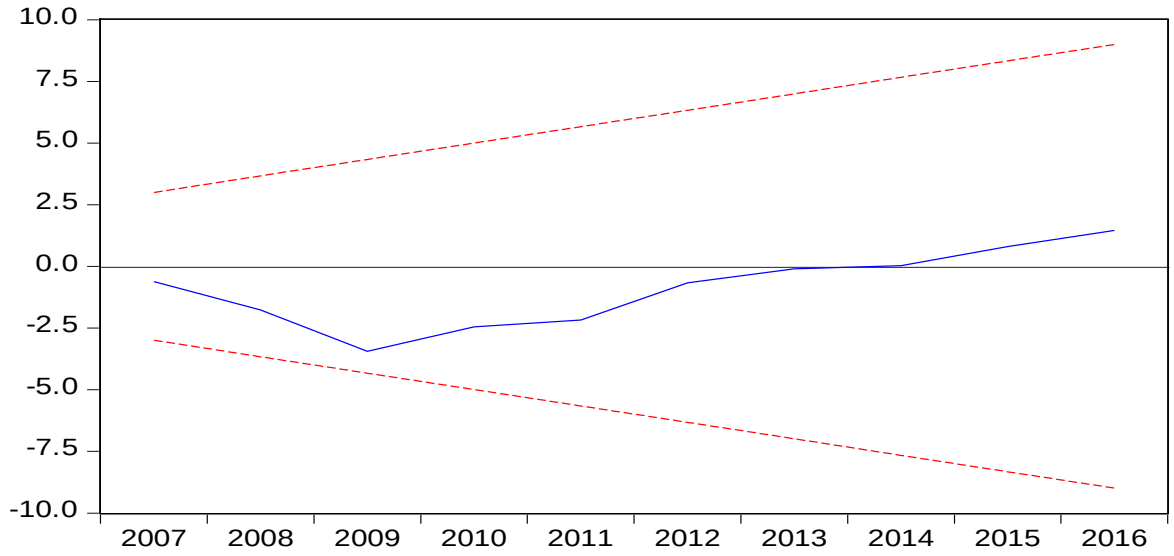
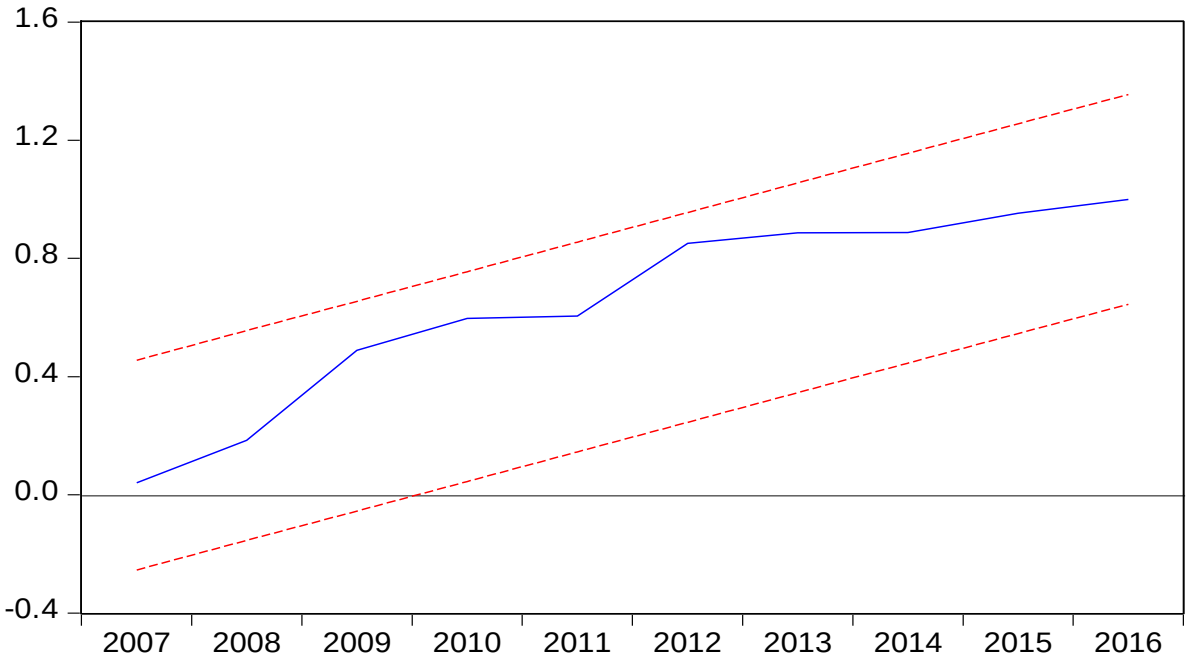


Figure 3: CUSUM of Squares at 5 % Significance



6. CONCLUSION

This study aims to investigate the factors affecting environmental quality in Cameroon. The ARDL bounds tests reveal that the calculated F-statistics is more than the critical values, indicating the presence of a long-run relationship among the variables. We also found that the ECT (-1) is negative (-94.8%) and statistically significant at 5% level. This shows that about 95% of deviation in the previous year will be adjusted in the long-run. Specifically, a 1% increase in $LFDI_t$ and LFD_t will raise $LCO2_t$ by 0.01% and 1.34% respectively. Meanwhile, a 1% increase in $LGDP_t$ and LHC_t reduce$LCO2_t$ by close to 1.09 % and 3.71% respectively. From these results, it is deduced that human capital (LHC_t) is an important variable that contributes in improving the quality of the environment. As a recommendation, the government should develop measures that raise the level of human capital. Also, a more technical system of education couple with high enrollment of women in higher education should be encouraged. Moreover, a negative association is settled between economic growth and carbon dioxide emissions. This negative relationship between these two constructs indicates that, pollution turn to decrease when income increases and thus support the relevant of environmental Kuznets curve (EKC) in Cameroon. It is therefore crucial for the government to implement growth and eco-friendly policies that mitigate the spread of pollution. Above all, we found that financial development is significant and positively related to carbon dioxide emissions. This implies that financial development acts as a stimulus in raising environmental pollution in Cameroon. It is therefore mandatory for policy-makers to develop strategies that mitigate the spread of pollution by encouraging the practice of green and sustainable finance. Moreover, the government should develop the financial systems in a way that promotes inclusive finance among the younger generations and women in particular. Finally, a positive long-run relationship is found between foreign direct investment and carbon dioxide emissions, indicating that the pollution havens hypothesis is relevant in Cameroon. It is therefore recommended that the government should develop policies that attract environmentally friendly products to Cameroon.

REFERENCES

Aali-Bujari, A., Venegas-Martínez, F., & Palafox-Roca, A. O. (2017). Impact of Energy Consumption on Economic Growth in Major Organization for Economic Cooperation and Development Economies (1977-2014): A Panel Data Approach. *International Journal of Energy Economics and Policy*, *7*(72), 18–25.

Abdouli, M., & Hammami, S. (2017). The Impact of FDI Inflows and Environmental Quality on Economic Growth: an Empirical Study for the MENA

Countries. *Journal of the Knowledge Economy*, *8*(1), 254–278.

Aboagye, S. (2015). Towards Economic Growth and Development in Sub-Saharan Africa: Does That Mar the Environment? *The Department of Economics, University of Ghana, Accra*, 1–17.

Alam, M. S. and S. J. H. S. and N. A. and S. (2016). Financial development and environmental quality: The way forward. In *MPRA Working Paper* (Issue 46733).

Ali, M. (2018). Environmental Degradation in France : The Effects of FDI , Financial Development , and Energy Innovations. In *MPRA Working Paper* (Issue 26 July).

Awad, A., & Warsame, M. H. (2017). Climate Changes in Africa : Does Economic Growth Matter ? A Semi-parametric Approach. *International Journal of Energy Economics and Policy*, *7*(1), 1–8.

Beck, T. (2013). Finance for development : A research agenda. In *Development Dilemmas* (Issue September, pp. 4–27).

Bond, C. A., Burger, N., Nguyen, P., & Justice, R. (2015). Implications of Australian Economic Growth for Environmental Sustainability.

Brock, W. A., & Taylor, M. S. (2010). The Green Solow model. *Journal of Economic Growth*, *15*(2), 127–153.

Carillo, F., & Maietta, O. W. (2014). The Relationship between Economic Growth and Environmental Quality : The contributions of economic structure and agricultural policies. *New Medit N.*, *13*(1), 15–21.

Chakraborty, B., & Gupta, M. R. (2014). Human Capital Accumulation, Environmental Quality, Taxation and Endogenous Growth. In *Economic Research Unit, Indian Statistical Institute.* (pp. 193–215).

Fakher, H., & Abedi, Z. (2017). Relationship between Environmental Quality and Economic Growth in Developing Countries (based on Environmental Performance Index). *Environmental Energy and Economic Research*, *1*(3), 299–310.

Galeotti, M. (2007). Economic growth and the quality of the environment: Taking stock. *Environment, Development and Sustainability*, *9*(4), 427–454.

Goetz, S. J., Debertin, D. L., & Pagoulatos, A. (2016). Human Capital, Income, and Environmental Quality: A State-Level Analysis. *Agricultural and Resource Economics Review*, *27*(02), 200–208.

Grossman G.M. and A.B. Krueger (1995), Economic growth and the environment, The Quarterly Journal of Economics 110, 353-377.

Harrison, G. S. E. and A. E. (1997). Moving to Greener Pastures? Multinationals and the Pollution Haven Hypothesis 1(January), 1-18.

Hilaire, N., & Kaffo Fotio, H. (2014). Effects of Economic Growth on CO2 Emissions in the "Congo Basin" Countries. *International Journal of Economics and Finance*, *7*(1), 107–117.

Hundie, S. K. (2018). Modelling Energy Consumption , Carbon Dioxide Emissions and Economic Growth Nexus in Ethiopia : Evidence from Cointegration and Causality Analysis. *Turkish Journal of Agriculture - Food Science and Technology Available*, *6*(6), 699–709.

Ioannis Kostakis, S. L. and E. S. (2011). Foreign Direct Investment and Environmental Degradation: Further evidence from Brazil and Singapore. In *MPRA Working Paper* (Issue 46733).

Jesus Clemente, Antonio Montanes, M. R. (1998). Testing for a unit root in variables with a double change in the mean. *Economics Letters 59*(October), 175–182.

Johansen, S. (1988). Statistical Analisis of Cointegration Vectors. *Journal Of Economic Dynamics and Control*, *12*(September), 231–254.

Joysri, A. (2009). Fdi , Growth and the Environment : Evidence From India on Co2 Emission During the Last Two Decades. *Journal of Economic Development*, *34*(1), 43–58.

Kuznets, S. (1955). Economic Growth and Income Inequality. *The American Economic Review*, *45*(1).

Lee, J., & Strazicich, M. C. (2003). Minimum Lagrange Multiple Unit Root Test With Two Structural Breaks. *Review of Economics and Statistics*, *85*(4), 1082–1089.

Levine, R. (1997). Financial development and economic growth: views and agenda. *Journal of Economic Literature*, *XXXV*(June), 688–726.

Levine, R. (2005). Chapter 12 Finance and Growth: Theory and Evidence. In *Handbook of Economic Growth* (Vol. 1, Issue SUPPL. PART A, pp. 865–934).

Li, S., Zhang, J., & Ma, Y. (2015). Financial development, environmental quality and economic growth. *Sustainability (Switzerland)*, *7*(7), 9395–9416.

Libanda, J., Marshall, D., & Nyasa, L. (2017). The Effect of Foreign Direct Investment on Economic Growth of Developing Countries: The Case of

Zambia. *British Journal of Economics, Management & Trade*, *16*(2), 1–15.

Moghadam, H. E., & Lotfalipour, M. R. (2015). Impact of Financial Development on the Environmental Quality in Iran. *Chinese Business Review*, *13*(09), 537–551.

Mugableh, M. I. (2013). Analysing the CO2 Emissions Function in Malaysia: Autoregressive Distributed Lag Approach. *Procedia Economics and Finance*, *5*(13), 571–580.

Munir, S., Chaudhry, I. S., & Akhtar, M. H. (2013). Financial Liberalization and Economic Growth in Pakistan: Empirical Evidence from Co-integration Analysis. In *Pakistan Journal of Social Sciences* 33(2), 227–241.

N. Agarwal, R. (2012). Economic Globalisation, Growth and the Environment: Testing of Environment Kuznet Curve Hypothesis for Malaysia. *Journal of Business & Financial Affairs*, *01*(02), 1–8.

Oxfam. (2020). Britons reach Africans' annual carbon emissions in just two weeks. https://www.theguardian.com/environment/2020

Petrosillo, I., Zurlini, G., Corlianò, M. E., Zaccarelli, N., & Dadamo, M. (2007). Tourist perception of recreational environment and management in a marine protected area. *Landscape and Urban Planning*, *79*(1), 29–37.

Phimphanthavong, H. (2013). The Impacts of Economic Growth on Environmental Conditions in Laos. *Int.J.Buss.Mgt.Eco.Res., 4*(5), 766–774.

Phuong, N. D., Thi, L., & Tuyen, M. (2018). The Relationship between Foreign Direct Investment, Economic Growth and Environmental Pollution in Vietnam : An Autoregressive Distributed Lags Approach. *International Journal of Energy Economics and Policy*, *8*(5), 138–145.

Roth, S. (2017). Air pollution, educational achievements, and human capital formation. In *IZA World of Labor* (Issue August).

Saidi, K., & Hammami, S. (2015). The impact of CO2 emissions and economic growth on energy consumption in 58 countries. *Energy Reports*, *1*, 62–70.

Saud, S., Chen, S., Danish, & Haseeb, A. (2019). Impact of financial development and economic growth on environmental quality: an empirical analysis from Belt and Road Initiative (BRI) countries. *Environmental Science and Pollution Research*, *26*(3), 2253–2269.

Sehrawat, M., Giri, A. K., & Mohapatra, G. (2015). The impact of financial development, economic growth and energy consumption on environmental degradation: Evidence from India. *Management of Environmental Quality: An International Journal*, *26*(5), 666–682.

Selden T.M. and D.S. Song (1994), Environmental quality and development: is there a Kuznets curve for air pollution emissions?, Journal of Environmental Economics & Management 27, 147-162.

Soren Johansen, K. J. (1990). Maximum liklihood Estimation and Inference on Cointegration-witth Applications to the Demand for money. *Oxford Bulletin of Economics and Statistics*, *52* (2), 0305-9049.

The World Bank Report. (2009). The World Bank Annual Report. In *The World Bank Annual Report*.

Torras, M., & Boyce, J. K. (1998). Income, inequality, and pollution: A reassessment of the environmental Kuznets curve. *Ecological Economics*, *25*(2), 147–160.

Valadez, G. V., & Hu, J. (2016). Relationship between the Environment and Economic Growth in China via Exports : A Perspective of Ecological Impact (2000-2014). *Journal of Environmental Protection*, *7*(2152–2219), 1670–1692.

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CASUAL RELATION BETWEEN NUMBER OF TOURISTS AND EXCHANGE RATES: AN IMPLEMENTATION FOR TURKEY

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ABSTRACT

Objective - The aim of this study is to determine the importance of foreign exchange inflow by examining the relationship between exchange rate and number of tourists with an econometric analysis. The effect of changing exchange rates on the number of tourists coming to Turkey, and whether the expenditures of the incoming tourists has an impact on the exchange rates is determined with an empirical analysis.
Methodology - Granger Causality Tests and the econometric model of Toda and Yamamoto were used in the study to analyze the relationship between tourist number and exchange rate. In addition, Augmented Dickey-Fuller (ADF) unit root test was also employed to determine the order stationarity of variables.
Findings - The study found a unilateral causality relationship between the number of tourists and the exchange rate. At this point, there is an unilateral causality relationship from the exchange rate to the number of tourists. While the exchange rate affects the number of tourists, the number of tourists does not affect the exchange rate.
Conclusion- In conclusion, it was stated with an econometric analysis that fluctuations in the exchange rate affect the number of tourists coming to Turkey and, the economic activities of tourists coming to Turkey do not affect the exchange rates.

Keywords: Tourism, tourist, exchange rate, Toda and Yamamoto Econometric model, VAR analysis.
JEL Codes: E00, F00, Z30

1. INTRODUCTION

With the globalization trend that have had an enormous impact on the whole world since the 1980s, the geographical boundaries have lost their importance. The rapid development in mass media and innovations such as smartphones, internet, satellite connections, fiber optic cables, etc. have caused geographical boundaries to lose their importance. The increase in mobilization between people as well as objects is a natural result of this process. Exploring the world which has become a global village, journeys to unknown places, and transportation to popular areas of interest and curiosity and has become easier.

The tourism sector seems to never lose its popularity in the world economy. On the contrary it gradually increases its importance over time. The world economy is based mainly on the service sector. Tourism is one of the most important sub-components of the service sector. Tourism sector, which plays an important role in the growth and development of countries, is also called 'chimney-free industry'.

Countries with archaeological, cultural, historical and natural beauties combine this advantage with the elements of 'tourism demand' and increase tourism profits. The profit of capital, combined with the labor-intensive service sector, bring about both capital inflow and a rise in employment levels in countries. (Şen & Şit, 2015:6752). The 'foreign exchange-earning' feature of the tourism sector is quite remarkable. The tourism sector stands out as a vital source of foreign exchange, especially in achieving the balance of foreign trade in developing countries. (Uğuz and Topbaş, 2011: 2)

A competitive strategy based on factor costs and price competition is being pursued in the tourism sector, which is one of the subcomponents of the service sector in Turkey. This strategy also makes exchange rate shocks created by fluctuations in foreign exchange markets, critical for the sector. Foreign currency volatility compared to other sectors is affecting the tourism sector rapidly. Terrorism, pandemic diseases, natural disasters, internal turmoil and political turmoil, which negatively affect tourism demand, stand out as 'sources of shock'.

Economic shocks, on the other hand, find themselves a new area of discussion in the literature. Some of these economic shocks occur as a result of developments such as fluctuations in oil prices and exchange rate shocks. For the tourism sector, which attracts fixed capital investments that can be considered risky, movements in exchange rates are perhaps one of the most important topics to follow.

The effect of any development in foreign exchange rates on Turkish tourism depends on the competitiveness of Turkish tourism in the world. The increase in the demand for Turkish tourism and an increase in the number of foreigners entering the country in response to any decrease in the exchange rate shows that, Turkish tourism has the quality to offer world-class service in response to this demand.

As tourism goods and services will become relatively cheap when the exchange rate rises, the increase in demand is expected to reflect positively on the country's tourism revenues. Otherwise, the country's tourism revenues fall into a downward trend. Therefore, the relationship of tourism revenues with the real exchange rate is of interest to researchers and policy makers. In this study, firstly the concepts of tourism sector and revenues, exchange rate and economic shock, secondly the relationship between the tourism sector, the number of incoming tourists and exchange rates were explained with a literature review. Finally, the relationship between the number of tourists coming to Turkey and the exchange rates was tested with Toda-Yamamato causality analysis with annual data covering the period of 1985-2019.

2. LITERATURE REVIEW

When studies evaluated within the scope of the literature survey are examined, it can be seen the relationship between exchange rate and tourism income is discussed within the framework of different variables and models. In this context, dependent variables of models are generally identified as tourism revenues, while it is shown that independent variables differ, and in addition to the real exchange rate; number of tourists, hotel prices, real GDP, world income and investment in tourism variables are also used. The number of studies examining the relationship between tourism revenues and economic growth is quite high. In his study, Crouch (1994) stated that the exchange rate has a key role in predicting tourism demand.

In a study on Singapore, conducted by Toh and Khan (1997), it was revealed that changes in exchange rate and tourist income, expressed 94% of the number of incoming tourists. Webber (2001) analyzed the relationship between Australian Tourism and the exchange rate by examining the quarterly data between 1983 and 1997 with Johansen and Granger Analyses, and concluded that changes in the exchange rate explained tourism demands by half. Dritsakis (2004) detected a strong Granger causality relationship between tourism revenues and the real exchange rate in Greece, with quarterly data from 1960-2000. Patsoaritis et al (2005) examined Greek tourism through regression analysis and found a strong correlation between tourism earnings and the real exchange rate. Eugenio-Martin and Morales (2004) found a weak relationship between exchange rate, tourism earnings and purchasing power parity after conducting Panel Data Analysis.

Employing ARDL analysis, Mervar and Payne (2007) found the impact of the exchange rate on demand for Croatian tourism to be weak in their study which covers the years 1994-2004.

In the framework of a reverse causality relationship, Narayan (2004) concluded that an increase of a country's currency against other country currencies contributes to the development of tourism along with wage increases.

Demirel et al. (2008) did not find a significant correlation between changes in exchange rates and tourist numbers in their studies. For tourists coming to Turkey from countries such as France, Germany, USA and UK, the exchange rate does not stand out as a meaningful variable.

In a study conducted by Sivri (2010), the number of tourists who came to Turkey between 1963-2008, their expenditures and the stagnation of tourist expenditures per capita was examined. Zivot-Andrews and Lee-Strazicich tests were employed and it was concluded that the series were stationary.

In his study, Belloumi (2010) examined Tunisia's data from 1970-2007 with the method of Cointegration and Granger causation; and concluded that there was a long-term relationship between the real exchange rate and tourism revenues and growth variables.

In his study, Ghartey (2010) examined Jamaica's data from 1963-2008 using the method of Cointegration, Granger causation and ADL model. As a result of the study, there is a unilateral causality from long-term tourist revenues towards the exchange rate variable. There is no causality from economic growth to the exchange rate variable.

Mahmoudina et al. (2011) examined the relationships between economic growth and tourism revenues in Mena countries (1995-2007). As a result of their research, they found that there was a bilateral causality relationship between tourism revenues and economic growth in the short and long term. In addition, it was determined that there was a unilateral causality relationship from exchange rate to economic growth and from exchange rate to tourism revenues.

In their study, which employed cointegration and EGARCH models, Uğuz and Topbaş (2011) concluded that there was a statistically significant long-term relationship between the exchange rate, tourism demand and exchange rate volatility variables in the data of the years between 1990 and 2010 in Turkey.

Erkan et al. (2013) examined the relationship between tourism revenues and number of tourists in Turkey between 2005-2012 with VAR analysis and Granger causality test. As a result of their research, they concluded that there is a bilateral causal relationship between tourism revenues and the number of tourists in Turkey and that the real exchange rate does not have any effect on tourism revenues.

In his study, Tang (2013) investigated the relationship between tourism revenues and real income in Malaysia between 1974-2009 by using the Granger causality test. As a result of his research, he concluded that while the existence of a causal relationship between tourism revenues and real income could not be determined in the short term, there was no bi-directional causal relationship in the long term.

In their study, Jayat & Hilake (2013) examined Sri Lanka's data between 1967 and 2011 with the method of Cointegration and Granger causation, and concluded that in the long term, there was a causality relationship between real GDP, international tourism income and real exchange rate. The results of the analysis support tourism-based growth. There is a unilateral causality relationship from tourist incomes towards economic growth.

Kılıç & Bayar (2014) examined the relationship between real exchange rate, tourism revenues and investments in Turkey between 1994-2013. As a result of their research, they concluded that there is a long-term positive relationship between real exchange rate, tourism revenues and investments.

In their study, which employs Frequency Distribution and Bootsrap based Toda Yamamoto Causality method, Şen & Şit (2015) concluded that between 2000 and 2012, the real exchange rate in Turkey had an effect on Turkey's tourism revenues, and tourism revenues affected the real exchange rate.

Using the data from Andalusia, Spain between 2005 and 2012 with the Multiple Regression analysis and Least Squares method, Nasir et al. (2015), concluded that the real exchange rate, the number of international tourists, hotel prices and the number of star hotels are important factors affecting tourism revenues.

In his study, Koyuncu (2015) tested the data between 1980 and 2014 of Turkey with the Granger causality method. The study revealed that there is a unilateral causality relationship between tourism income and current account deficit, unilateral relationship between growth and tourism income, bilateral relationship between growth and tourism income, and unilateral causality relationship between tourism income and exchange rate.

In their study, Barati and Ranjbar (2016) found that real national income and exchange rate coefficients had a positive relationship with tourism income in Latin America, Southeast Asia and Iran (1995-2011).

3. TOURISM AND TOURISM POTENTIAL OF TURKEY WITH ITS FOREIGN EXCHANGE-EARNING FEATURE

Today, the tourism sector is one of the leading income-generating factors in the world economy. Tourism income is too important for developing countries to ignore because of the positive economic effects it creates on the macroeconomic performance of countries such as creating jobs, providing foreign currency, and becoming a source of income for the government. (Değer,2006: 7).

Large amounts of investments make tourism a thriving sector. Tourism is regarded as one of the most important service sectors that enables a country to gain profit in economic, social and cultural areas. Therefore, the developed and developing countries with tourism potential, especially with the emphasis on international tourism activities, aim to raise the level of welfare both to accelerate their economic development and to spread revenue to the base of population in their countries (Aktaş, Kaplan and Kocaman, 2013: 755).

Tourism income is included in the international services section of the current account and is an important income item for countries. Thanks to this feature, tourism income contributes to the growth of national income and the development of countries. Tourism, which is considered as an important source of income, has great importance in terms of foreign exchange revenues that it provides to countries and its contribution to financing the foreign and internal budget deficits of countries. On the other hand, it has important effects in reducing the burden of unemployment problem by creating employment opportunities. Tourism activities show an increasing rate of development in the world economy.

Tourism income also facilitates convergence between countries by contributing to its distribution from rich countries to poorer countries, from developed to developing and underdeveloped countries. In this way, tourism also helps regional development and allows reducing regional economic disparities. Therefore, the investments, which will be made in the tourism sector, will have a positive impact on the progress of the underdeveloped regions. (Bahar and Bozkurt, 2010: 255).

The service sector is a labor-intensive sector that includes tourism. In developing countries such as Turkey, where capital is insufficient but labor is intensive, the growth of the tourism sector is viewed as an opportunity to contribute to the increase of the national income of the country. These labor-intensive countries increase their employment levels and thus their national income by providing more foreign exchange inputs to their countries through the growth of the tourism sector (Yamak, Tanrıöver and Güneysu, 2012: 206).

On the other hand, other sectors with which the tourism sector is connected can increase their production and thus their employment depending on the development of tourism. In this context, the development of tourism sector in developing countries creates growth in agriculture, industry, trade and services sectors, encouraging the increase of the country's production.

Especially after 1980, the tourism sector in Turkey experienced a great surge and today it has become one of the indispensable cornerstones of the country's development. This rapid rise of tourism in the Turkish economy undoubtedly has a very important place in the investment incentives and financial support, which was provided to the sectors by the “Tourism Incentive Law” No. 2634, which was enacted in 1982.

Due to Turkey's geographical, historical and cultural resources, Turkey is an attractive touristic center with extensive amenities such as health tourism, thermal tourism, cultural tourism, adventure tourism, golf tourism, religious tourism, congress tourism and winter tourism in addition to sun-sea-sand tourism what we call the classic holiday. With the worldview changing in parallel with the social and economic developments in developed countries, the importance attached to the lifestyle and life quality is both increasing and differentiating.

The use of natural resources is increasingly preferred in protecting human health and maintaining a healthy life. At this point, Turkey has the potential to be very ambitious in the development of modern health and thermal tourism with its traditional hot springs and Turkish baths. Turkey is among the most preferred countries in the world for offering quality and economical prices in healthcare services. In addition, its proximity to European countries, its easy access to the major cities of the world and its abundance of conference facilities, its first class location for meetings and congresses, enhance congress tourism in Turkey.

Thanks to its geographical structure, vegetation, suitable climatic features, outstanding landscape values and rural lifestyle with an emphasis on traditional values, Turkey is extremely suitable for adventure tourism, hunting tourism, winter tourism, the sports of mountaineering and speleology. For the development of religious tourism of the three Abrahamic religions -Islam, Christianity, Judaism, it is aimed to increase the number of visitors with the improvement of the important extant pilgrimage centers by considering aspects such as the landscaping, lighting, transportation, etc. and by promoting (Republic of Turkey Ministry of Culture and Tourism, 2014).

Turkey is a very rich country in terms of alternative tourism opportunities, which can be sustained both in summer and winter months. However, since tourism has been viewed only as a foreign exchange generating element in an unplanned development for years, mass tourism, that target sea-sand-sun, has been highlighted in the areas of promotion, marketing, investment and encouragement. Alternative tourism opportunities have been ignored. Turkey's historical and cultural advantages and unique natural beauties have been forgotten all over the world. The Ministry of Culture and Tourism has determined the targets to realize in the tourism sector with the "Tourism Strategy of Turkey (2023)".

With this strategy, Turkey will expand the tourism season throughout the year by developing alternative tourism opportunities as well as coastal tourism. Thus, it is aimed to increase the share of international tourism revenue.

4. METHODOLOGY AND DATA

In this part of the study, the relationship between the number of tourists (TOUR) and the exchange rate (ER) was examined empirically. Depending on the availability of the data, study used annual data which covers the period of 1985-2019. The data were obtained from the tourism statistics of the Central Bank of the Republic of Turkey, TÜİK and TÜRSAB. Finally, in empirical analysis, the logarithm of variables was taken.

In this study, causality analysis proposed by Toda and Yamamoto (1995) was used to examine the relationship between exchange rate and number of tourists. The advantage of this method developed by Toda and Yamamoto (1995) is that it enables accessing to causality findings through the VAR model independently of the inter-series cointegrated relationship.

In the Toda-Yamamoto causality test, time series form a VAR model using level values of numerous levels - it does not matter which level- of order stationarity. In this test, which consists of two stages, firstly the optimal delay length is determined and the maximum degree of integration (dmax) is determined for the series that are subject to application. Determining the appropriate delay length for the VAR model is carried out using criteria such as Akaike and Hannan-Quinn. Thus, the augmented VAR model which includes the delay length of K+dmax is estimated with the detection of k, the optimal delay length with dmax, the maximum degree of integration. In the second phase, Wald tests are applied to the k delayed VAR coefficient Matrix, hence Granger causality-related inferences can be made.

Another advantage of this method proposed by Toda Yamamoto is that it allows causality inferences based on the VAR model regardless of whether the series are cointegrated or not. In addition, the fact that this approach does not require the use of some pre-tests, which are necessary for unit root tests, also makes the Toda Yamamato test more preferable.

On the procedural side of the Toda Yamamoto test, which can be applied to the level values of the series, an improved Wald test (MWALD), which applies restriction tests to the parameters of K-delayed VAR model is used. The first step of this two-step procedure is to determine the optimal length of k delay and the maximum degree of integration (dmax) for the series in the system. Criteria such as Akaike and Hannan-Quinn can be used to determine the appropriate delay length for the VAR model. With the determination of optimal delay length (k) and maximum degree of integration (dmax), an improved VAR model containing a total delay length of k+dmax can be estimated. The second step of the procedure is performed by applying Wald tests to the VAR coefficient matrix with a delay length of k, which has been obtained to make inferences based on Granger causality.

5. EMPIRICAL RESULTS

In addition, firstly Augmented Dickey-Fuller (ADF) unit root test was also employed to determine the order stationarity of variables. The results of ADF unit root tests applied to the levels and first differences of variables are presented in the table.

Table 1: ADF Unit Root Test Results of the Levels and Differences of Variables

Augmented Dickey-Fuller (ADF) unit Root Test		
Variables	**Delay Length**	**t-statistic**
MIN	0	-0.74594
TOUR	3	-1.96657
ΔMIN	0	-5.29151*
ΔTOUR	3	-4.57305*

Notes: The symbol of * shows that the existence of the unit root with the zero hypothesis at the level of 5% significance is rejected. Delay lengths were determined using the Akaike Information Criterion (AIC). The symbol of "Δ" shows that the first level of difference of series is taken.

Firstly, expanded Dickey-Fuller (ADF) and Phillips-Perron (PP) unit root tests were used to determine the stasis order of variables during the investigation of the relationship between variables, with causality analysis developed by Toda and Yamamoto (1995). According to the results of the ADF unit root test, shown in Table 1, the exchange rate and number of tourists' variables are first-order stationary variables. The models established for the Toda-Yamamoto causality test adapted to the study are as follows:

$$DK_t = \alpha_1 + \sum_{i=1}^{k+d\,max} \beta_{1i} TUR_{t-i} + \sum_{i=1}^{k+d\,max} \theta_{1i} DK_{t-i} + \varepsilon_{1t}$$

$$TUR = \alpha_2 + \sum_{i=1}^{k+d\,max} \beta_{2i} DK_{t-i} + \sum_{i=1}^{k+d\,max} \theta_{2i} TUR_{t-i} + \varepsilon_{2t}$$

Accordingly, k was designated as "1" according to the VAR model, dmax as "1", and the augmented VAR(2) model was estimated by the seemingly unrelated regression method. The causality analysis results obtained by this model are shown in Table 2.

Table 2: Toda-Yamamoto Causation Analysis Results

Zero Hypothesis	Delay Length	MWWALD Statistic
$\boldsymbol{TOUR \not\rightarrow MIN}$	2	1.25292
$\boldsymbol{MIN \not\rightarrow TOUR}$	2	7.07020*

The symbol of * shows the rejection of the zero hypothesis at 5% significance level.

According to the results in Table 2, a unilateral causality relationship was found between the number of tourists and the exchange rate. Accordingly, there is a unilateral causality relationship from the exchange rate to the number of tourists. While the exchange rate affects the number of tourists, the number of tourists does not affect the exchange rate.

6. CONCLUSION

Tourism sector, which is one of the most important sub-sectors of the service sector, increases its importance in the world as a sector that increases employment in addition to the positive externalities it provides to the manufacturing industry, agriculture and other sectors. Especially in the post-1980 period, the importance of the tourism sector in Turkey has been increasing with each passing day.

Tourism contributes to Turkey's integration into the global economy, as well as being a sector that provides currency to Turkey. There is a significant competition in terms of tourism sector in the world. Local, global, socio-economical and socio-cultural developments effect immensely the conduct of tourism activities. Therefore, tourism industry has become a global concept.

In the face of the exchange rate changes and/or uncertainties of the process of price-based competition in the Turkish tourism sector, there is an impact on tourism demand. In theory, it is expected that a positive shock in the exchange rate will reduce the prices of tourism services in Turkey, in terms of said exchange rate type.

On the other hand, in the event of a negative shock in the exchange rate, the prices of tourism services in the country will rise in terms of the said exchange rate, and since the domestic currency will gain value against the foreign exchange, it is expected to have a negative effect on the tourism demand shock.

In this study, the effect of exchange rate changes on the number of tourists coming to Turkey was examined. The findings have shown that there is a unilateral causality relationship where the number of tourists coming to Turkey does not affect the exchange rates but the exchange rate triggers the number of tourists. It is also understood that tourism is still considered as a luxury, since it is heavily influenced by changes in consumer incomes.

For Turkey, the exchange rate has been determined to be an important variable for those who prefer the destination. At this point, it was shown that the fact that Turkey has a more suitable touristic product price than the European countries with which it competes against, has positively affected the tourism demand in the long term.

Holiday sales directed at domestic tourists are negatively affected by the rising prices and the depreciation of the Turkish Lira. In terms of foreign tourists, the rise in the value of the dollar and the euro against the Turkish Lira allows more tourists to come to our country. In order to achieve the objective of spending per capita on foreign currency basis in tourism income, it is necessary to attract tourists with high-income to our country and also to invest in environment and smart urbanism in tourism destinations.

The recent increase in exchange rates is expected to affect tourism in two ways. Firstly, with these exchange rate increases, the number of visitors is foreseen to increase as Turkey becomes slightly cheaper for foreigners. Secondly, it is estimated that there

may be a slowdown in foreign tourism due to the increase in foreign exchange rates making it more expensive for Turks, and that some shifts in domestic tourism may be experienced from there.

Turkey should increase its share of world tourism revenues which excess $ 1 trillion. For tourism, which is under the influence of many internal and external factors due to its structure, emergency response plans can be prepared which can be implemented in extraordinary situations and which take into account a large number of possibilities. Additionally, if the continuation of a healthy cooperation of industry representatives and policy makers, stable continuation of structural reforms and arrangements for tourism, actualizing productivity-enhancing innovations, development of alternative tourism types by diversifying tourism services such as winter tourism, health tourism, nature tourism, etc., and updating tourism policies in accordance with the current conditions can be achieved, then Turkey will be able to rise up in the world tourism league and increase its share.

REFERENCES

Aktaş, A. Rıza, Kaplan, F. ve Kocaman, S. (2013).“Turizm ile Ekonomik Büyüme Arasındaki İlişki: Akdeniz Ülkeleri Üzerine Bir Panel Veri Analizi”, *International Conference on Eurasian Economies*, p.755-760.

Bahar, O. ve Bozkurt, K. (2010). “Gelişmekte Olan Ülkelerde Turizm-Ekonomik Büyüme İlişkisi: Dinamik Panel Veri Analizi”, *Anatolia: Turizm Araştırmaları Dergisi,* 21,(2), (Güz), s.255-265.

Barati E. ve H. Ranjbar (2016). Granger causality and dynamic relationship between the actual values of receipt derived from tourism, national income and exchange tares in selected countries in selected countries with tourist attraction. *International business management*, 10 (16), 3389-3395.

Belloumİ M. (2010), “The Relationship between Tourism Receipt, Real Effective Exchange Rate and Economic Growth in Tunisia*”, International Journal of Tourism* Research,12(5):550 – 560

Değer, M. Kemal (2006). “Turizme ve İhracata Dayalı Büyüme: 1980-2005 Türkiye Deneyimi”, Atatürk Üniversitesi, *İktisadi ve İdari Bilimler Dergisi*, 20, s.68-86.

Demirel, B., Bozdağ, E. G. ve İnci, A. G. (2020, June 5). Döviz Kurlarındaki Dalgalanmaların Gelen Turist Sayısına Etkisi: Türkiye Örneği. Retrieved from http://www.deu.edu.tr/userweb/iibf_kongre/dosyalar/demirel.pdf.

Dritsakis, N. (2004), Tourism as a Long-run Economic Growth Factor: an Empirical Investigation for Greece using Causality Analysis. *Tourism Economics*, 10, 305-316.

Erkan B., Kara, O. ve Harbalıoğlu, M. (2013). Türkiye’de Turizm Gelirlerinin Belirleyicileri. *Akademik bakış dergisi,* S. 39, 1-20.

Eugenio-Martin ve Morales (2004).Tourism and Economic Growth in Latin American Countries: A Panel Data Approach, *Nota Di Lavoro* 26.

Ghartey E. E. (2010), “Tourism, “Economic Growth and Monetary Policy in Jamaica”,*11th Annual SALISES 2010 Conference in Port of Spain*, Trinidad-Tobago, 24-26 March, 1-25.

Jayathilake Bandula P. M. (2013), “Determinants of Demand for International Tourism in Sri Lanka: An Econometric Evaluation”, *International Journal of Business,* Economics and Law, vol. 2, issue. 2, 22-27.

Kılıç, C. ve Bayar, Y. (2014). Effects of Real exchange rate volatility on tourism receipts and expenditures in Turkey. *Advances in management & applied economics*, Vol. 4, No. 1. 89-101.

Koyuncu F. T. (2015), “Turizm Gelirinin Türkiye’nin Makro Ekonomik Performansına Katkısı: Ekonometrik Bir Çözümleme”, *Uluslararası Sosyal Araştırmalar Dergisi*, cilt. 8, sayı. 38, 959-968.

Mahmoudinia, D., Soderjani, E. S. & Pourshahabi, F. (2011). Economic growth, tourism receipts and exchange rate in MENA zone: Using panel causality technique. *Iranian economic review*, vol. 15, no.29, 129-146.

Mervar, A. ve Payne, J. (2007). Analysis of Foreign Tourism Demand for Croatian Destinations: Long-Run Elasticity Estimates, *Tourism Economics*, 13: 407-20.

Narayan, P.K. (2004). Economic Impact of Tourism on Fiji's Economy: Empirical Evidence from the Computable General Equilibrium Model. *Tourism Economics*, 10:419-33.

Nasir A. M., J. WU ve J. C. Guerrero (2015), “Economic Growth, Exchange Rate and Constrained Competiveness of the Tourism Sector in Andalucia”, *International Journal of Management and Economics*, No. 48, 84-100.

Patsouratis, V. Frangouli, Z. ve Anastasopoulos G. (2005). Competition in Tourism among the Mediterranean Countries. *Applied Economics*, 37:1865-70.

Sivri, U. (2010). Şokların Yabancı Ziyaretçi Sayısı ve Yabancı Ziyaretçi Harcamaları Üzerindeki Etkisi Kalıcı Mıdır? *TİSK Akademi Dergisi*, 5 (10), 220-237.

Crouch, G. I. (1994). The Study of International Tourism Demand: A Review of Findings. *Journal of Travel Research*, 12-23.

ŞEN A. ve ŞİT M. (2015). Reel Döviz Kurunun Türkiye'nin Turizm Gelirleri Üzerindeki Etkisinin Amprik Analizi", *Journal of Yaşar University*, 10/40, 6752-6762.

Tang, C.F. (2011) Is the tourism-led growth hypothesis valid for Malaysia? A view from disaggregated tourism markets. *International journal of tourism research*, 13, pp. 97-101.

Toda, H. Y.; Yamamoto, T., (1995). Statistical Inference in Vector Autoregression with Possibly Integrated Processes. *Journal of Econometrics*, Volume 66: 225-250.

Toh, R. S., H. Khan, and F. T. Ng (1997). Prospects for the Tourism Industry in Singapore: A Regression Model. *Cornell HRA Quarterly*, 38: 80-87.

Uğuz S. Ç. ve Topbaş F. (2011). Döviz Kuru Oynaklığı Turizm Talebi İlişkisi, Paper Presented at *EconAnadolu 2011:Anadolu International Conference in Economics* II June 15-17:1-11.

Webber A. (2001). Exchange Rate Votality and Coentegration in Tourism Demand. *Journal of Travel Research*, 39: 398.

Türkiye Cumhuriyeti Kültür ve Turizm Bakanlığı, (2014). Retrieved from http://www.kultur.gov.tr, Date of Access: 18.07.2020.

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THE GLOBALIZATION INDICATORS AND TOURISM DEVELOPMENT: A DYNAMIC PANEL-DATA ANALYSIS FOR MEDITERRANEAN COUNTRIES

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ABSTRACT

Purpose- This study investigates how economic, social and political globalization indicators influence tourism development from 1995 to 2018 in the context of eight Mediterranean countries economies.
Methodology- A group of econometric tests; regressions with ordinary least squares (OLS), fixed effects (FE), random effects (RE), dynamic OLS, fully modified OLS, and at the end, the GMM approaches have been estimated from panel data of this study to achieve accurate and unbiased results.
Findings- Globalization factors categorized EG (economic globalisation), SG (social globalization) and PG (political globalization) exert positively significant and positive effects on tourism development in the selected countries' tourism growth. An improvement in any one of these globalization factors would mean higher tourism growth in the countries.
Conclusion- The results indicate that economic, social, and political globalization are significant factors for tourism development. Thus, this study proves that economic, social, and political integration of countries are significant driving forces behind their tourism development. Empirical findings propose that tourism sector significantly encourages economic growth. Also, the globalisation has a long-term relationship with tourism development.

Keywords: Tourism development, globalization indicators, KOF Index, panel data analysis, economic growth
JEL Codes: F60, F65, F63

1. INTRODUCTION

The tourism sector not only makes a considerable contribution to the GDP but also plays an important role in terms of providing employment opportunities, reducing poverty, increasing income distribution, creating additional demand for goods and services, providing additional tax revenues and foreign exchange reserves for the governments.

With increasing globalization and opportunities around the world, most countries are initiating several policies to reach their targets of economic growth, and tourism has become one of the most significant tools for achieving this purpose.

This study uses annual data from 1995 to 2017 and employs a ordinary least squares (OLS), fixed effects (FE), random effects (RE), dynamic OLS, fully modified OLS and GMM for the empirical investigation. The reason for taking Mediterranean countries (Egypt, France, Greece, Italy, Morocco, Spain, Tunisia, and Turkey) as a focal point is that the recent developments in the Mediterranean region have shown that international tourist inflows could be sharply affected by external shocks (Ren, Can, et al.2019:2). Therefore, these countries should upgrade their market portfolios (inbound tourism basket) to attract tourists from richer countries. These adverse external shocks can be even more problematic for some of these countries, where economies largely depend on tourism earnings. Globalization is considered a determining factor with huge impact on tourism industry growth (Fereidouni, Al-Mulali, Najdi, 2014) as it expands the market and integrates societies; decreases geographical restrictions on socio cultural classifications (Friedman, 1999; Waters, 1995) increases the flow of people, ideas, and technologies (Albrow, 1996); and alters societies' economic, political, and cultural infrastructure. On the one hand, as a result of globalization, the tourism industry as a service trade became more sensitive to financial, economic, and political crises (Al-Rjoub, 2011; Kiani, 2011; Sinnakkannu and Nassir, 2008). On the other hand, Cohen (2012) claimed that globalization has had remarkable influence on the tourism industry's development (Javid and

Katircioglu, 2017:1). The literature has established the relationship between globalization indicators and TAs, no attention has been given to the relationship between globalization indicators and tourism development as measured by tourism expenditures (TEs) or as tourism receipts (TRs).

This study aims to broaden the tourism literature by assessing whether globalization indicators influence tourism development. More specifically, examines whether social globalization (SG), political globalization (PG), or economic globalization (EG) affect TAs (tourism arivals), TEs (tourism expenditures) or TRs (tourism receipts). In this research, the Konjunkturforschungsstelle (KOF) Globalization Index was used to evaluate these relationships; the KOF calculation method addresses globalization's economic, social, and political aspects. This study will implement the new measures developed by the KOF Index, along with various economic, social, and political elements to more meticulously analyze how globalization indicators affect tourism development. Due to the model we use, it will also generate significant value to policy and practice regarding tourism development. And also, these data will be quite beneficial for policymakers who need to understand how globalization indicators influence tourism development.

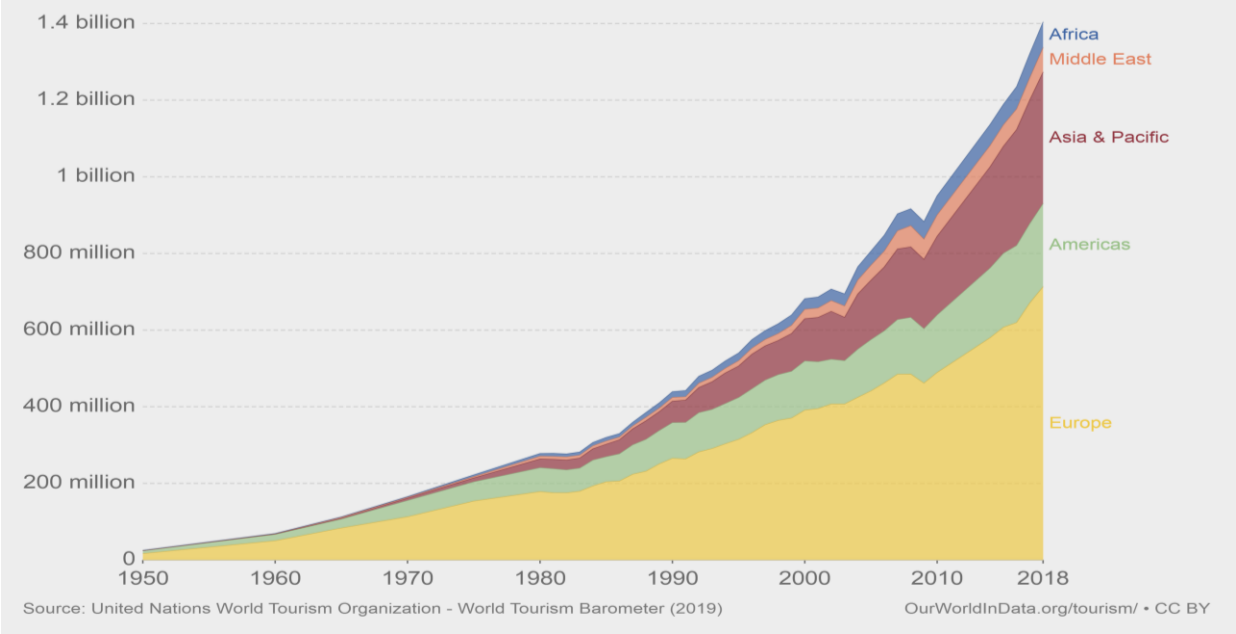
2. LITERATUR REVIEW

In spite of different approaches to the globalization phenomenon, in most definitions both economy and society are the important factors underlying the basis of the globalization of the world economy. As Boğa and Erkişi mentioned (2019), comparisons between previous studies are difficult because of different periods used and the share of tourism in total economy varies in selected countries. Kosolapov N.A.(2001), defines the globalisation the intensification of the crisis phenomena and weakening of the role of the national state the tendency to the unification of the power, the global expansion of the consumption means, the solution to the local problems in the context of the global community, the flexible and multi-center character of the international relations. According to Dreher (2006): *Globalization is a process that erodes national boundaries, integrates national economies, cultures, technologies and governance, and produces complex relations of mutual interdependence.*Objective indicators are helpful in determining which countries are or are about to be globalized, and these include the Maastricht Globalization Index (MGI) (Martens and Zywietz, 2006), which was created by the Dutch Research Institute, and the other one globalization index produced by the KOF Swiss Economic Institute introduced by Dreher et al., 2006. (Javic ve Katırcıoğlu, 2017:3) Unlike the Maastricht Globalisation Index, KOF Index does not take into account environmental factors. It was updated in 2008 by Dreher et al. and in 2019 by Gygli et al.

Dreher (2006) emphasizes that using trade or investment to GDP as a proxy for globalization provides less robust results, while using the KOF Globalization Index as a proxy for globalization yields more robust results. Dreher (2006) examines the impact of globalization on taxation using and updating a self-developed globalization index for 30 OECD countries over the period 1970-2000. The results show that globalization has a positive effect on capital tax rates (Sevinç, Yalaman ve Sevil, 2019: 355). Tourism can be relevantly described as a composite product or a "product-system", that is made up of technologically separate components which are sequentially linked into a value added chain whose final product is sold to the tourist (Petit and Salhi, 2013). The United Nations World Tourism Organization (UNWTO) estimates that internationally there were just 25 million tourist arrivals in 1950. 68 years later this number has increased to 1.4 billion international arrivals per year. Figure 1. shows the numbers by regions.

WTTC's (World Travel and Tourism Council) annual research shows the Travel and Tourism sector experienced 3.5% growth in 2019, outpacing that of the global economy (2.5%) for the ninth consecutive year. Over the past five years, one in four new jobs were created by the sector. In 2019, Travel andTourism's direct, indirect and induced impact accounted for: US$8.9 trillion contribution to the world's GDP, 10.3% of global GDP, 330 million jobs, 1 in 10 jobs around the World, US$1.7 trillion visitor exports (6.8% of total exports, 28.3% of global services exports), US$948 billion capital investment (4.3% of total investment) (https://wttc.org/Research/Economic-Impact).

Figure 1: International Tourist Arrivals by World Region



There are four approaches in tourism literature to examine the relationship between tourism and economic growth: the tourism-led growth hypothesis: tourism causes growth; the conservation hypothesis: growth causes tourism; the feedback hypothesis: bidirectional causality; and the neutrality hypothesis: no significant causality (Ren et.al.,2019:3).

Studies are particularly on the causality between tourism and economic growth and vary according to the various econometric methods using cross-sectional/panel data or time series. Seetanah (2010) found that tourism development was the main factor in explaining economic performance using a study which analyzed the relationship between tourism and economic growth in island countries by applying the Generalized Method of Moments (GMM) technique in dynamic panel data for the period of 1990-2007. Kum et al. (2015), analyzed the relationship between tourism activity and economic growth for the Future 11 countries using the data from 1995-2013 and a panel cointegration technique. They found a positive relationship between tourist arrivals and GDP. According to the results, a 1% increase in tourist arrivals increases GDP by 0.06% in the Future 11 countries. Tang and Abosedra (2014) have analyzed the impact of tourism on economic growth in 24 Middle East and North African (MENA) countries over the period 2001–2009. The findings demonstrate that tourism has a positive impact on growth. Similarly, Holzner (2011) has examined the efect of tourism on economic growth in 134 countries over the period 1970–2007 and the study concluded that tourism positively a_ects growth in the long run. In the panel data sample of 21 countries in the Mediterranean region (African, Asian and European countries), Tugcu, C.T. (2014) tested the causality (using the approach by Dumitrescu, E., I.; Hurlin, C. (2012) between tourism and growth over the period 1998–2011. The empirical results indicate that there is a bidirectional relationship between the variables of European and Asian countries. However, the paper also concludes that there is no relationship between tourism and growth in a sample of African countries.

Shahzad et al. (2017) conducted research on the top 10 tourist destinations to test the growth-cause tourism hypothesis by using the Quantile-to-Quantile (QQ) approach and a tourism index for the period 1990-2015. Although the results of the study revealed a positive relationship between these two variables, the relationship observed for China and Germany was weak. The authors attributed this result to the relatively lower share of tourism in these economies. Danish and Wang (2019) investigate the dynamic relationship between tourism, economic growth, and CO2 emissions from 1995 to 2014 in the context of BRICS economies. Empirical findings propose that tourism sector significantly encourages economic growth; however, tourism degrades the quality of the environment. Also, globalisation has a long-term relationship with economic growth but an insignificant relationship with CO2 emissions. The long-term elasticities further recommend that investment stimulate economic growth and mitigate CO2 emissions. Trunina et al. (2020) provide the globalization processes dynamics assessment in the theoretical approach and the impacts on the world travel market development. The interest of foreign tourists in Ukraine's history and culture will grow the tourism development, which will enable the country to preserve its cultural and historical heritage and to be successfully placed at the world travel market. Harun and Suprayitno (2012) examined general characteristics of Singapore's tourism industry and its role within the process of globalization. The output

of the study has shown that the price of consumer index (Index) have influence the increasing number of tourist to Singapore (TouS) in a positive way and only the total number of hotels in Singapore is the major factor that contributed to the tourism sector's income.

3. DATA AND METHODOLOGY

3.1.Model Specification and Data

The empirical models were specifically designed as a reduced form of the dynamic panel model of tourism development. TEs, TAs, and TRs represent three different proxies for tourism development in three different models. In each model, the specific proxy was a function of globalization sub-indices: EG, PG, and SG. These factors' influence on TEs, TAs, and TRs was examined separately based on equations (1), (2), and (3). The variable, CV, is control variables added to the models of the present study. In the models i denotes the country (i = 1,…8) and t denotes the time period (t = 1995,…2017). Equations (1) through (3) are fairly general specifications, allowing for dynamic tourism development effects, stochastic error terms (ε), fixed time effects (ψ), and individual fixed country effects (C). The econometric form of equations:

$$\log TA_{it} = \beta_0 + \beta_1(\log EG_{it}) + \beta_2 (\log PG_{it}) + \beta_3(\log SG_{it}) + \log CV_{i+} C_i + \psi_t + \varepsilon_{it} \quad (1)$$

$$\log TE_{it} = \beta_0 + \beta_1 (\log EGit) + \beta_2(\log PG_{it}) + \beta_3 (\log SG_{it}) + \log CV_{it} + C_i + \psi_t + \varepsilon_{it} \quad (2)$$

$$\log TR_{it} = \beta_0 + \beta_1 (\log EG_{it}) + \beta_2(\log PG_{it}) + \beta_3(\log SGit) + \log CV_{it} + C_i + \psi_t + \varepsilon_{it}, \quad (3)$$

We used annual data from 8 countries between 1995 and 2018 to examine globalization's influence on tourism development. All variables were transformed into the natural logarithmic form. This section explains the econometric strategy and estimation of results.

Dependent variables: This study's dependent variable was tourism development. The literature's most commonly used measures were statistical availability and consistency between data sources, international TAs, TEs, and international TRs. (Lee and Brahmasrene, 2013; Nguyen, Nguyen and Nguyen, 2014; Ridderstaat, Oduber, Croes, Nijkamp and Martens, 2014; Saha and Yap, 2014; Song et al., 2010; Tang and Tan, 2015; Tugcu, 2014). Accordingly, this study used these three indicators to comprehensively measure tourism industry development. These data obtained from World Development Indicators.

International tourism number of arrivals (TA): International inbound tourists (overnight visitors) are the number of tourists who travel to a country other than that in which they have their usual residence, but outside their usual environment, for a period not exceeding 12 months and whose main purpose in visiting is other than an activity remunerated from within the country visited.

International tourism receipts (TR) (current US$): International tourism receipts are expenditures by international inbound visitors, including payments to national carriers for international transport. These receipts include any other prepayment made for goods or services received in the destination country. They also may include receipts from same-day visitors, except when these are important enough to justify separate classification.

International tourism expenditures (TE) (current US$): International tourism expenditures are expenditures of international outbound visitors in other countries, including payments to foreign carriers for international transport. These expenditures may include those by residents traveling abroad as same-day visitors, except in cases where these are important enough to justify separate classification.

Independent Variables: KOF Globalization Index's sub-components, EG (economic globalisation), SG (social globalisation) and PG (political globalisation) are our independent variables and can be downloaded form http://www.globalization.kof.ethz.ch. KOF Globalisation Index, a composite index measuring globalization for every country in the world along the economic, social and political dimension. The new index is based on 43 instead of 23 variables in the previous version (Dreher 2006; *updated* Dreher et.al. 2008). The new index is used to examine the effect of globalization on tourism development. The 2018 KOF Globalisation Index is based on 43 individual variables, which are aggregated to a de facto and a de jure index of five sub-dimensions (trade, financial, interpersonal, informational and cultural globalization), three dimensions (economic, social and political globalization) and covers 207 countries, one total index (Gygli et.al.2019:558). Economic globalization (EG) which is a composite measure comprising the variables: trade in goods and services, trade partner diversity, foreign direct investment, portfolio investment, international debt, international reserves, international income payments. Social globalization (SG) consists of interpersonal globalisation, informational globalisation, cultural globalisation. Political globalization (PG) characterizes the diffusion of government policies like embassies, UN peace keeping missions, International NGOs (Gygli et.al., 2019:543-546).

Control variables: The control variables of gross domestic product (GDP, 2010 = 100 at dollar prices), gross fixed capital formation (GFC, 2010 = 100 at dollar prices), overall population (POP), and real effective exchange rates (RER, 2010 = 100)

have been added as in the works of Poprawe (2015) and Yap and Saha (2013). This is to avoid omitted variable problems in regressions.

Table 1: **Variable Names, Symbols, Definition and Source**

Variable names	Symbol	Definition	Unit	Source
Tourism Arrivals	TA	number of tourists	numbers	Worldbank
Tourism Receipts	TR	Expenditures by international inbound visitors	Current US$	World bank
Tourism Expenditure	TE	expenditures of international outbound visitors	Current US$	World bank
Economic Globalisation	EC	represents trade in goods and services, trade partner diversity, foreign direct investment, etc.	Sub-Indice	KOF Globalisation index
Political Globalisation	PG	a composite measure presents the distribution of government policies	Sub-Indice	KOF Globalisation index
Social Globalisation	SG	Conveys how ideas, information, images and people progress	Sub- Indice	KOF Globalisation index
Economic Growth	GDP	Gross domestic product is used for calculation of economic growth	Current US$	World bank
Population	POP	Total population is based on the defacto definition of population	numbers	World bank
Reel Exchange rate	RE	Index	2010=100 at $ price	World bank
Gross Fixed Capital	GFC	gross domestic fixed investment includes land improvements (fences, ditches, drains, and so on); plant, machinery, and equipment purchases etc.	Current US$	World bank

4. FINDINGS AND DISCUSSIONS

This study has employed different panel estimation methods for regressions of Equation (1) through (3) in order to control for robustness of results. Therefore, regressions with ordinary least squares (OLS), fixed effects (FE), random effects (RE), dynamic OLS, fully modified OLS, and GMM approaches have been estimated from panel data of this study. Equations (1) through (3) are examples of the linear dynamic panel model introduced by Blundell and Bond (1998). Their GMM method solves likely crosssection dependence and endogeneity problems in a regression model. The GMM method can also solve other problems that make the estimation inconsistent – for example: (1) autocorrelation problems due to lagged dependent variables and (2) a small sample size or a large number of cross sections. It is important to mention that prior to these estimations, standard panel unit root tests will be carried out to see if data generating process of series are stationary**.** Panel estimates for the 8 countries' tourism development are presented in Tables 3, 4 and 5.

The presence of non-stationary data leads to meaningless results, so it is important to check the level of stationarity for underlying variables. According to correlation matrix of tourism development indicators are not generally and highly correlated. Therefore, no autocorrelation problems are expected. And four different unit root tests applied to check whether or not the data were stationary**.** According to the results as seen Table 2, all of the variables seem to be stationary at their level forms especially based to Levin, Lin and Chu test.

Table 2: Unit Root Test Results

Variables	Levin, Lin and Chu t*	Im, Pesaran and Shin W-stat	ADF–Fisher Chi-square	PP–Fisher Chi-square
lnEG	-3.8733 (0.0001)	-3.3580 (0.0004)	47.4271 (0.0001)	44.7562 0.0002
lnSG	-5.6598 (0.0000)	-2.1809 (0.0146)	27.6781 (0.0345)	27.8625 (0.0328)
lnPG	-4.3484 (0.0000)	-1.6708 (0.0474)	22.2529 (0.1352)	12.5777 (0.7033)
lnTR	-2.5139 (0.0060)	0.1470 (0.5584)	12.5541 (0.7050)	10.7922 (0.8221)
lnTE	-1.4499 (0.0735)	0.9237 (0.8222)	13.2127 (0.6571)	10.8323 (0.8197)
lnTA	-2.0326 (0.0210)	0.9071 (0.8178)	11.0742 (0.8049)	10.1186 (0.8604)
lnGDP	-1.3882 (0.0825)	1.0720 (0.8581)	6.8818 (0.9755)	7.6543 (0.9585)
lnGFC	-2.1925 (0.0142)	0.4344 (0.6680)	14.6287 (0.5520)	8.3379 (0.9382)
lnPOP	4.0466 (1.0000)	4.5401 (1.0000)	-1.6194 (0.9473)	-1.9738 (0.9758)
lnRE	-0.0456 (0.4818)	0.1277 (0.5508)	15.4329 (0.4932)	16.0644 (0.4485)

Note: The figures in the parentheses show the p-values.

Table 3 reports the regression results of Equation (1). Globalization factors variables (EG, SG, and PG) generally exert positively significant effects on tourist arrivals across different methodological regressions. There are some negative signs for their coefficients but are not statistically significant. This is to conclude that no matter what approach is selected for Equation (1), the effects of EG, SG and PG factors on tourist arrivals are positively significant.

Table 3 also shows that control variables of this study (GDP, POP, and RE) do also exert statistically significant effects on tourist arrivals to the selected 8 countries. The signs of coefficient for real exchange rates with respect to tourist arrivals are negative as expected**.**

Table 3: The Effects of Globalization Factors on Tourist Arrivals

Dependent variable **LnTA**										
Independent variables	**OLS**	**FE**	**RE**	**DOLS None**	**DOLS With constant**	**DOLS With trend**	**FMOLS None**	**FMOLS with constatnt**	**FMOLS with trend**	**GMM**
Intercept	-0.021	-0.001	0.020							0.518
lnEG	0.000	0.000	0.000	0.0029	-0.3634	0.3905	0.000	0.0000	0.0000	0.109
lnSG	0.000	0.000	0.000	0.0000	0.1510	-0.525	0.000	0.0000	0.0000	0.110
lnPG	-0.021	-0.595	0.020	-0.000	0.9900	-0.138	-0.000	-0.0312	0.7948	-0.803
lnGDP	0.000	-0.267	0.000	-0.207	-0.1917	0.3989	0.000	-0.0207	0.0014	0.409
lnGFC	0.470	0.016	0.469	0.0178	0.0042	-0.304	0.058	0.0000	0.1266	0.011
lnPOP	0.001	0.001	0.001	0.0000	0.1263	0.6146	0.000	0.0000	0.0000	0.766
lnRE	0.743	0.000	0.743				-0.000	0.0000	0.1791	-0.004
AR (−2)										0.4480

Adj. R^2	0.9502	0.8405	0.9520	0.9928	0.9920	0.9945	0.949	0.9777	0.9900	
Wald Chi 2										88560.4
S.E. of Reg	0.2292	.15234	.152342	0.0846	0.0892	0.0741	0.2289	0.1513	0.1012	
F-prob.	0.0000	0.0000	0.0000							0.0000
Long runvar	-			0.0003	0.0001	2.64E-	0.006	0.0047	0.0025	
Obs.	192	192	192	168	168	168	184	184	184	184

Note: For DMOLS, we had to decrease the number of indipendent variables.

Table 4 reports the regression results of Equation (2) where TRs are dependent variable. The variables of globalization factors (EG, SG, and PG) again generally perform positively significant effects on TRs across different methodological regressions. This is to conclude for Equation (2), the effects of EG, SG, and PG factors on tourist receipts are positively significant no matter what approach is selected. Table 4 also shows that control variables of this study (GDP, POP, and RE) do also exert statistically significant effects on TRs of the selected 8 countries.

Tablo 4: The Effects of Globalization Factors on Tourism Receipts

Dependent variable LnTR										
Indep. variables	**OLS**	**FE**	**RE**	**DOLS None**	**DOLS With constant**	**DOLS With trend**	**FMOLS None**	**FMOLS with constant**	**FMOLS with trend**	**GMM**
Intercept	-0.126	-0.003	-0.124							-0.214
lnEG	0.000	0.000	0.000	0.0206	-0.0574	0.0006	0.0000	0.0000	0.0000	0.032
lnSG	0.000	0.830	0.000	0.0006	0.0178	-0.0011	0.0000	0.7470	0.5369	0.188
lnPG	0.610	0.015	0.609	0.0049	0.4159	-0.0007	-0.3140	0.0001	0.0000	0.357
lnGDP	0.000	0.000	0.000	0.5643	0.7676	0.0005	0.0000	0.0000	0.0000	0.001
lnGFC	0.000	0.000	0.000	0.0020	0.0000	-0.0008	0.0000	0.0000	0.7647	0.000
lnPOP	0.000	0.078	0.000	0.0029	0.4748	0.0009	0.0000	0.0031	-0.2765	0.123
lnRE	-0.125	0.198	-0.124				-0.0000	0.0091	-0.0006	-0.024
AR (−2)										0.7436
Adj. R^2	0.953	0.867	0.9549	0.99198	0.99675	0.99998	0.95283	0.97859	0.98730	
Wald Chi2										45692.
S.E. of Reg	.2527	.9618	.17407	0.10217	0.06501	0.00465	0.25075	0.16892	0.13009	
F-prob.	0.000	0.000	0.0000							0.0000
Long run var.				0.00073	8.59E-05	8.60E-08	0.00836	0.00715	0.00559	
Obs.	192	192	192	168	168	168	184	184	184	184

Finally, Table 5 reports the regression results of Equation (3) where TEs are dependent variable. The variables of globalization factors (EG, SG, and PG) again generally exert positively significant effects on TEs across different methodological regressions. This is to conclude that no matter what approach is selected for Equation (3), the effects of EG, SG, and PG factors on TEs are again positively significant. Table 5 also shows that control variables of this study (GDP, POP, and RE) do also exert statistically significant effects on TEs of the selected 8 countries.

Tablo 5: The Effects of Globalization Factors on Tourism Expenditures

Dependent variable LnTE										
Indep. variables	**OLS**	**FE**	**RE**	**DOLS None**	**DOLS With const.**	**DOLS With trend**	**FMOLS None**	**FMOLS with const.**	**FMOLS with trend**	**GMM**
Intercept	-0.000	-0.000	-0.000							-0.500
lnEG	0.000	0.000	0.000	0.0002	0.1548	0.0022	0.0000	0.0000	0.0004	0.000

lnSG	0.000	-0.417	0.000	0.0373	0.6478	-0.0044	0.0000	-0.2145	0.0005	0.207
lnPG	-0.915	0.003	-0.915	0.0000	0.2758	-0.6056	-0.0000	0.0000	0.1438	-0.311
lnGDP	0.000	0.000	0.000	0.0001	0.0098	0.0021	0.0000	0.0000	0.0000	0.000
lnGFC	-0.016	-0.001	-0.015	0.1052	0.2751	-0.0028	0.0001	-0.0000	-0.0000	-0.000
lnPOP	0.000	0.000	0.000	0.1602	0.7449	0.0040	0.0000	0.0000	0.0874	0.085
lnRE	0.000	0.824	0.000				-0.1569	-0.5763	-0.1507	0.716
AR (–2)										0.5262
Adj. R^2	0.9720	0.8839	0.9730	0.9939	0.99646	0.9999	0.9565	0.98854	0.9900	
Wald Chi2										13853.7
S.E. of Reg	.25174	.98751	.16426	0.1152	0.08830	0.0111	0.3113	0.15995	0.1487	-
F-prob.	0.0000	0.0000	0.0000							0.0000
Long run var.				0.00066	0.00018	5.83E-07	0.01149	0.00820	0.00586	
Obs.	192	192	192	168	168	168	184	184	184	184

Note: According to Hausman test Prob>chi2 = 0.0000, so Fixed Effect model is more suitable.

5. CONCLUSION

Results suggest that globalization factors categorized EG, SG, and PG trends in the globe exert positively significant and positive effects on tourism development in the selected countries' tourism growth. Therefore, to ensure a solid growth performance, the policymakers in these countries can implement some policies to upgrade the income level of a country's tourist arrivals. Indeed, the economic growth performance of some countries in the panel dataset is mainly based on the tourism sector. In addition to this other factors such as climate change, country size, economic policies, historical relationships (common language, common religion), political instability and real exchange rates can play a significant role in the income level of a country's tourist arrivals. Economic or political cooperation can also build up transculturation that can also positively affect the level of income level of a country's tourist arrivals.

An improvement in any one of these globalization factors would mean higher tourism growth in the countries. And country-specific economic aggregates such as gross domestic product, gross fixed capital, population and real exchange rates are important and significant contributors to these effects.

Tourism is a luxury good, and therefore, the income elasticity of the international tourism demand is larger than one and the tourists in the low-income countries can show a more negative reaction to adverse conditions than those of the countries attracting tourists like our sample. A decline in tourism revenue, and its negative effects on economic performance, will bring more problems to developing countries, especially developing countries whose economies mainly depend on tourism revenue. The visa liberalization policy for high-income economies can upgrade the income level of their tourist inflows and this can sustain economic and environmental performance. Providing a stable tourism revenue is one of the most significant sources of foreign exchange earnings. Therefore, the income level of their tourist inflows can also associate with the volatility of exchange rate earnings because a higher level of income level of a country's tourist arrivals can make the real value of the exchange rate less volatile. Consequently, upgrading tourism revenue can also ensure less volatile exchange rate markets. However, the exchange rate system (e.g., the flexible or fixed systems) can also affect the value of the income level of a country's tourist arrivals, and this issue also merits a future study. With its geographical location, Turkey, which is in a strategic position, but also a country with deep historical and cultural relations with the countries of the world, it is inevitable that presence in close relationships with international economic organizations in the globalization process by staying out of this development.

REFERENCES

Boğa, S. ve Erkişi, K. (2019). The relationship between international tourism receipts and economic growth in asia pacific countries: A panel data analysis. The Academic Elegance, 6(11), pp.31-46.

Danish and Zhaohua Wang (2019). Dynamic relationship between tourism, economic growth, and environmental quality. Journal of Sustainable Tourism, pp.1-17. https://doi.org/10.1080/09669582.2018.1526293.

Dreher, A. (2006). Does globalization affect growth? Evidence from a new index of globalization. Applied Economics, 38(10), 1091–1110.

Dreher, A., Gaston, N., and Martens, P. (2008). Measuring globalisation - gauging its consequences. New York: Springer

Dumitrescu, E.-I.; Hurlin, C. (2012). Testing for Granger non-causality in heterogeneous panels. Economic Modelling, 29(4),1450-1460

https://doi.org/10.1016/j.econmod.2012.02.014

Gygli, Savina, Florian Haelg, Niklas Potrafke and Jan-Egbert Sturm (2019). The KOF Globalisation Index – Revisited. The Review of International Organizations, 14(3), 543-574. https://doi.org/10.1007/s11558-019-09344-2

Harun, A. and Eko, Suprayitno (2012). The important factors of tourism development in Singapore. https://www.researchgate.net/publication/322910876,1-15. doi: 10.18860/iq.v0i0.1736

Holzner, M. (2011). Tourism and economic development: The beach disease?. Tourism Management, 32(4), 922–933. https://doi.org/10.1016/j.tourman.2010.08.007

Javid, Elyeh and Salih, Katircioglu (2017). The globalization indicators-tourism development nexus: a dynamic panel-data analysis, Asia Pacific Journal of Tourism Research, DOI: 10.1080/10941665.2017.1378240

Kosolapov, N.A .(2001). The international political organization of the globalized world: models for a medium-term prospect. *Social sciences and modernity*, **6**, 141-143.

Kum, H., Aslan, A. and Gungor, M. (2015). Tourism and Economic Growth: The Case of Next-11 Countries. *International Journal of Economics and Financial Issues*, 5(4), 1075-1081.

Nowak, J.J. and Petit, Sylvain and Sahli, Mondher. (2013). Globalisation in tourism: A Theoretical and empirical trade examination. 1-51, 10.1142/9789814327084_0025 https://www.researchgate.net/publication/305147345.

Pesaran, M. H. (2004). General diagnostic tests for cross section dependence in panels. Cambridge Working Papers in Economics 0435, 3, 1–39. doi:https://doi.org/https://ideas.repec.org/p/cam/camdae/0435.html

Ren, Taizeng, Can, M., Paramati, S. R., Fang, J., and Wu, W. (2019). The Impact of Tourism Quality on Economic Development and Environment: Evidence from Mediterranean Countries. *Sustainability*, *11*(8), 2296. MDPI AG. Retrieved from http://dx.doi.org/10.3390/su11082296

Roser, Max (2020). "Tourism". *Published online at OurWorldInData.org.* Retrieved from: https://ourworldindata.org/tourism

Seetanah, B. (2010). Assessing the Dynamic Economic Impact of Tourism for Island economies. *Annals of Tourism Research*, 38(1), 291-308.

Sevinç, Deniz, Öz-Yalaman, G. ve Güven, S. (2019). The impact of globalization on corporate taxation: evidence from the kof globalization index. Journal of Research in Economics, Politics and Finance, 4(3): 350-369.

Shahzad, S. J. H., Shahbaz, M., Ferrer, R. and Kumar, R. R. (2017). Tourism-led Growth Hypothesis in the Top Ten Tourist Destinations: New Evidence Using the Quantile-on-Quantile Approach. *Tourism Management*, 60, 223-232

Tang, C.F. and Abosedra, S. (2014). The impacts of tourism, energy consumption and political instability on economic growth in the MENA countries. Energy Policy, 68, 458–464. https://doi.org/10.1016/j.enpol.2014.01.004

Trunina, I. M., Olena, Anatoliivna Sushchenko , Viktoriia, Valeriivna Druzhynina and Olena Leonidivna Zahorianska (2020). Globalization impact on the world travel market development, SHS Web of Conferences 73, 01029. https://doi.org/10.1051/shsconf/202073010 29

Tugcu, C.T. (2014). Tourism and economic growth nexus revisited: A panel causality analysis for the case of the Mediterranean Region. Tourism Management, 42, 207–212. https://doi.org/10.1016/j.tourman.2013.12.007

Westerlund, J. (2007). Testing for error correction in panel data. Oxford Bulletin of Economics and Statistics, 69,709–748. doi:10.1111/j.1468-0084.2007.00477.x

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THE RELATIONSHIP AMONG SOVEREIGN CREDIT RISK PREMIUM, SOVEREIGN BONDS AND CURRENCY RATES IN FRAGILE THREE COUNTRIES

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ABSTRACT

Purpose- For developing countries that are highly dependent on foreign investment in terms of saving gap funding, risk assessment tools are crucially important. Under the evolving circumstance of flow of international funds along the last decade, this study aims to investigate into causality relationship among sovereign credit default swap premiums, interest and currency rates of "Fragile Three" Countries of Brazil, South Africa and Turkey through new generation econometric methods for the period of 2007M2-2017M1.
Methodology-To that end, stationarity, co-integration and causality relationships were analysed by means of Kapetanios's (2005) multi-structural fractural unit root test, Johansen Cointegration Test (1990) and Toda-Yamamoto (1995) test (TY), respectively.
Findings- Our findings suggest that these variables of F3 countries are influenced substantially from each other.
Conclusion- The necessary economic policies should be developed to ensure permanent stability at exchange rate and interest rate levels. In order to ensure these countries to maintain financial stability, economic, political and social reforms are required to minimize country risks and to decrease dependency on foreign capital.

Keywords: Sovereign credit default swap premiums, sovereign bond interest rates, foreign currency, fragile three.
JEL Codes: G15, F31

1. INTRODUCTION

Fluctuations experienced in the world economy along the last decade have intensively influenced developing countries owing to their fragile macroeconomic indicators and strong dependency on foreign funds. The onset of the economic crisis in developed countries launched by the mortgage crisis in 2008 influenced developing countries as well. Vast amount of monetary resource was injected into the developed markets for strengthening their financial system (Breuer and Sauter, 2013). Federal Reserve (FED) followed cheap money policy and decreased interest rates from 5% to 0.25% gradually. This situation especially enhanced attractiveness of developing countries highly dependent on foreign funds and offering high interest rates for global investors. While developing countries enjoyed these fund inflows, however, they were exposed associated risks.

Similar to the oceanic tidal behaviour, these funds, which flooded into emerging markets afterwards of mortgage crisis, then started to migrate back to their home, developed countries, after FED's statement on rising interest rates slowly by reducing government bond purchase on May 2013. Accordingly, emerging markets faced with difficult position in terms of accessing current global funds. These economic developments resulted in fragility concept to come forward in the relevant literature. Financially fragile means that borrowers who perpetrate economic activity as entrepreneurs have inadequate resources for the realization of their production decisions (Bernanke and Gertler, 1990: 88). Accordingly, fragility levels of developing countries with high dependency on global capital markets, measured by financial ranking institutions are considered important indicator for foreign

investors (Bekkour et al., 2015). Financial markets measure fragility through various economic indicators. Recent reports published by financial institutions are closely followed by "international investors" with abundant saving, who are significantly y effective on flows of global funds. In this sense, countries with high dependency on foreign capital are monitored by prominent financial ranking institutions in terms of their macroeconomic indicators so that they could be classified on the basis of their individ ual risk exposure.

In the economy report published by Morgan Stanley in August 2013, countries' current account deficit to GDP rate s were analyzed and the countries were ranked with respect to their sensitivity to capital inflows. While India, Brazil, Indonesia, Turkey an d South Africa were referred as the most "fragile five" countries (Morgan Stanley, 2013), Turkey was addressed as t he most fragile country in this list. As India and Indonesia have succeeded to gain a positive economic posture owing to their structural reforms, in the suggestion report published by the Bank of America Merrill Lynch in 2017, Turkey, Brazil and South Afr ica were assessed as the most risky three countries for investment and referred as "Fragile Three" (F3) (ETF Trends, 2017).

Financial markets take numbers of economic indicators into consideration in evaluation of individual country economies. The concept of the "Credit Default Swap" (CDS) was gifted the finance world by the JP Morgan in 1994 (Augustin et al., 2016). In terms of monitoring financial risks in the market, CDS premiums have been an alternative tool besides sovereign credit scores (Mora, 2006, p.9; Flannery et al., 2010, p.2095; Başarır and Keten, 2016). The CDS has been recognized as useful tool which differentiates the default risk of bond issuer party from other risks clearly in assessment and pricing of the credit risk (Whetten, et al., 2004). Thus, CDS has been preferred over other credit derivatives (Norden and Weber, 2009, p.530). In other words, sovereign CDS functioning as credit insurances directly effective on investment made on a portfolio (e.g. sovereign bonds) in a country. Th e greater the CDS premium (read as score) for a specific country, the higher the cost of foreign debt is (Fontana and Scheicher, 2010).

Economic and political stability is directly effective on country CDS premiums. One of the most significant risk factors for foreign investments is the status in which the investment would not find its nominal value. In theory, CDS premiums are required to be closely related with risky bond yield, in other words, the CDS premium has adverse effect on interest rates and the term spread (Duffee, 1999; Whetten el al., 2004). It's expected and empirically proved that when interest rates rise CDS spreads will be rise (Kargı, 2014). Additionally, the risk is comprised of the risk of interest rates as well as risk of exchange rates (Zh ang et al., 2009; Yang, et al., 2010). Accordingly, correlation and interaction are expected among sovereign CDS, currency rate and interest ra te. Whereas the global capital inflow is important for the developing countries highly dependent to foreign funds, the minimization of associated risk is important for investors as much. For this reason, countries like Brazil, South Africa, and Turkey were selected due to their high sensitivity to foreign capital inflows. An increase in the fragility of these countri es will also affect their exchange rates and interest rates, indirectly. As the relationship between country risk and exchange and interest rates have been investigated by numbers of researchers, the reported findings are varied in a wide spectrum due to t he studied data frequency, country, time period, employed analysis method, and so on. In this sense, it would be appropriate to read and consider the re sults reported by various researchers according to their unique study conditions and perspectives. From the point of view reflected by the notable and similar studies in the literature, also summarized herein paper, as the financial risk perceived by foreign i nvestors toward a certain country increase, this country's overall interest burden on its foreign bo rrowing tends to increase. CDS premiums needed to be paid in the exchange of investment in such country equities tend to increase as well.

This study aims to investigate into effects of government bond interest rate (BIR) and foreign exchange (FX, local cu rrency to USD) on CDS premiums in Brazil, South Africa, and Turkey referred as "Fragile Three" through using Johansen Cointegration test and Toda-Yamamoto (1995) causality test for the period of 2007M2-2017M1. In this study, the effect of increasing the fragility of concerned three countries to foreign capital inflows was tried to be revealed. It was expected that this study to draw the at tention of these countries to financial risks because the rise in interest and exchange rates may also increase the fina ncial risk perception toward these countries. After the relevant literature review presented in Section 2, study data and the methodology employed to identify the relationship between saving-investment gap and growth rate was presented in Section 3. Finall y, empirical modeling framework and conclusion were included in Section 4 and 5, respectively. Countries with high dependency on foreign financing use interest rates to attract foreign capital inflow. However, this situation can adversely affect the risk p erception of the country. To observe this effect, in this study, Brazil, South Africa, and Turkey were selected as samples because of their high economic vulnerability and dependence on foreign financing. At the same time, the relationship between CDS and BIR, FX was realized with using cointegration test different than the earlier empirical studies. In this regard, this study is expected to bring a nove l analysis perspective and to make a contribution to the literature and attract the attention of policymakers.

2. LITERATURE REVIEW

The Credit Default Swap (CDS) premiums, one of the significant financial economy concepts associated with risk, has started to be utilized in the empirical context in the beginning of 2000s (Skinner and Townend, 2002) as an indicator reflecting perceived market risk toward equities from a certain country or a corporation. As the CDS premium concept refers overall CDS premiums required in the market, sovereign CDS concept denotes the ones issued on country equity.

The preliminary empirical study on CDS was conducted by Skinner and Townend (2002), in which five factors (risk-free rate, yield on the reference security, volatility, maturity and the exercise price) that could determine the value of CDSs were analyzed by using linear regression model for the period of 1997M9-1999M2 on non-Asian and Asian subsamples. Authors find these five variables as important estimators of CDS premium. Similarly, Chan-Lau and Kim (2004) investigated the correlation between equity prices, CDS and bond rates in emerging markets by means of cointegration analysis, Granger causality tests, and by the price discovery measures proposed by Hasbrouck (1995) and Gonzalo and Granger (1995, p.27) for the period of M3.2001-M3.2003. Researchers report that the CDS and bond spreads are cointegrated in all countries with the exception of Mexico, the Philippines, and Turkey. The existence of the equilibrium price relationship between the CDS and bond markets provides evidence that arbitrage forces between CDS and bond spreads to converge in spite of the pressures arising from market frictions and other various technical factors. The Granger causality tests show causality between markets, a one-day horizon. The CDS is found as significant estimator of the price discovery process for most countries. For the longer horizon, price discovery occurs in both the CDS and bond markets. In some countries, it is evidenced that the bond market led the CDS market for longer horizons. In Brazil case, the CDS contributes into price estimation in the range of 1% to 78%. Nevertheless, the Hasbrouck finds that Gonzalo and Granger statistics show for most of the countries that the CDS market has slight edge over the bond market for price estimation.

On the other hand, Zhang, Yau and Fung (2009) studied the lead–lag relationship between the CDS market and the currency market based on the data covering M1.2004 to M2.2008 by accounting for daily currency rates of JPY, EUR, GBP and AUD to USD and currency rates of JPY, USD, GBP and AUD to EUR. Researchers report the significant Granger-causality effects flowing from changes in both the North American investment-grade (IG) and from high-yield (HY) CDS indices to changes in the JPY, EUR and AUD exchange rates in terms of the USD for the whole period and during the credit crisis of 2007 to 2008. However, for the four currencies accounted in terms of the EUR, significant Granger-causality of the credit risk is found only with the AUD.

Norden and Weber (2009) report positive correlation between CDS spread and bond market based on a study employed Granger analysis. Although CDS is found effective on price discovery bond prices, it is more effective in stock markets.

Yang, Morley and Hudson (2010) analyzed the casual relationship between CDS premiums, risk-free interest rates and exchange rates by using VAR and VECM econometric models for the period of 2005-2009 for both the US and France. Researchers address bi-directional Granger causality between CDS premium and exchange rate in France and unidirectional Granger causality between CDS premium and exchange rate in the US. While researchers report negative correlation between CDS and foreign exchange for France, they report a positive correlation for the US.

In another recent study, O'Kane (2012) investigated the relationship between the Eurozone sovereign CDS premiums and the same sovereign bond markets by employing the Granger causality test for the period of Eurozone debt crisis in 2009-2011. The researcher finds both autocorrelation and cross-correlation between lagged values of changes in the CDS premium and the bond yield spread, with the greatest effect occurring at a lag of one day. The researcher also reports the dominant direction of information flow from CDS premiums to bonds for Greece, but from bonds to CDS for France and Italy, while Ireland and Portugal exhibited Granger causality in both directions.

Mora-Jensen (2013) analyzed the empirical relationship between sovereign CDS premiums and Yen/USD exchange rate for the period between early 2005 and 2010. The results indicate that in stable periods, there is no relation or Granger Causality effect from either the CDS premium to the exchange rate or vice versa. On the contrary, during the financial crises period, strong implications of information flow between the CDS spreads on to the exchange rate are observed. There are signals that Japanese CDS premiums have Granger causing effect on the Yen/USD exchange rate.

Covering the European Debt crisis period (2009-2012), Koy (2014) studied the relationship between the CDS Premium and Eurobond foreign countries including Germany, France, Italy, Spain, Portugal, Ireland, Turkey and Greece by unit root test and cointegration analysis. The author reports significant causality from CDS premiums to Eurobond premiums. Results concerning Turkey suggest that changes in CDS premiums lead changes in Eurobond premiums.

Similarly, Sambalaibat (2014) studied the relationship between sovereign CDS and bond rates through regression model especially for the recent debt crisis in Europe based on the data covering the period of 2004-2012. By utilizing from time series model, the author reports a significant and positive correlation between the amount of CDS net notional outstanding and bond market liquidity. The bond market liquidity and the amount of CDS purchased are correlated with credit risk and the size of the bond market (Sambalaibat, 2014).

Bozkurt (2015) investigated the impact of financial stability indicators (credit/savings, gross default account receivable amount/gross credit amount, net default account receivables/equity capital, fixed assets/total assets, liquid assets/total assets, net profit/capital, net profit/total assets, free capital/total asset, equity capital/total asset, outstanding debt of non-financial sector/GDP, bank interest rates for saving accounts, inflation rate, GDP growth, interest rate for government borrowing) on CDS premiums through fuzzy regression analysis covering the period of 2002–2014. The researcher reports a positive correlation between CDS and rates of government bond interest and inflation.

Bekkour et al. (2015) studied Eurozone during the debt crisis period for the relationship between EU member countries credit worthiness and the common currency of Euro. As a result, authors concluded that creditworthiness of member countries with vulnerable fiscal positions have a significant effect on the deviation of the common currency.

Başarır and Keten (2016) studied the relationship between CDS premiums and stock market index and currency rates of 12 emerging countries in terms of short and long term correlation for the period of 2010-2016 by means of Granger causality test and by the Johansen Cointegration test, respectively. Authors address bi-directional causality relationship between CDS premiums and stock market indexes at 95% significance level. However, no any causality relationship is found with currency rate neither in the short or long term.

Similarly, Karet al. (2016) investigated the relationship between CDS and currency rate (Euro/TRL) by employing an asymmetric causality test developed by Hatemi-J and Roca (2014) for the period of 2009 and 2015 in which different shocks were experienced. The researchers report bi-directional negative relationship between CDS and EUR/TL exchange rate by means of the MS VAR method. Their results unravel the existence of a causation link between CDS and nominal exchange rate on the long term. Additionally, the rolling windows causality analysis results expose the causal relationship from CDS spreads to EUR/TL exchange rate only in 2013 and 2015.

The empirical studies above are largely oriented on the relationship between CDS and macroeconomic indicators, market indices and other derivatives. It is seen that majority of studies detect significant relationship between concerned variables at various levels depends on characteristics of their analyses It is important to recognize the influence of time period concerned (e.g. crisis period or not) and statistical methods employed during these investigations on data series. For instance, whereas correlation among variables become more visible during crisis periods, the strength of correlation erodes along the relatively stable periods. Additionally, Granger and Garch model-based statistical methods yield significant but weak relationships, while the models derivatives of regression yield stronger and significant correlation. The results of majority of studies available in the relevant literature such as Chan-Lau and Kim (2004), Norden and Weber (2009), Zhang et al. (2009), Yang et al.(2010), Özkaplan (2011), O'Kane (2012), Koy (2014), Sambalaibat (2014), and Bekkour et al. (2015) are found to be parallel with the present study. On the other hand, the study of Başarır and Keten (2016) find no relationship between CDS and foreign currencies of 12 emerging countries including Turkey. Yang et al. (2010) reveal positive and negative correlations between CDS and foreign exchange for France and the U.S, respectively. Kar, Bayat and Kayhan (2016) report negative correlation between CDS and Euro/TL rate.

This study includes the most prominent three developing countries highly dependent on foreign funds, sensitive to fluctuations in CDS spreads and known as "fragile three" instead of sampling developed countries. In the meantime, new generation econometric methods were employed for an extensive analysis period in the light of recent investment banking agenda. Thus, it is considered that a certain contribution would be made to the relevant literature.

3. DATA AND METHODOLOGY

In this study, the relationship between Credit Default Swap (CDS, logarithmic), Government Bond Interest Rate (BIR, 5-Year Bond Yield for Turkey, 10-Year Bond Yield for South Africa and Brazil) and nominal Foreign Exchange (FX, USD) was analyzed for F3 countries for the period from 2007M2-2017M1. The period from 2007M2 to 2017M1 was preferred because the most robust data was obtained for this period. The logarithm of the CDS has been taken for easy interpretation. Time series used in the study are collected from monthly data (120 monthly observations) published by Bloomberg L.P. (Bloomberg, 2017) and investing.com (Investing, 2017). Eviews and GAUSS programs were used during the analysis phase. The effects of the BIR and FX varibles on CDS were analyzed separately and the following model is estimated for each country;

$$CDS_{it} = \alpha_0 + \alpha_1 BIR_{it} + \alpha_2 FX_{it} + u_{it} \quad (1)$$

Where, i and *t* refercountries (Brazil, Turkey, South Africa) and time, respectively; while α_0 is constant term, α_1 is coefficient of BIR, α_2 is coefficient of FX and u is the error term.

The stationary of the series was analyzed by Kapetanios's (2005) multiple structural break unit root test, the evidence for existence of cointegration was investigated by Johansen Cointegration Test (1990) and the causality relationship among series was examined by Toda-Yamamoto (1995) causality test (TY).

3.1. Kapetanios (2005) Multiple Structural Break Unit Root Test

The stability of time series means that it has a constant mean and variance, covariance related to lag level and approximation a certain value in time (Gujarati and Porter, 2012:740). However, potential structural breaks in time series need to be taken into consideration otherwise unit root analyzes could result in misleading inferences (Perron, 1989). The structural break unit root test was first included in the empirical studies conducted by Perron (1989) and continued by Zivot-Andrews (1992), Lumsdaine-Papell (1997), Perron (1997), Ng-Perron (2001) and Lee-Strazicich (2003). While these methods reckon one or two structural breaks in the series, the Kapetanios (2005) test takes into account up to five structural breaks, the number of breaks and break points can be determined internally by the test method. The model used in this test is as follows (Kapetanios, 2005):

$$y_t = \alpha_0 + \alpha_1 t + \beta y_{t-1} + \sum_{i=1}^{p} \gamma_i \Delta y_{t-i} + \sum_{i=1}^{m} \varphi_i DU_{i,t} + \sum_{i=1}^{m} \aleph_i DT_{i,t} + \epsilon_t \quad (2)$$

$$DU_{i,t} = \begin{cases} 1 & t > T_{b,i} \\ 0 & in\ other\ situations \end{cases} \text{ and } DT_{i,t} = \begin{cases} t - T_{b,i} & t > T_{b,i} \\ 0 & in\ other\ situations \end{cases}$$

DU and *DT* are intercept and trend break dummy variables respectively; and null hypothesis of the test is defined as "*ϐ=1, series contain unit root"*. In this test, structural break points are determined by using grid search scheme of Bai and Perron (1998) due to the convenience of application (Kapetanios, 2005: 127). In this context, initially each period is considered as a probable structural break date and the date on which has the minimum sum of squared residuals (SSR) is accepted as a first break date. Then this date is kept constant and the second break date is investigated (Murat et al., 2013). These steps are repeated until *m* break dates, and finally number of structural breaks and break dates which have minimum *t* statistics values are accepted (Capistrán and Ramos-Francia, 2009). In this study, maximum lag length was set to 12 by using Equation (3) developed by Schwert (1988). Where *k* denotes maximum lag length, *T* denotes the number of observations. Table 1 exhibits Kapetanios (2005) multiple structural break test results; and charts of the series are given in the Appendix.

$$k = 12 \times (T/100)^{1/4} \quad (3)$$

Table 1: Kapetanios (2005) Multiple Structural Break Unit Root Test

		τ-statistic	Critical Value (%1)	Structural Break Dates
Turkey	*CDS*	-4.564	-5.954	2009M3-2011M4-2012M12-2015M5
	BIR	-5.846	-9,039	2008M6-2009M11-2011M12-2012M10-2015M8
	FX	-6.152	-9.039	2008M9-2010M6-2011M9-2014M1-2015M4
Brazil	*CDS*	-7.695	-9.039	2009M2-2012M1-2012M8-2014M7-2015M7
	BIR	-7.457	-9,039	2008M9-2011M5-2012M4-2014M3-2015M8
	FX	-5.610	-9,039	2009M2-2011M5-2013M2-2014M1-2015M6
South Africa	*CDS*	-4.693	-6,192	2008M4-2010M4-2011M7-2014M11-2016M7
	BIR	-4.899	-9.039	2008M4-2010M6-2012M6-2014M9
	FX	-5.610	-9,039	2009M3-2011M8-2012M9-2014M6-2015M8

Turkey	*ΔCDS*	-11,412***	-7,395	2008M12-2009M12-2011M12-2013M8-2016M5
	ΔBIR	-10,057***	-6,856	2008M12-2010M9-2013M3-2014M8
	ΔFX	-10,914***	-7,395	2008M8-2010M9-2014M7-2015M11-2016M7
Brazil	*ΔCDS*	-10,168***	-7,395	2009M3-2011M5-2012M5-2015M4-2015M12
	ΔBIR	-11,411***	-7,395	2009M1-2010M7-2012M7-2015M4-2015M9
	ΔFX	-10,113***	-7,395	2008M10-2010M3-2013M7-2015M3-2015M8
South Africa	*ΔCDS*	-10,223***	-7,395	2009M5-2010M9-2015M5-2016M1-2016M6
	ΔBIR	-9,534***	-7,395	2008M6-2010M9-2013M3-2014M8-2015M10
	ΔFX	-10,071***	-7,395	2008M12-2010M1-2011M7-2015M5-2015M11

Note: *** denotes significance at the %1 level. Test statistics were obtained with codes written for the Gauss program. Critical values were obtained with 1.000 bootstrap replications.

According to Table 1, the levels of variables have a unit root, on the other hand when their first difference is taken, they become stationary; *I(1).* Based on the structural break dates indicated by the test method, the important structural break dates observed with the F3 countries corresponded with the period of 2008-2009. 2008 global crisis first caused immediate shocks in currency rates and interest rates. Uncertainty caused by the global crisis increased CDS premiums of Brazil, South Africa and Turkey in the beginning of 2009. As a respond, policy makers increased interest rates significantly for managing the ongoing crisis. However, as a consequence of the crisis, economies of these three countries contracted remarkably in 2009; and experienced recession. By the end of 2009, Turkey made significant reforms with banking auditing protocols and regulations after the previous crises. In the same year with a provided in confidence, CDS premiums and interest rates declined significantly in Turkey to 183 and 9.87%, respectively. As the European debt crisis deepened further, it caused serious disagreements across the EU in 2011; and threatened the future of the Euro currency. This situation affected Turkey's CDS premium adversely. In the same period, the Brazilian growth rate started to decrease and its currency depreciated significantly. Accordingly, CDS premiums for Brazil and therefore interest rates in the country increased. In 2010 and 2011, it was seen that there was a fluctuation in South Africa's CDS rates between 125 and 174. Especially in this period, high unemployment rates, low growth rate and low saving rates in South Africa have resulted in middle-income trap, fragility and economic fluctuations (Kumo, 2015). It was observed that after the Fed's statement that it would decrease government bond purchase and follow tight monetary policy by increasing interest rates in May 2013, F3 countries sufered to access foreign funds. Moreover, another significant adverse impact on developing countries was decreasing Chinese foreign investment on these countries (Göçer and Akın, 2016). National currencies of developing countries have devalued remarkably. Especially, as a result of an interest rate increase by the Turkish Central Bank by 4.25% in January 2014 was acknowledged that Turkey was the most fragile country among others (Landon, 2014). Increasing currency and interest rate risk with F3 countries in the period of 2014-2015 was the factor increasing their cost of foreign funding. In the same period, factors such as low growth rate, decreasing industrial production and increasing government debt in Brazil caused 139% increase in CDS premium of this country from the beginning of 2014 to the end of 2015. In South Africa case, stagflation, twin deficits and high debt across sectors caused CDS premium of this country to increase until the beginning of 2016 and increased the risk associated with foreign debt management of the country as recorded 356, the highest level since the 2008 crisis. After May 2015, CDS premium has increased up to 312 for Turkey, it continued further because of economic and political risk factors. For example, the military coup attempt experienced in July 2016 repelled foreign capital, which resulted in the devaluation of TL against foreign currencies by about 26% in Turkey.

3.2. Johansen Cointegration Analysis

Cointegration relationship between CDS, BIR and FX was analyzed by using Johansen Cointegration Test (1990). This test allows working with the level values of the series and the analysis of cointegration with more than one variable is more reliable. On the basis of structural break dates observed with the Kapetanios (2005) multiple structural break unit root test, two or three break dates that showed similarity and gave the best results were selected and included in the analysis as dummy variable at this point. Table 2 exhibits results of Johansen Cointegration Test. For each country, different lag levels were determined by using sequential modified LR test statistic (each test at 5% level).

Table 2: Johansen Cointegration Test Results

TURKEY (with 12 lags)							
Trace Test				**Maximum Eigenvalue Test**			
Null (H_0) Hypothesis	Alternative Hypothesis	λ_{trace}	%5 Critical value	Null (H_0) Hypothesis	Alternative Hypothesis	λ_{max}	%5 Critical value
r=0*	r>0	46.147	35.192	r=0*	r=1	23.852	22.292
r≤1*	r>1	22.295	20.261	r=1*	r=2	16.116	15.892
r≤2	r>2	6.179	9.1645	r=2	r=3	6.179	9.1645
BRAZIL (with 15 lags)							
Trace Test				**Maximum Eigenvalue Test**			
Null (H_0) Hypothesis	Alternative Hypothesis	λ_{trace}	%5 Critical value	Null (H_0) Hypothesis	Alternative Hypothesis	λ_{max}	%5 Critical value
r=0*	r>0	49.996	35.192	r=0*	r=1	31.341	22.299
r≤1	r>1	18.655	20.261	r=1	r=2	14.845	15.892
r≤2	r>2	3.809	9.164	r=2	r=3	3.806	9.164
SOUTH AFRICA (with 6 lags)							
Trace Test				**Maximum Eigenvalue Test**			
Null (H_0) Hypothesis	Alternative Hypothesis	λ_{trace}	%5 Critical value	Null (H_0) Hypothesis	Alternative Hypothesis	λ_{max}	%5 Critical value
r=0*	r>0	62.406	35.192	r=0*	r=1	29.63173	22.299
r≤1*	r>1	32.774	20.261	r=1*	r=2	24.17656	15.892
r≤2	r>2	8.597	9.164	r=2	r=3	8.597814	9.164

Note:* suggests rejecting null hypothesis.

According to results in Table 2, both trace and maximum Eigen value tests suggest that there single eventual cointegration relationship between variables related with Brazil. For Turkey and South Africa, it could be said that there was at most two cointegration relationships. These results showed that the variables of fragile three countries act together in the long run period. Within this framework, the cointegration equations could be rewritten as below:

$Model_{Turkey}$

$$CDS_{TR} = 4.595944 + 0.046029BIR_{TR} + 0.154389FX_{TR} \qquad (4)$$

[-20.2098] [-4.58661] [-2.54685]

$Model_{Brazil}$

$$CDS_{BR} = 3.099183 + 0.069537BIR_{BR} + 0.518351FX_{BR} \qquad (5)$$

[-11.5710] [-3.51842] [-5.71149]

$Model_{SAfrica}$

$$CDS_{SA} = 2.160397 + 0.297605BIR_{SA} + 0.145274FX_{SA} \qquad (6)$$

[-1.96989] [-2.02940] [-2.54064]

Estimate of equations show that the impact of government bond interest rate and foreign exchange rate of USD on CDS fragile three countries is positive and statistically significant.

On the basis of the results of conducted analyses exhibited on Table 3 above, a positive and significant correlation was determined among CDS, interest rate and local currencies of F3 countries. A unit of increase in interest rate and currency in Turkey inc rease

CDS premium by 0.05 and 0.15 units, respectively. In Brazil case, it increased CDS premium by 0.07 and 0.52 units respectively; in South Africa case, it increased CDS premium by 0.30 and 0.15 units, respectively.

3.3. The Error Correction Model

Dynamic behaviour of cointegrated variables in the long-term equilibrium displays deviations in the short run. If the system returns to equilibrium in the long run, these deviations should be removed. To analyze this situation, the error correction model is applied to variables. The results of ECM are reported in Table 3.

Table 3: Results of Error Correction Model

	EC_{t-1}	ΔCDS_{t-1}	ΔBIR_{t-1}	ΔFX_{t-1}	K_{2008}	K_{2011}	K_{2014}	R^2	$\bar{R}^2$	F-Statistics
$Model_{Turkey}$	-0.627	0.202	-0.038	0.252	0.050	-0.001	-	0.45	0.19	1.696
	[-3.804]	[1.040]	[-1.767]	[0.951]	[1.917]	[-0.023]	-			
$Model_{Brazil}$	-0.741	0.410	-0.099	0.119	0.139	-	-0.080	0.56	0.24	1.763
	[-4.103]	[2.062]	[-3.684]	[0.531]	[3.801]	-	[-1.765]			
$Model_{SAfrica}$	-0.114	-0.125	-0.190	0.113	-0.149	0.047	-0.050	0.29	0.16	2.199
	[-3.394]	[-1.135]	[-3.954]	[2.378]	[-3.097]	[1.184]	[-1.157]			

Note: [ ] indicates t-statistics value.

According to the results of the error correction model, it shows that the deviations occurring in the short term in all three countries disappear in the long term and the series converges again to the long term equilibrium values. The difference between observed values and long-term equilibrium values of CDS figures is eliminated within 2 months for Turkey and Brazil, within 9 months for South Africa.

3.4. Todo Yamamoto (1995) Causality Test

The Toda-Yamamoto (1995) causality test (TY) was conducted in order to obtain robust results of the causality relationship between CDS, interest and exchange rate of F3 countries. In this method, the series can be included in the analysis without the need for knowledge such as stationary and cointegration, there by the loss of observations are shortened by this method (Gune s, et al. 2016).

Firstly, the optimum lag length (*k*) is determined by using VAR. The maximal order of integration (dmax) is added to kin the second stage. And then, the VAR model is estimated with the levels of series according to (*k+dmax*) lag length. As this stage, estimated VAR model is similar for the three countries as follows:

$$CDS_t = \alpha_0 + \sum_{i=1}^{k+d_{max}} \alpha_{1i} CDS_{t-i} + \sum_{i=1}^{k+d_{max}} \alpha_{2i} BIR_{t-i} + \sum_{i=1}^{k+d_{max}} \alpha_{3i} FX_{t-i} + \mu_t \quad (7)$$

$$BIR_t = \beta_0 + \sum_{i=1}^{k+d_{max}} \beta_{1i} BIR_{t-i} + \sum_{i=1}^{k+d_{max}} \beta_{2i} CDS_{t-i} + \sum_{i=1}^{k+d_{max}} \beta_{3i} FX_{t-i} + \mu_t \quad (8)$$

$$FX_t = \gamma_0 + \sum_{i=1}^{k+d_{max}} \gamma_{1i} FX_{t-i} + \sum_{i=1}^{k+d_{max}} \gamma_{2i} CDS_{t-i} + \sum_{i=1}^{k+d_{max}} \gamma_{2i} BIR_{t-i} + \mu_t \quad (9)$$

At the last stage, restrictions are applied on coefficients of d_{max} ; and significances of restrictions are tested by employing the MWALD test. The null hypothesis of test is "there is no causality".

In this analysis, *k* was determined according to sequential modified LR test statistic for each country (*k* is 12, 15, 6 for Turkey, Brazil and South Africa, respectively). There was no autocorrelation and heterogeneity in the VAR model. The maximal order of integration (d_{max}) is estimated at 1 because variables are *I(1)*; then regression models were estimated with $k+d_{max}$ lag length. Results of TY test are presented in Table 4.

Table 4: Results of Todo Yamamoto Causality Test

	Null Hypothesis	*Lag Length k=12,15,6 d_{max}=1*	*χ^2 Statistics*	*Probability*
Turkey	*CDS ⇏ BIR*	13	47,03***	0,00
	CDS ⇏ FX	13	25,77***	0,02
	BIR ⇏ CDS	13	35,70***	0,00
	BIR ⇏ FX	13	44,97***	0,00
	FX ⇏ CDS	13	21,85**	0,06
	FX ⇏ BIR	13	26,60***	0,01
Brazil	*CDS ⇏ BIR*	16	46,79***	0,00
	CDS ⇏ FX	16	24,81**	0,07
	BIR ⇏ CDS	16	25,23**	0,07
	BIR ⇏ FX	16	10,22	0,85
	FX ⇏ CDS	16	36,89***	0,00
	FX ⇏ BIR	16	50,87***	0,00
South Africa	*CDS ⇏ BIR*	7	6,90	0,44
	CDS ⇏ FX	7	6,69	0,46
	BIR ⇏ CDS	7	20,89***	0,00
	BIR ⇏ FX	7	33,09***	0,00
	FX ⇏ CDS	7	15,02**	0,04
	FX ⇏ BIR	7	7,95	0,34

Note: *** ,** denotes significance at the %1 and %5 level, respectively.

The results suggested bi-directional causality between the CDS and the exchange rate and the interest rate in Turkey and Brazil. However, for South Africa, the causality between the CDS and the exchange rate and the interest rate was unidirectional; the exchange rate and the interest rate were found to be cause of the CDS.

Obtained results are conforming to the majority of findings in the relevant literatures such as Yang et al. (2010), Özkaplan (2011), Koy (2014),Norden and Weber (2009), Sambalaibat (2014), Chan-Lau and Kim (2004), Zhang et al. (2009), Bekkour et al. (2015), O'Kane (2012). On the other hand, the study of Başarır and Keten (2016) finds no relationship between CDS and foreign currencies of 12 emerging countries including Turkey. Yang et al. (2010), reveal positive and negative correlations between CDS and foreign exchange for France and the U.S, respectively. Kar, Bayat and Kayhan (2016) report negative correlation between CDS and Euro/TL rate. This study included the most prominent three developing countries highly dependent on foreign funds, sensitive to fluctuations in CDS spreads and known as "fragile three" instead of sampling developed countries. In the meantime, new generation econometric methods were employed for an extensive analysis period in the light of recent investment banking agenda. Thus, it was considered that a certain contribution would be made to the relevant literature.

5. CONCLUSION

The primary common characteristic of these three countries was their need for external funding. Sensitivity of these countries towards external and internal economic developments and abundance of factors stimulating relevant risks have negative impact on their fragility. The main risk for foreign investors is the loss of their capital and/or expected return on their investment. There fore, investors consider risks based on indicators such as CDS premiums, indicator of country credibility, interest rates and local currencies differently from each other. From the point of emerging markets, the increasing country risk caused by adverse economic conditions would complicate to find external finance, which will cause the exchange rates to increase and the country to raise interest rates in order to attract foreign financing. The general expectation is that the higher the CDS premium, the higher the funding cost is (Eğilmez, 2013). Indeed, this status would differ with respect to the current political and economic conjuncture of individual countries.

In this paper, causality relationship among individual CDS, BIR and FX (domestic currency/USD) data from Brazil, South Africa and Turkey referred as "Fragile Three" was investigated through new generation econometric analysis methods for the period of 2007M2-2017M1. Findings could be classified in three main topics. According to the Kapetanios (2005) structural -fractural unit root test results, it was seen that country CDS, BIR and FX indicators are highly sensitive to financial crisis. Although fundamental causes of crises differ, country risk phenomenon is always adversely influenced by this circumstance. Moreover, developments threatening political and economic stability, for example, the military coup in Turkey, middle-income gap in South Africa, both unstable economic growth and low savings rates in F3 countries were also considered as a factor with negative influence on country risk, which could, in turn, have a negative impact on country credibility. Secondly, it was seen that CDS premium, interest rates and local currencies of F3 countries exhibited similar behavior on the long term; and that short term deviations returned to their long term equilibrium value.

F3 countries need to offer higher interest rate to attract greater foreign capital from the market under their current economic and political risks. According to positive relationship between BIR and CDS, the increase in interest rates will not provide the expected foreign fund inflow into these countries. Positive relationship between FX and CDS is found. Increasing risk associated with an economy is considered as the factor limiting inflowing of foreign funds and thus elevating currency rates. Cointegration coefficients obtained with the F3 countries were found to be statistically significant.

Third and finally, the results revealed bi-directional causality between the CDS and the FX and BIR in both Turkey and Brazil. However, for South Africa, the causality between the CDS and FX rate and BIR was found to be unidirectional whereas FX and BIR were found to be causes of the CDS. It could be suggested that the increase of BIR and FX would be resulted in adverse effects on macroeconomic indicators of F3 countries because of the pass through effect. As a result of this, the economic fragility and the risk premium of countries would be increased. The acquired results also showed that the increase in the CDS lead to an increase in the risk perception toward the relevant country and an outflow of foreign capital; and finally, it causes an increase in FX and BIR especially in Brazil and Turkey.

Our findings suggested that these variables of F3 countries were influenced substantially from each other. The necessary economic policies should be developed to ensure permanent stability with FX and BIR indicators of these countries. In order to attract foreign investments and to reduce the perception of risky countries, F3 countries should reduce their BIR gradually and at the same time to ensure stability with their FXs. Moreover, a strong central bank reserve is required for stability in respective countries' currencies. In order to ensure that F3 countries maintain their financial stability, certain economic, political and social reforms are required through minimizing country risks and decreasing dependency on foreign capital.

REFERENCES

Augustin P., Subrahmanyam M. G., Tang, D. Y., & Wang S. Q. (2016). Credit default swaps: Past, present, and future. *The Annual Review of Financial Economics*, 8(10): 1–10.22.

Bai, J. & Perron, P. (1998). Estimating and testing linear models with multiple structural changes. *Econometrica*, 66 (1): 47-78.

Başarır Ç. & Keten M. (2016). A Cointegration analysis between CDS premiums, stock indexes and exchange rates in Emerging countries. *MAE Univeristy Social Sciences Periodical*, 8(15): 369-380

Bekkour, L., Jin, X., Lehnert, T., Rasmouki, F. & Wolff, C. (2015). Euro at risk: The impact of member countries' credit risk on the stability of the common currency. *Journal of Empirical Finance*, 33: 67–83.

Bernanke, B. & Gertler, M. (1990). Financial fragility and economic performance. *The Quarterly Journal of Economics*, 105 (1): 87–114.

Bloomberg Statistical Database, www.bloomberg.com, [Accessed 2017]

Breuer A. & Sauter O. (2013). Calculating the unthinkable: Exchange rate effects of a credit event. *Applied Economics Quarterly*, *Berlin*, 58(1): 1-18.

Bozkurt, İ., (2015). Determination of the relationship between financial stability and CDS premiums by using fuzzy regression analysis: Turkey case. *Gümüşhane University, Electronic Periodical of Social Sciences*, 6(13): 64-80.

Capistrán, C. & Ramos-Francia, M. (2009). Inflation dynamics in Latin America. *Contemporary Economic Policy*, 27(3): 349-362.

Chan-Lau, J. & Kim Y. (2004). Equity prices, credit default swaps, and bond spreads In Emerging Markets. *IMF Working Paper No. 27*.

O'Kane, D. (2012). The link between Eurozone sovereign debt and CDS prices. *EDHEC-Risk Institute Report*

Duffee, D. (1999). Credit swap valuation. *Financial Analysist Journal*, 55: 73–87.

Eğilmez, M. (2013). Foreing exchange, interest, government bond, BIST, credit ranking, CDS briefly. *Kendime Yazılar*, http://www.mahfiegilmez.com/2013/07/kur-faiz-dibs-bist-reyting-cds-hepsi.html. [Accessed 15 February 2017].

ETF Trends (2017). Emerging market ETFs: Keep wath over the fragile three. https://www.etftrends.com/2015/03/emerging-market-etfs-keep-watch-over-fragile-three. [Accessed February 2017].

Flannery, M.J., Houston J.F. & Partnoy F. (2010). Credit default swap spreads as viable substitutes for credit ratings. *University of Pennsylvania Law Review*, 158: 2085.

Fontana, A. & Scheicher, M. (2010). An analysis of Euro Area sovereign CDS and their relation with government bonds. *European Central Bank Working Paper Series* – 1271.

Gonzalo, J. & Granger, C. (1995). Estimation of common long-memory components in cointegrated systems. *Journal of Business & Economic Statistics,* 13(1): 27-35.

Göçer, İ. & Akin, T. (2016). The effects of saving-Investment gap on economic growth in the Fragile Five: A new generation econometric analysis. *Ege Akademik Bakış*, 16(2):197.

Gujarati, D. N. & Porter, D. (2012). *Temel ekonometri*. Translated by: Şenesen, Ü., Şenesen, G. G., İstanbul, Literatür Press.

Gunes, S., Polat, F. & Akin, T. (2016). *Kalkınma bağlamında büyüme, yolsuzluk ve demokrasi ilişkis*i. Economic Development Social and Political Interactions, Ijopec Publication No: 25: 13-21, Turkey. ISBN: 978-0-9932118-5-0.

Hasbrouck, J. (1995). One security, many markets: determining the contributions to price discovery. *The Journal of Finance*, 50(4): 1175-1199.

Hatemi-J, A. & Roca, E. (2014). BRICs and PIGS in the presence of Uncle Sam and Big Brothers: Who drive who? evidence based on asymmetric causality tests. Available online: http://econpapers.repec.org/paper/griapaper/finance_3a201401.htm [Accessed February 2017].

Investing Statistical Database (2017), the relevant link: https://tr.investing.com/currencies/usd-try-chart [Accessed February 2017]

Johansen, S. & Juselius K. (1990). Maximum likelihood estimation and inference on cointegration—with applications to the demand for Money. *Oxford Bulletin of Economics and Statistics*, 52(2): 169-210.

Kapetanios, G. (2005). Unit-root testing against the alternative hypothesis of upto m structural breaks. *Journal of Time Series Analysis*, Vol.26 (1): 123–133.

Kar, M., Bayat, T. & Kayhan, S. (2016). Impacts of credit default swaps on volatility of the exchange rate in Turkey: The case of Euro. *International Journal of Financial Studies*, 4 (14): 1-18.

Kargi, B. (2014). Credit default swap (CDS) spreads: the analysis of time series for the integration with the interest rates and the growth in Turkish economy. *Montenegrin Journal of Economics*, 10(1), 59-66.

Koy, A. (2014). An emprical study on credit default swaps and on bonds. *İstanbul Ticaret University, Working Paper Series, Discussion Papers*, WPS NO/ 01 / 2014-07: 1-12.

Kumo, W.L. (2015). Inflation Targeting Monetary Policy, Inflation Volatility and Economic Growth in South Africa. *African Development Bank Group, Working Paper Series*, No. 216, January.

Landon, T. J. (2014). Fragile five is the latest club of emerging nations in turmoil. *New York Times*, http://www.nytimes.com/2014/01/29/business/international/fragile-five-is-the-latest-club-of-emerging-nations-in-turmoil, [Accessed February 2017].

Lee, J. & Strazicich, M.C. (2003). Minimum lagrange multiplier unit root test with two structural breaks. *The Review of Economics and Statistics*, 85 (4): 1082-1089.

Lumsdaine, R.L. & Papell, D.H. (1997). Multiple trend breaks and the unit root hypothesis. *The Review of Economics and Statistics*, 79: 212-218.

Mora, N. (2006). Sovereign credit ratings: Guilty beyond reasonable doubt? *Journal of Banking & Finance*, 30(7): 2041–2062.

Mora-Jensen, D. S. (2013). The relationship between the exchange rate and sovereign credit default swaps: An empirical analysis. Master Thesis, (May 27th, 2013), Copenhagen Business School.

Morgan Stanley Research Report (2013). FX Pulse. http://www.morganstanleyfa.com/public/projectfiles/dce4d168-15f9-4245-9605-e37e2caf114c.pdf [Accessed February 2017].

Murat, S., Şener, S. & Yılancı, V. (2013). Economic crises, natural disasters, terror activities and their impact on tourists vistiing Turkey? *Periodicle of Faculty of Economics*, 63(1): pp. 1-15.

Ng, S. & Perron, P. (2001). Lag length selection and the construction of unit root tests with good size and power. *Econometrica*, Vol.69: 1519-1554.

Norden, L. & Weber, M. (2009). The Co-movement of credit default swap, bond and stock markets: An empirical analysis. *European Financial Management*, 15(3): 529–562.

Özkaplan, D. (2011). Turkish credit default swaps and relationship with financial indicators. Graduate Study Thesis, İstanbul Bilgi University.

Perron, P. (1989). The great crash, the oil price shock, and the unit root hypothesis. *Econometrica*, 57(2): 1361-1401.

Perron, P. (1997). Further evidence on breaking trend functions in macroeconomic variables. *Journal of Econometric*, 80: 355-385.

Sambalaibat, B. (2014). Essays in financial economics: Currency risk and pricing Kernal volatility, CDS and sovereign bond market liquidity, CDS as sovereign debt collateral. Carnegie Mellon University, Doctorate Study Thesis.

Schwert, W. G. (1988). Tests for unit roots: A Monte Carlo investigation. *NBER Technical Working Paper Series*, No: 73.

Skinner, F. S. & Townend, T. G. (2002). An empirical analysis of credit default swaps. *International Review of Financial Analysis*, 11(3): 297-309.

Toda, H. Y. & Taku, Y. (1995). Statistical inference in Vector Autoregressions with possibly integrated processes. *Journal of Econometrics*, 66(1): 225-250.

Whetten, M., Adelson, M. & Bemmelen M. V. (2004). Credit default swap primer, nomura fixed income research. https://tr.scribd.com/document/27781334/Credit-Default-Swap, (Accessed in 2017).

Yang, L., B. Morley, & J. Hudson (2010). A study of the causal relationships between sovereign CDS spreads, Risk-Free interest rates and exchange Rates. Proceedings of the 8th INFINITI Conference on International Finance, Dublin, Ireland.

Zhang, G., Yau J. Hung-Gay, F. (2009). Do credit default swaps predict currency vaules? *Applied Financial Economics*: 1-44.

Zivot, E. & Andrews, D. (1992). Further evidence on the great crash, the oil-price shock and the unit-root hypothesis. *Journal of Business Economic Statistics*, 10(3):.251-270.